ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

COMPUTER SCIENCE & ENGINEERING

For

5 YEAR INTEGRATED DUAL DEGREE PROGRAM (I.D.P)

Leading to

(B.TECH. & M.Tech. / MBA)

(Applicable for the batches admitted from 2017-2018)

JNTUH COLLEGE OF ENGINEERING HYDERABAD

(Autonomous)

Kukatpally, Hyderabad – 500085

Telangana, India

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Kukatpally, Hyderabad-500 085

ACADEMIC REGULATIONS 2017
for CBCS Based 5 YEAR INTEGRATED DUAL DEGREE PROGRAM (B.Tech. & M.Tech/MBA)

(Effective for the students admitted into I year from the
Academic Year **2017-18** and onwards)

1.0   5 Year Integrated Dual Degree Program in Engineering & Technology (IDP)

JNTUH offers 5 Year (10 Semesters) Integrated Dual Degree (IDP) Programme, under
Choice Based Credit System (CBCS) at its Constituent Autonomous College - JNTUH
College of Engineering Hyderabad, with effect from the Academic Year 2017 - 18 onwards,
in the following Branches of Engineering

S.No.	UG Program	PG Program	
		M.Tech. (Specialization)	**MBA (Specialization)***
1)	B.Tech. in Electronics & Communication Engineering	M.Tech. (Communications & Signal Processing)	MBA (Human Resources / Finance/ Marketing/ Systems)
2)	B.Tech. in Computer Science & Engineering	M.Tech. (Computer Science)	MBA (Human Resources / Finance/ Marketing/ Systems)
3)	B.Tech. in Electrical & Electronics Engineering	M.Tech. (Power Electronics)	MBA (Human Resources / Finance/ Marketing/ Systems)
4)	B.Tech. in Mechanical Engineering	M.Tech. (Manufacturing Systems)	MBA (Human Resources / Finance/ Marketing/ Systems)
5)	B.Tech. in Civil Engineering	M.Tech. (Structural Engineering)	MBA (Human Resources / Finance/ Marketing/ Systems)

(* A Minimum of 15 students is necessary for any specialization to be offered.)
A student would be conferred the B.Tech Degree and M.Tech or MBA Degree in this IDP, after
the successful completion of all the requirements for th 10 semesters of study and earning the
appropriate credits.

2.0 Eligibility for Admission

2.1   Admission to the IDP shall be made either on the basis of the merit rank obtained by the
qualifying candidate at an Entrance Test conducted by the Telangana State Government
(EAMCET), OR the University, OR on the basis of any other order of merit approved by the
University, subject to reservations as prescribed by the Government from time to time.

2.2   The medium of instructions for the entire IDP in E&T   will   be ENGLISH only.

2.3   Students opting for the 5 year integrated IDP must specify their choice for M.Tech. (with in
the specializations given above) or MBA as the case may be, after choosing the appropriate
Branch of Engineering, at the time of Admissions only. Option thus exercised is final, and
cannot be changed during the study period.

2.4   Students opting for 5 years integrated IDP have to study for the specified period, to earn the relevant credits for the award of both the B.Tech. and M.Tech. / MBA Degrees, and they will not be permitted to have a choice for B.Tech. Degree alone after 4 years study.

3.0 IDP Structure

3.1   The IDP Programmes of JNTUH-CEH are of Semester Pattern, with 10 Semesters constituting 5 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 22 Weeks duration (inclusive of Examinations), with a minimum of 90 Instructional Days per Semester.

3.2   UGC/ AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations, which are as listed below.

3.3   Semester Scheme:
Each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC.

3.4   Credit Courses:
All Subjects/ Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practicals Periods : Credits) Structure, based on the following general pattern ..

•   One Credit - for One hour/ Week/ Semester for Theory/ Lecture (L) Courses; and,

•   One Credit - for Two hours/ Week/ Semester for Laboratory/ Practical (P) Courses or Tutorials (T).
Other student activities like NCC, NSS, NSO, Study Tour, Guest Lecture etc., and identified Mandatory Courses will not carry Credits.

3.5   Subject/ Course Classification:
All Subjects/ Courses offered for the UGP are broadly classified as : (a) Foundation Courses (FnC), (b) Core Courses (CoC), and (c) Elective Courses (EℓC).

-    Foundation Courses (FnC) are further categorized as : (i) HS (Humanities and Social Sciences), (ii) BS (Basic Sciences), and (iii) ES (Engineering Sciences);

-    Core Courses (CoC) and Elective Courses (EℓC) are categorized as PS (Professional Subjects), which are further subdivided as – (i) PC (Professional/ Departmental Core) Subjects, (ii) PE (Professional/ Departmental Electives) , (iii) OE (Open Electives); and (iv) Project Works (PW);

-    Minor Courses (1 or 2 Credit Courses, belonging to HS/ BS/ ES/ PC as per relevance); and
-    Mandatory Courses (MC - non-credit oriented).

3.6   Course Nomenclature:
The Curriculum Nomenclature or Course-Structure Grouping for the each of the IDP E&T is as listed below :

S.No.	UG/PG Program	Group/Category/Component	Description
1)	UG	BS – Basic Sciences	Includes - Mathematics, Physics and Chemistry Subjects
2)	UG	ES - Engineering Arts and Sciences	Include fundamental engineering subjects

3)	UG	HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management
4)	UG	PC – Professional Core	Includes core subjects related to the parent discipline, department or branch of engineering
5)	UG	PE – Professional Electives	Includes Elective subjects related to the parent discipline, department or branch of engineering
6)	UG	OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline, department or branch of engineering
7)	UG	Project	B.Tech. Project or UG Project or UG Major Project
8)	UG	Industrial Training/ Mini Project	Industrial Training/ Internship/ UG Mini Project/ Mini Project
9)	PG	PGC	PG Core Subjects related to the M.Tech. Specialization / MBA
10)	PG	PGE	PG Elective Subjects related to the M.Tech. Specialization / MBA
11)	PG	Project	PG Project M.Tech. / MBA
12)	PG	Seminar	Seminar / Colloquium at PG level, in M.Tech. / MBA
13)	PG	Comprehensive Viva	Comprehensive Viva based on all Subjects
		Total	**254**

4.0   Course Work

4.1   A student, after securing admission, shall pursue the IDP (B.Tech+M.Tech or MBA) in a minimum period of 5 Academic Years, and a maximum period of 10 Academic Years (starting from the Date of Commencement of I Year).

The entire course of study is of five academic years, comprising of 10 semesters. **All the I, II, III, IV and V years are on two-semester pattern.**

4.2   Each student shall Register for and Secure the specified number of Credits required for the completion of the IDP and Award of the B.Tech+M.Tech / MBA. Degree in respective Branch of Engineering.

4.3   The student must secure a total of 260 credits for the IDP - 174 credits for the B.Tech. Degree Program, plus 86 credits for the M.Tech./ MBA Program.

4.4   The course work and curriculum for first 3 years (6 Semesters) would be same as that the Regular B.Tech (4 year) in the relevant branch of Engineering.

5.0   Course Registration

5.1   A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him about the IDP, its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.

5.2   Academic Section of the College invites 'Registration Forms' from students before the beginning of the Semester, through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examiantions) of the 'PRECEDING SEMESTER'.

5.3   A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his Faculty Advisor, which should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).

5.4   A Student may be permitted to Register for his Subjects/ Course of CHOICE upto III year II semester with a typical total of 24 Credits per Semester (Minimum being 20 C and Maximum being 28 C, permitted deviation being ± 17%), based on his PROGRESS and SGPA/ CGPA, and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses, in the Department Course Structure and Syllabus contents. However, a MINIMUM of 20 Credits per Semester must be registered to ensure the 'STUDENTSHIP' in any Semester.

A Student may be permitted to Register for his Subjects/ Course of CHOICE in IV year I semester and V year I semester with a typical total of 30 Credits per Semester (Minimum being 26 C and Maximum being 34 C, permitted deviation being ± 14%), based on his PROGRESS and SGPA/ CGPA, and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses, in the Department Course Structure and Syllabus contents. However, a MINIMUM of 26 Credits per Semester must be registered to ensure the 'STUDENTSHIP' in any Semester.

A Student may be permitted to Register for his Subjects/ Course of CHOICE in IV year II semester with a typical total of 28 Credits per Semester (Minimum being 24 C and Maximum being 32 C, permitted deviation being ± 14%), based on his PROGRESS and SGPA/ CGPA, and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses, in the Department Course Structure and Syllabus contents. However, a MINIMUM of 24 Credits per Semester must be registered to ensure the 'STUDENTSHIP' in any Semester.

A Student must Register for his Subjects/ Course in V year II semester with a total of 22 Credits per Semester.

5.5   Open Electives: Students are to register One Open Elective (OE-I) during III Year I Semester, one (OE-II) during III Year II Semester , from the list of Open Electives given. However, Students can not opt for an Open Elective Subject offered by their own (parent) Department, if it is already listed under any category of the Subjects offered by parent Department in any Semester.

5.6   There shall be an Industry oriented Mini-Project, in collaboration with an Industry of the relevant specialization, to be registered immediately after III year II semester examinations, and taken up during the summer vacation for about eight weeks duration.

5.7   Each Student shall Register the UG Project Work during the IV Year II Semester, as per the instructions of the Project Guide/ Project Supervisor assigned by the Head of Department.

5.8   The PG Project shall start immediately after the completion of the IV Year II Semester, and shall continue through V Year I and II Semesters as per the instructions of the Project Guide/ Project Supervisor assigned by the Head of Department and registered after approval from PRC.

5.9   Choice for 'additional Subjects/ Courses' to reach the Maximum Permissible Limit of 28/32/34 Credits (above the typical 24/28/30 Credit norm) must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/ Counselor.

5.10   If the Student submits ambiguous choices or multiple options or erroneous entries - during ON-LINE Registration for the Subject(s) / Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, only the first mentioned Subject/ Course in that Category will be taken into consideration.

5.11   Subject/ Course Options exercised through ON-LINE Registration are final and CAN NOT be changed, and CAN NOT be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have

alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5.12   Cancelation of Registration of Subjects/ Courses may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor (subject to retaining a minimum of required credits) 'within 15 Days of Time' from the beginning of the current Semester.

6.0   Subjects/ Courses to be offered

6.1   A Subject/ Course may be offered to the Students, ONLY IF a Minimum of 1/3 of the class Strength opt for the same. The Maximum Strength of a class is limited to 80 (60 + 1/3 of the class Strength).

6.2   More than ONE TEACHER may offer the SAME SUBJECT (Lab./ Practicals may be included with the corresponding Theory Subject in the same Semester) in any Semester. However, selection choice for students will be based on - 'FIRST COME FIRST SERVE Basis and CGPA Criterion' (ie., the first focus shall be on early ON-LINE ENTRY from the student for Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).

6.3   If more entries for Registration of a Subject come into picture, then the concerned Head of Department shall take necessary action, whether to offer such a Subject/ Course for TWO (or multiple) SECTIONS or NOT .

6.4   In case of options coming from Students of other Departments/ Branches/ Disciplines (not considering OPEN ELECTIVES), PRIORITY shall be given to the student of the 'Parent Department' first.

7.0   Attendance Requirements

7.1   A student shall be eligible to appear for the End Semester Examinations upto III year II semester, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/ Courses (excluding Mandatory or Non-Credit Courses) for that Semester.

A student shall be eligible to appear for the End Semester Examinations in IV and V year , I Semester and II Semester, if he acquires a minimum of 75% of attendance in that subject.

7.2   Condoning of shortage of attendance is up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence.

7.3   A stipulated fee shall be payable towards condoning of shortage of attendance.

7.4   Shortage of Attendance below 65% shall in NO case be condoned.

7.5   Students, whose shortage of attendance is not condoned in any Semester, are not eligible to take their End Examinations of that Semester; they get detained and their registration for that Semester shall stand cancelled. They will not be promoted to the next Semester. They may seek re-registration for all those Subjects registered in that Semester in which he got detained, by seeking re-admission for that Semester as and when offered; in case if there are any Professional Electives and/ or Open Electives, the same may also be re-registered if offered, however, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the SAME set of Elective Subjects offered under that category.

7.6   Students from IV year I semester onwards, whose shortage of attendance is not condoned in any Subjecr, are not eligible to take their End Examinations of that Subject,   they get detained and their registration for that Subject shall stand cancelled. They may seek re-registration for all those Subjects registered in which they got detained, by seeking re-regiter for that Subjects as and when offered.

8.0   Academic Requirements
The following Academic Requirements have to be satisfied, in addition to the Attendance Requirements mentioned in Item No.**7.**

8.1 (a) **UG Part**

A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Subject/ Course, if he secures not less than 35% marks (25 out of 70 marks) in the End Semester Examination, and a minimum of   40% of marks in the sum total   of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Subject/ Course.

A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to - Industry oriented Mini-Project/ Seminar, if he secures not less than 40% of the total marks (40 marks) to be awarded for each.   The student would be treated as failed,   if he - (i) does not submit a report on his Industry oriented Mini-Project, or does not make a presentation of the same before the Evaluation Committee as per schedule, or (ii) does not present the Seminar as required in the IV year II Semester, or (iii) secures less than 40% of marks (40 marks) in Industry oriented Mini-Project/ Seminar evaluations.

He may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent Semester, as and when it is scheduled.

(b) **PG Part**
A Student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Subject/ Course, if he secures not less than 40% Marks (28 out of 70 Marks) in the End Semester Examination, and a minimum of   50% of Marks in the sum total   of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing B Grade or above in that Subject.

A Student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to - Seminar, and Comprehensive Viva-voce, if he secures not less than 50% of the total Marks to be awarded for each.   The Student would be treated as failed, if he -   (i) does not attend the Comprehensive Viva-voce as per the schedule given, or (ii) does not present the Seminar as required, or (ii) secures less than 50% of Marks (< 50 Marks) in ‒Seminar/ Comprehensive Viva-voce evaluations.
He may reappear for comprehensive viva where it is scheduled again; For seminar, he has to reappear in the next subsequent Semesters, as and when scheduled.

8.2   A Student will not be promoted from I Year to II Year, unless he fulfils the Attendance and Academic Requirements and secures a total of 24 Credits out of 48 Credits   i.e. 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

8.3   A Student will not be promoted from II Year to III Year, unless he fulfils the Attendance and Academic Requirements and secures a total of 58 Credits out of 96 Credits i.e. 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

8.4 A Student will not be promoted from III Year to IV Year, unless he fulfils the Attendance and Academic Requirements and secures a total of 86 Credits out of 144 Credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

A student shall be promoted from IV Year to V Year, if the student completes the UG Project satisfactorily and earns the prescribed number of credits for UG Project by the end of IV Year II Semester.

8.5 A Student shall - register for all Subjects covering 254 Credits as specified and listed (with the relevant Course/ Subject Classifications as mentioned) in the Course Structure, put up all the Attendance and Academic requirements for 254 Credits securing a minimum of P / B Grade (Pass Grade) or above in each Subject, and 'earn ALL 254 Credits securing SGPA $\geq$ 5.0 / 6.0 (in each Semester), and CGPA (at the end of each successive Semester) $\geq$ 5.0/ 6.0, to successfully complete the UGP and PGP.

8.6 If a Student registers for some more 'extra Subjects' (in the parent Department or other Departments/Branches of Engg.) other than those listed Subjects totaling to 254 Credits as specified in the Course Structure of his Department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 254 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra Subjects' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in Items 7 and 8.1 – 8.4 above.

8.7 Students who fail to earn 254 Credits as per the Course Structure, and as indicated above, within 10 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in IDP Programme and their admissions shall stand cancelled.

8.8 When a Student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester, as and when offered, with the Academic Regulations of the Batch into which he gets readmitted. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire Semester in which he got detained.

8.9 When a Student is detained due to lack of Credits in any year, he may be readmitted in the next year, after fulfilment of the Academic Requirements, with the Academic Regulations of the Batch into which he gets readmitted.

8.10 A student eligible to appear in the End Semester Examination in any Subject/ Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that Subject/ Course at the supplementary examination / SEE as and when conducted. In such cases, his Internal Marks assessed earlier for that Subject/ Course will be carried over, and added to the Marks to be obtained in the supplementary examination/SEE, for evaluating his performance in that Subject.

9.0   Evaluation - Distribution and Weightage of Marks

(a) UG Part

9.1 The performance of a student in each Semester shall be evaluated Subject-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory or Practicals or Seminar or Drawing/Design or Industry oriented Mini-Project or Minor Course, etc; For all Subjects/ Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE. However, the UG Project Work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on 30% CIE (Continuous Internal Evaluation) and 70% SEE (Semester End Examination), and a Letter Grade corresponding to the % marks obtained shall be given.

9.2 a) For Theory Subjects (inclusive of Minor Courses), during the Semester, there shall be 2 mid-term examinations for 25 marks each. Each mid-term examination consists of one objective paper for 10 marks, plus one subjective paper for 15 marks, with a duration of 120 minutes (20 minutes for objective and 100 minutes for subjective papers). Further, there will be an allocation of 5 marks for Assignment. Objective paper may be set with multiple choice questions, True/ False, fill-in the blanks, matching type questions, etc. Subjective paper shall contain 5 questions, out of which the Student has to answer 3 questions, each for 5 marks.

   b) The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

   c) First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second mid-term examinations. The Assignments shall be as specified by the concerned subject teacher.

   d) The first mid-term examination Marks and first Assignment Marks shall make one set of CIE Marks , and the second mid-term examination Marks and second Assignment Marks shall make second set of CIE Marks; and the better of these two sets of marks shall be taken as the final marks secured by the Student towards Continuous Internal Evaluation in that Theory Subject.

9.3 For Practical Subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks, and 70 marks are assigned for Lab./Practical End Semester Examination (SEE). Out of the 30 marks for internals, day-to-day work in the laboratory shall be evaluated for 20 marks; and for the remaining 10 marks - two internal practical tests (each of 10 marks) shall be conducted by the concerned laboratory teacher and the better of these two tests is taken into account. The SEE for Practicals shall be conducted at the end of the Semester by Two Examiners appointed by Head of the Department.

9.4 For the Subjects having Design and/or Drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 30 marks for CIE (20 marks for day-to-day work, and 10 marks for internal tests) and 70 marks for SEE. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

9.5 The Industry oriented Mini-Project shall be submitted in a Report form, and a presentation of the same shall be made before a Committee, which evaluates it for 100 marks. The Committee shall consist of Head of the Department, the supervisor of Mini-Project, and a Senior Faculty Member of the Department. There shall be no internal marks for Industry oriented Mini-Project. The Mini-Project shall be evaluated in the IV Year I Semester.

9.6 Out of a total 200 marks allotted for the Project Work, 60 marks shall be for CIE (Continuous Internal Evaluation and 140 marks for the SEE (End Semester Viva-voce Examination). The Project Viva-voce shall be conducted by a Committee comprising of an External Examiner, Head of the Department, Senior faculty and Project Supervisor. Out of 60 marks allocated for CIE, 30 marks shall be awarded by the Project Supervisor (based on the continuous evaluation of student's performance throughout the Project Work period), and the other 30 marks shall be awarded by a Departmental Committee consisting of Head of the Department and Project Supervisor, based on the work carried out and the presentation made by the Student at the time of Viva-voce Examination.

9.7 For NCC/ NSS/ NSO types of Courses, and/or any other Mandatory Non-Credit Course offered in a Semester, a 'Satisfactory Participation Certificate' shall be issued to the Student from the concerned authorities, only after securing $\geq$ 65% attendance in such a Course. No marks or Letter Grade shall be allotted for these activities.

(b) PG Part (M.Tech.)

9.8   The performance of a Student in each Semester shall be evaluated Subject-wise (irrespective of Credits assigned) with a maximum of 100 Marks for Theory or Practicals or Seminar or Drawing/Design or Comprehensive Viva-voce etc;   These evaluations shall be based on 30% CIE (Continuous Internal Evaluation) and 70% SEE (Semester End Examination), and a Letter Grade corresponding to the % Marks obtained shall be given.

   i)   For Theory Subjects, CIE Marks shall comprise of - Mid-Term Examination Marks (for 25 Marks), and Assignment Marks (for 5 Marks).

   ii)   During the Semester, there shall be 2 Mid-Term examinations. Each Mid-Term examination shall be for 25 Marks (120 minutes duration). The better performance out of these two Mid-Term Examinations shall be considered for the award of 25 Marks.

9.9   For Practical Subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 Internal Marks, and 70 Marks are assigned for Lab./Practicals End Semester Examination (SEE). Out of the 30 Marks for Internals, day-to-day work assessment in the laboratory shall be evaluated for 20 Marks; and the performance in an internal Lab./Practical Test shall be evaluated for 10 marks. The SEE for Lab./ Practicals shall   be conducted at the end of the Semester by the concerned Laboratory Teacher and another faculty member of the same Department as assigned by the Head of the Department.

9.10   There shall be a Seminar Presentation in V Year I Semester. For the Seminar, the Student shall collect the information on a specialized topic,   prepare a Technical Report and submit to the Department at the time of Seminar Presentation. The Seminar Presentation (along with the Technical Report) shall be evaluated by Two Faculty Members assigned by Head of the Department,   for 100 Marks.   There shall be no SEE or External Examination for Seminar.

9.11   Each Student shall appear for a Comprehensive Viva-Voce at the end of the V Year II Semester. The Comprehensive Viva-Voce shall be conducted by a Committee, consisting of three senior faculty members of Department nominated by the Head of the Department, and the performance evaluation shall be for 100 Marks. There are no Internal Marks for the Comprehensive Viva-voce.

9.12 i)   The PGP Project shall start immediately after the completion of the IV Year II Semester, and shall continue through V Year I and II Semesters after approval of PRC. The Student shall carry out the literature survey, select an appropriate topic and submit a Project Proposal within 6 weeks (immediately after his IV Year II Semester End Examinations), for approval by the Project Review Committee (PRC). The PRC shall be constituted by the Head of Department, and shall consist of the Head of Department, Project Supervisor, and a Senior Faculty Member of the Department. The Student shall present his Project Work Proposal to the PRC (PRC-I Presentation), on whose approval he can 'REGISTER for the PG Project'. After Registration, the Student shall carry out his work, and continually submit 'a fortnightly progress report' to his Supervisor throughout the Project period. The PRC will monitor the progress of the Project Work and review, through PRC-II and PRC-III Presentations – one at the end of the V Year I Semester, and one before the submission of M.Tech. Project Work Report/ Dissertation.

   ii)   After PRC-III presentation, the PRC shall evaluate the entire performance of the Student and declare the Project Report as 'Satisfactory' or 'Unsatisfactory'. Every Project Work Report/ Dissertation (that has been declared 'satisfactory') shall undergo 'Plagiarism Check' as per the University/ College norms to ensure content plagiarism below a specified level of 30%, and to become acceptable for submission. In case of

unacceptable plagiarism levels, the student shall resubmit the Project Work Report, after carrying out the necessary modifications/ additions to his Project Work/ Report as per his Supervisor's advice, within the specified time, as suggested by the PRC.

iii) If any Student could not be present for PRC-II at the scheduled time (after approval and registration of his Project Work at PRC-I), his submission and presentation at the PRC-III time (or at any other PRC specified dates) may be treated as PRC-II peformance evaluation, and delayed PRC-III dates for him may be considered as per PRC recommendations. Any Student is allowed to submit his M.Tech. Project Dissertation 'only after completion of 40 weeks from the date of approval/registration' of his Project, and after obtaining all approvals from the PRC.

iv) A total of 200 Marks are allotted for the M.Tech. Project Work, (out of which   100 Marks are allotted for internal evaluation and 100 Marks for external evaluation). For internal Evaluation of 100 marks, Project Supervisor shall evaluate for 60 marks based on the continuous Internal Evaluation(CIE) of the student's performance and combined PRC-I, II & III performance evaluation will be for 40 marks (to be awarded by PRC, as SEE).

9.13 i) The Student shall be allowed to submit his Project Dissertation, only on the successful completion of all the prescribed PG Subjects (Theory and Labs.), Seminar, Comprehensive Viva-voce etc. (securing B Grade or above), and after obtaining all approvals from PRC. In such cases, the M.Tech. Dissertations will be sent to an External Examiner nominated by the Principal of the College, on whose 'approval', the Student can appear for the M.Tech. Project Viva-voce Examination, which shall be conducted by a Board, consisting of the PG Project Supervisor, Head of the Department, and the External Examiner who adjudicate the M.Tech. Project Work and Dissertation. The Board shall jointly declare the Project Work Performance as 'satisfactory', or 'unsatisfactory'; and in successful cases, the External Examiner shall evaluate the Student's Project Work presentation and performance for 100 Marks (SEE).

ii) If the adjudication report of the External Examiner is 'not favourable' , then the Student shall revise and resubmit his Dissertation after one Semester, or as per the time specified by the External Examiner and/ or the PRC. If the resubmitted report is again evaluated by the External Examiner as 'not favourable', then that Dissertation will be summarily rejected. Subsequent actions for such Dissertations may be considered, only on the specific recommendations of the External Examiner and/ or PRC.

iii) In cases, where the Board declared the Project Work Performance as 'unsatisfactory', the Student is deemed to have failed in the Project Viva-voce Examination, and he has to reappear for the Viva-voce Examination as per the Board recommendations. If he fails in the second Viva-voce Examination also, he will not be considered eligible for the Award of the Degree, unless he is asked to revise and resubmit his Project Work by the Board within a specified time period (within 5 years from the date of commencement of his I Year I Semester).

(c) PG Part (MBA)

10.1   Theory Subjects are evaluated for 100 marks, and Practicals / Lab. Subjects are also evaluated for 100 marks.

10.2   PG Summer Internship, Seminar and Comprehensive Viva-voce shall be evaluated for100 marks each.

10.3.   There shall be a PG Summer Internship, preferably in an industry, to be taken up during the vacation, immediately after the IV year II Semester End Examinations. The Internship Activity shall be submitted in a Report form, and the student shall also deliver a Seminar (based on the PG Summer Internship)   before the MBA Project Evaluation Committee (PEC); both the Report and the Seminar shall be evaluated for 100 marks each by the PEC, at the beginning of the V Year I Semester. The PEC shall be constituted by the Head of Dept. or

Principal/Director of the College/School, and shall consist of the Head of the Department, the Supervisor of PG Summer Internship Program/Seminar/PG Project and a Senior Faculty Member of the Department. There shall be no internal marks for this PG Summer Internship Program.

10.4   For theory subjects, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination. For the award of the 30 Internal (sessional) marks for theory subjects, there shall be 2 internal examinations during the Semester, one at the middle of the Semester and the other immediately after the completion of instructions; each of which shall be evaluated for 25 marks, and the **better** of these two internals shall be considered for awarding the 25 sessional marks. The remaining 5 sessional marks, will be awarded based on the student's performance in the Assignments.

10.5 i) Every PGP Student shall be required to execute his MBA Project, under the guidance of the Supervisor assigned to him by the Head of Department. The PGP Project shall start immediately after the completion of the V Year I Semester, and shall continue through V Year II Semesters. The Student shall carry out the literature survey, select an appropriate topic and submit a Project Proposal within 6 weeks (immediately after his V Year I Semester End Examinations), for approval by the Project Review Committee (PRC). The PRC shall be constituted by the Head of Department, and shall consist of the Head of Department, Project Supervisor, and a Senior Faculty Member of the Department. The Student shall present his Project Work Proposal to the PRC (PRC-I Presentation), on whose approval he can 'REGISTER for the PG Project'. Every Student must compulsorily register for his MBA Project Work, within the 6 weeks of time-frame as specified above. After Registration, the Student shall carry out his work, and continually submit 'a fortnightly progress report' to his Supervisor throughout the Project period. The PRC will monitor the progress of the Project Work and review, through PRC-II and PRC-III Presentations – one at the end of the V Year II Semester, and one before the submission of MBA Project Work Report/ Dissertation.

   ii) After PRC-III presentation, the PRC shall evaluate the entire performance of the Student and declare the Project Report as 'Satisfactory' or 'Unsatisfactory'. Every Project Work Report/ Dissertation (that has been declared 'satisfactory') shall undergo 'Plagiarism Check' as per the University/ College norms to ensure content plagiarism below a specified level of 30%, and to become acceptable for submission. In case of unacceptable plagiarism levels, the student shall resubmit the Project Work Report, after carrying out the necessary modifications/ additions to his Project Work/ Report as per his Supervisor's advice, within the specified time, as suggested by the PRC.

  iii) If any Student could not be present for PRC-II at the scheduled time (after approval and registration of his Project Work at PRC-I), his submission and presentation at the PRC-III time (or at any other PRC specified dates) may be treated as PRC-II peformance evaluation, and delayed PRC-III dates for him may be considered as per PRC recommendations. Any Student is allowed to submit his MBA Project Dissertation 'only after completion of **24 weeks** from the date of approval/registration' of his Project, and after obtaining all approvals from the PRC.

  iv)   A total of 200 Marks are allotted for the MBA Project Work, (out of which 100 Marks are allotted for internal evaluation and 100 Marks for external evaluation). For internal Evaluation of 100 marks, Project Supervisor shall evaluate for 60 marks based on the continuous Internal Evaluation(CIE) of the student's performance and combined PRC-I, II & III performance evaluation will be for 40 marks (to be awarded by PRC, as SEE).

10.6 i) The Student shall be allowed to submit his Project Dissertation, only on the successful completion of all the prescribed PG Subjects (Theory and Labs.), Seminar, Comprehensive Viva-voce etc. (securing B Grade or above), and after obtaining all approvals from PRC. In such cases, the MBA. Dissertations will be sent to an External Examiner nominated by the Principal of the College, on whose 'approval', the Student can appear for the MBA. Project Viva-voce Examination, which shall be conducted by a Board, consisting of the PG Project Supervisor, Head of the

Department, and the External Examiner who adjudicated the MBA Project Work and Dissertation. The Board shall jointly declare the Project Work Performance as 'satisfactory', or 'unsatisfactory'; and in successful cases, the External Examiner shall evaluate the Student's Project Work presentation and performance for 100 Marks (SEE).

ii) If the adjudication report of the External Examiner is 'not favourable' , then the Student shall revise and resubmit his Dissertation after one Semester, or as per the time specified by the External Examiner and/ or the PRC. If the resubmitted report is again evaluated by the External Examiner as 'not favourable', then that Dissertation will be summarily rejected. Subsequent actions for such Dissertations may be considered, only on the specific recommendations of the External Examiner and/ or PRC.

iii) In cases, where the Board declared the Project Work Performance as 'unsatisfactory', the Student is deemed to have failed in the Project Viva-voce Examination, and he has to reappear for the Viva-voce Examination as per the Board recommendations. If he fails in the second Viva-voce Examination also, he will not be considered eligible for the Award of the Degree, unless he is asked to revise and resubmit his Project Work by the Board within a specified time period (within 5 years from the date of commencement of his I Year I Semester).

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10.7 There shall be a Comprehensive Viva at the end of the V year II Semester, for the award of 100 marks. The Comprehensive Viva-Voce shall be conducted by the PRC, with the addition of one more Senior Faculty Member of the Department/School. The Comprehensive Viva is aimed to assess the student's understanding in various subjects studied during the PG part of Dual Degree Program. There are no internal marks for the Comprehensive Viva.

11.0 Grading Procedure

11.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 9 above, and a corresponding Letter Grade shall be given.

11.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed …

(a) For UG

% of Marks Secured in a Subject / Course	Letter Grade As per UGC Guidelines	Grade Points
More than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B+ (Good)	7
50 and not less than 60%	B (Average)	6
40 and not less than 50%	C (Pass)	5
Below 40%	F (Fail)	0
Absent	Ab	0

(b) For PG

% of Marks Secured in a Subject / Course	Letter Grade As per UGC Guidelines	Grade Points
80% and above ($\geq$ 80% , $\leq$ 100%)	O (Outstanding)	10
Below 80% but not less than 70% ($\geq$ 70% , < 80%)	A^+ (Excellent)	9
Below 70% but not less than 60% ($\geq$ 60% , < 70%)	A (Very Good)	8
Below 60% but not less than 55% ($\geq$ 55% , < 60%)	B^+ (Good)	7
Below 55% but not less than 50% ($\geq$ 50% , < 55%)	B (above Average)	6
Below 50% (< 50%)	F (FAIL)	0
Absent	Ab	0

11.3   A student obtaining F Grade in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the End Semester Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

11.4   A Letter Grade does not imply any specific % of Marks.

11.5   In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'. However, he has to repeat all the Subjects/ Courses pertaining to that Semester, when he is detained (as listed in Items 8.8- 8.9).

11.6   A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ Course.
Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

11.7   The Student passes the Subject/ Course only when he gets GP $\geq$ 5 (for UG) / 6 (for PG)

11.8   The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$$\text{SGPA} = \{ \textstyle\sum_{i=1}^{N} C_i\, G_i \} / \{ \sum_{i=1}^{N} C_i \} \; \dots \; \text{For each Semester,}$$

where 'i'   is the Subject indicator index (takes into account all Subjects in a Semester),   'N' is the no. of Subjects 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department),   is the no. of Credits allotted to the ith Subject, and   represents the Grade Points (GP) corresponding to the Letter Grade awarded for that ith Subject.

11.9   The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

$$\text{CGPA} = \{ \textstyle\sum_{j=1}^{M} C_j\, G_j \} / \{ \sum_{j=1}^{M} C_j \} \; \dots \; \text{for all S Semesters registered}$$
$$\text{(ie., upto and inclusive of S Semesters, S} \geq 2 \text{),}$$

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards upto and inclusive of the Semester S (obviously M > N), 'j'   is the Subject indicator index (takes into account all Subjects from 1 to S Semesters),   is the no. of Credits allotted to the jth Subject, and   represents the   Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

11.10   For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

11.11   For Calculations listed in Item 11.6 – 11.10, performance in failed Subjects/ Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/ Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

11.12   Passing Standards:

i)   A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA $\geq$ 5.00/ 6.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UGP, only when gets a CGPA $\geq$ 5.00/ 6.00; subject to the condition that he secures a GP $\geq$ 5 (for UG) / 6 (for PG) in every registered Subject/ Course in each Semester (during the entire UGP/PGP) for the Degree Award, as required.

ii)   In spite of securing P Grade or above in some (or all) Subjects/ Courses in any Semester, if a Student receives a SGPA < 5.00 / 6.00 and/ or CGPA < 5.00/ 6.00 at the end of such a Semester, then he 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) -

(a) to go into the next subsequent Semester (subject to fulfilling all other attendance and academic requirements as listed under Items 7-8);

(b) to 'improve his SGPA of such a Semester (and hence CGPA) to 5.00/ 6.00 or above', by reappearing for ONE or MORE (as per Student's choice) of the same Subject(s) / Course(s) in which he has secured P Grade(s) in that Semester, at the Supplementary Examinations to be held in the next subsequent Semester(s). In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

(iii)   A Student shall be declared successful or 'passed' in any Non-Credit Subject/ Course, if he secures a 'Satisfactory Participation Certificate' for that Mandatory Course.

11.13 After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the Registered Students of that Semester, indicating the Letter Grades and Credits earned. It will show the details of the Courses Registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

12.0   Declaration of Results

12.1   Computation of SGPA and CGPA are done using the procedure listed in 11.6 – 11.10.
12.2   For Final % of Marks equivalent to the computed final CGPA, the following formula may be used …
% of Marks = (final CGPA – 0.5) x 10

13.0   Award of Degree

13.1   A Student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes all the examinations prescribed in the entire IDP E&T Programme and secures the required number of 174 for UGP and 80 Credits for PGP (with CGPA $\geq$ 5.0/ 6.0), within 10 Academic Years from the Date of Commencement of the First Academic Year, shall be declared to have 'QUALIFIED' for the Award of the B.Tech.+M.Tech /MBA Degree(UGP and PGP) in the chosen Branch of Engineering as selected at the time of Admission.

13.2   A Student who qualifies for the Award of UG + PG Degree as listed in Item 13.1 shall be placed in the following Classes …

13.3   Students with final CGPA (at the end of the IDP) for both UGP/ PGP $\geq$ 8.00/ 7.75, and fulfilling the following conditions -
(i) should have passed all the Subjects/Courses in 'FIRST APPEARANCE' within the first 5 Academic Years (or 10 Sequential Semesters) from the Date of Commencement of his First Academic Year,

(ii) should have secured a CGPA $\geq$ 8.00/ 7.75, at the end of each of the 10 Sequential Semesters, starting from the I Year I Semester onwards,

(iii) should not have been detained or prevented from writing the End Semester Examinations in any Semester due to shortage of attendance or any other reason, shall be placed in 'FIRST CLASS with DISTINCTION'.

Students having final CGPA (at the end of IDP) for both UGP/ PGP $\geq$ 8.00/ 7.75, but not fulfilling the above conditions shall be placed in 'FIRST CLASS'.

13.4   Students with final CGPA (at the end of the IDP) for UGP/ PGP $\geq$ 6.50/ 6.75 but < 8.00/ 7.75, shall be placed in 'FIRST CLASS'.

13.5   Students with final CGPA (at the end of the IDP) for both UGP/ PGP ≥ 5.50/ 6.00 but < 6.50/ 6.75, shall be placed in 'SECOND CLASS'.

13.6   All other Students who qualify for the Award of the Degree (as per Item 13.1), with final CGPA (at the end of the IDP) for UGP ≥ 5.00 but < 5.50, shall be placed in 'PASS CLASS'.

13.7   A student with final CGPA (at the end of the IDP) for UGP < 5.00 will not be eligible for the Award of the B. Tech Degree.

13.8   A student with final CGPA (at the end of the IDP) for PGP < 6.00 will not be eligible for the Award of the M. Tech / MBA Degree.

13.9   Students fulfilling the conditions listed under Item 13.1 alone will be eligible candidates for - 'University Rank' and 'Gold Medal' considerations.

14.0   Withholding of Results

14.1   If the student has not paid fees to University/ College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

15.0   Transitory Regulations

15.1   Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/ Courses (or equivalent Subjects/ Courses, as the case may be), and same Professional Electives/ Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 10 years from the Date of Commencement of his I Year I Semester).

16.0   Student Transfers

16.1   There shall be no Branch transfers after the completion of Admission Process.

16.2   There shall be no transfer among the Constituent Colleges and Units of Jawaharlal Nehru Technological University Hyderabad.

17.0   Scope
   i) Where the words "he", "him", "his", occur in the write-up of regulations, they include "she", "her", "hers".

   ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".

   iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.

   iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor/ Principal is final.

   v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.

MALPRACTICE RULES
The following Malpractice rules are applicable to both Internal Examinations/SEE/Supplementory Examinations:

	Nature of Malpractices	Punishment
	If the candidate:	
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

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5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate

		is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a 8police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College / University for further action to award suitable punishment.	

JNTUH COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMOUS)
5 Year Integrated Dual Degree Program (IDP)
(B.Tech. + M.Tech. / MBA)

COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE

(Applicable from the batch admitted from the Academic Year 2017-18 and onwards)

I YEAR   **I SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	BS	Mathematics - I	4	1	0	4
2	HS	English	3	0	0	3
3	ES	Computer Programming & Data Structures	4	1	0	4
4	ES	Engineering Graphics	3	0	3	4
5	ES	Environmental Science	3	0	0	3
6	ES	Computer Programming & Data Structures Lab	0	0	3	2
7	HS	English Language Communication Skills Lab	0	0	3	2
8	ES	Engineering Workshop	0	0	3	2
		NSS/NCC/NSO				
		Total Credits				**24**

I YEAR   **II SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	BS	Mathematics–II	3	1	0	3
2	ES	Basic Electrical & Electronics Engineering	4	0	0	4
3	BS	Applied Physics	3	1	0	3
4	BS	Engineering Chemistry	3	1	0	3
5	ES	Engineering Mechanics	3	1	0	3
6	BS	Computational Mathematics	2	0	0	2
7	ES	Basic Electrical & Electronics Engineering Lab	0	0	3	2
8	HS	Applied Physics Lab	0	0	3	2
9	BS	Computational Mathematics Lab	0	0	3	2
		NSS/NCC/NSO				
		Total Credits				**24**

II YEAR   **I SEMESTER**

S.No	Group	Subject	L	T	P	Credits
1	PC	Mathematical Foundations of Computer Science	4	1	0	4
2	ES	Digital Logic Design & Microprocessors	3	1	0	3
3	PC	Advanced Data Structures	4	1	0	4
4	PC	Object Oriented Programming Through Java	4	1	0	4
5	PC	Computer Organization & Architecture	4	1	0	4
6	HS	Gender Sensitization Lab	-	-	-	-
7	ES	Digital Logic Design & Microprocessors Lab	0	0	3	1
8	PC	Advanced Data Structures Through C Lab	0	0	3	2
9	PC	Object Oriented Programming Through Java Lab	0	0	3	2
		Total Credits				**24**

II YEAR   **II SEMESTER**

S.No	Group	Subject	L	T	P	Credits
1	BS	Computer Oriented Statistical Methods	3	1	0	3
2	PC	Design and Analysis of Algorithms	4	1	0	4
3	PC	Formal Languages and Automata Theory	4	1	0	4
4	PC	Software Engineering	4	1	0	3
5	PC	Operating Systems	4	1	0	4
6	PC	Scripting Languages Lab	0	0	3	1
7	PC	Operating Systems Lab	0	0	3	1
8	PC	Software Engineering Lab	0	0	3	2
9	HS	Human Values and Professional Ethics	2	0	0	2
		Total Credits				**24**

III YEAR   **I SEMESTER**

S.No	Group	Subject	L	T	P	Credits
1	PC	Computer Networks	4	1	0	4
2	PC	Compiler Design	4	1	0	4
3	PC	Database Management Systems	4	1	0	4
4	OE	Open Elective – I	3	0	0	3
5	HS	Manegerial Economics and Financial Analysis	4	0	0	4
6	PC	Database Management Systems Lab	0	0	3	2
7	PC	Compiler Design Lab	0	0	3	2
8	PC	Computer Networks Lab	0	0	3	1
		Total Credits				**24**

III YEAR   **II SEMESTER**

S.No	Group	Subject	L	T	P	Credits
1	PC	Data warehousing and Data Mining	4	1	0	4
2	PC	Web Technologies	4	1	0	4
3	OE	Open Elective – II	3	0	0	3
4	PE	Professional Elective – I	4	0	0	4
5	PE	Professional Elective – II	4	0	0	4
6	PC	Web Technologies Lab	0	0	3	2
7	PC	Data warehousing and Data Mining Lab	0	0	3	2
8	HS	Advanced English Language Communications Skills Lab	0	0	3	1
		Total Credits				**24**

During Summer Vacation between III and IV Years: Industry Oriented Mini Project

IV YEAR   **I SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PC (UG)	Grid and Cloud Computing	4	0	0	4
2	PE-III (UG)	Professional Elective-III	4	0	0	4
3	PGC-I	Problem Solving with Algorithms and Data Structures	4	0	0	4
4	PGE-I	PG Elective-I	4	0	0	4
5	PGE-II	PG Elective-II	4	0	0	4
6	PGE-III	PG Elective-III	4	0	0	4
7	PC (UG) Lab	Grid and Cloud Computing Lab	0	0	3	2
8	PGC Lab	Problem solving with algorithms and Data Structures Lab	0	0	4	2
9	EAC (UG)	Industrial Training / Mini Project Evaluation (Summer Program)				2
		Total Credits				**30**

IV YEAR   **II SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	HSS (UG)	Management Science	4	0	0	4
2	PGC-II	Advanced Database Engineering	4	0	0	4
3	PGE-IV	PG Elective-IV	4	0	0	4
4	PGC Lab	Advanced Database Engineering Lab	0	0	4	2
5	DC (UG)	Major Project				14
		Total Credits				**28**

V YEAR   **I SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PGC-III	Soft Computing	4	0	0	4
2	PGE-V	PG Elective-V	4	0	0	4
3	PGE-VI	PG Elective-VI	4	0	0	4
4	PGE-VII	PG Elective-VII	4	0	0	4
5	PG	PG Project Stage – I				12
6	PG	Seminar	0	0	3	2
		Total Credits				**30**

V YEAR   **II SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PG	PG Project Stage-II				18
2	PG	Comprehensive Viva				4
		Total Credits				**22**

OPEN ELECTIVE- I		
S.No.	Subject	Offering Department
1	Disaster Management	Civil Engineering
2	Non – Conventional Power Generation	Electrical & Electronics Engineering
3	Electrical Engineering Materials	
4	Nano-Technology	
5	Operations Research	Mechanical Engineering
6	Basics of Thermodynamics	
7	Fabrication Processes	
8	Electronic Measuring Instruments	Electronics & Communication Engineering
9	OOPS through JAVA	Computer Science & Engineering
10	Computer Graphics	
11	Engineering Materials	Metallurgical Engineering
12	Metallurgy for Non Metallurgists	
13	Industrial Pollution Control Engineering	Chemical Engineering

OPEN ELECTIVE- II		
S.No	Subject	Offering Department
1	Estimation, Quantity Survey & Valuation	Civil Engineering
2	Design Estimation and Costing of Electrical Systems	Electrical & Electronics Engineering
3	Energy Storage Systems	
4	Mechatronics	
5	Jet propulsion and Rocket Engineering	Mechanical Engineering
6	Ergonomics	
7	Mechatronics	
8	Principles of Electronic Communications	Electronics & Communication Engineering
9	Cyber Security	Computer Science & Engineering
10	Database Management Systems	
11	Corrosion Engineering	Metallurgical Engineering
12	Testing of Materials	
13	Solid Waste Management	Chemical Engineering

Professional Elective -I
1) Artificial Intelligence
2) Computer Graphics
3) Software Project Management
4) Speech Processing
5) Principle of Programming Languages

Professional Elective -II
1) Machine Learning and Pattern Recognition
2) Software Testing Methodologies
3) Social Network Analysis
4) Digital Image Processing

Professional Elective -III
1) Design Patterns
2) Advance Databases
3) Mobile Computing
4) Business Intelligence & Big data

P.G Elective -I
1) Information Retrieval Systems
2) Ad hoc and sensor Networks
3) Embedded Systems
4) Natural Language Processing

P.G Elective -II
1) Ethical Hacking
2) Web Mining
3) Bioinformatics
4) Simulation and Modeling

P.G Elective –III
1) Robotics
2) Linux Internals
3) Computer Forensics
4) Mobile Application Development

P.G Elective –IV
1) Web Services & Service Oriented Architecture
2) Information Security
3) Research Methodologies
4) Software Design & Engineering

P.G Elective –V
1) Information Systems Control & Audit
2) Internet of Things
3) Advanced Computer Architecture
4) User Interface Technologies

P.G Elective –VI
1) Information Storage and Management,
2) Professional Ethics
3) Security in Computing
4) High Performance Computing

P.G Elective –VII
1) Cryptanalysis
2) Data Analytics
3) Real Time Operating System
4) Digital Image Processing

JNTUH COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMOUS)
5 Year Integrated Dual Degree Program (IDP)
(B.Tech. + M.Tech. / MBA)

COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE FOR MBA

(Applicable from the batch admitted from the Academic Year 2017-18 and onwards)

IV YEAR   **I SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PC	Grid and Cloud Computing	4	0	0	4
2	PE-III (UG)	Professional Elective - III	4	0	0	4
3	HS (UG)	Management Science	4	0	0	4
4	PGC-I	Marketing Management	4	0	0	4
5	PGC-II	Human Resource Management	4	0	0	4
6	PGE-I	PG Elective-I	4	0	0	4
7	PC (UG) Lab	Grid and Cloud Computing Lab	0	0	3	2
8	PGC Lab	Soft Skills Lab	0	0	4	2
9	EAC (UG)	Industrial Training / Mini Project Evaluation (Summer Program)				2
		Total Credits				**30**

IV YEAR   **II SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PGC-III	Research Methodology and Statistical Analysis	4	0	0	4
2	PGC-IV	Business Law and Regulation	4	0	0	4
3	PGE-II	PG Elective-II	4	0	0	4
4	PGC Lab	Statistical Analysis Lab using SPSS / Excel	0	0	4	2
5	PC (UG)	Major Project				14
		Total Credits				**28**

V YEAR   **I SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PGC-V	Strategic Management	4	0	0	4
2	PGE-III	PG Elective-III	4	0	0	4
3	PGE-IV	PG Elective-IV	4	0	0	4
4	PGE-V	PG Elective-V	4	0	0	4
5	PG	PG Project Stage – I				12
6	PG	Seminar	0	0	3	2
		Total Credits				**30**

V YEAR   **II SEMESTER**

S.No.	Group	Subject	L	T	P	Credits
1	PG	PG Project Stage-II				18
2	PG	Comprehensive Viva				4
		Total Credits				**22**

Core & Electives:

Group	Marketing/HR/Finance/Systems
PGC-I	Marketing Management
PGC-II	Human Resource Management
PGE-I	Sales and Distribution / Training and Development / Financial Management / Management Information System
PGC Lab	Soft Skills Lab
PGC-III	Research Methodology & Statistical Analysis
PGC-IV	Business Law & Regulation
PGE-II	Integrated Marketing Communications / Management of Industrial Relations / Security Analysis and Portfolio Management / Enterprise Resource Planning
PGC Lab	Statistical Analysis Lab using SPSS / Excel
PGC –V	Strategic Management
PGE-III	Retailing Management / Compensation & Reward Management / Strategic Investment and Financing Decisions/E-Business
PGE-IV	Services Marketing / Management of Change / International Financial Management/Cyber Security
PGE-V	International Marketing / Performance Management / Derivatives / Information System Control and Audit

     Students are advised to take prior approval from the Mentor of the Department of H&SS before selecting and finalizing the Electives.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IDP (B.Tech. CSE & M.Tech. /MBA) I Year I-Sem   **L T P C**
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MATHEMATICS – I
(Common to all Branches)

Pre Requisites: NIL

Objectives:
- To train the students thoroughly in mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical Concepts of differential and integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

Outcomes:
At the end of the course, the student will be able to:
- become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
- attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

UNIT–I: Differential calculus   **(12 lectures)**
Rolle's Mean value Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – (all theorems without proof but with geometrical interpretations), verification of the Theorems and testing the applicability of these theorem to the given function.
Curve tracing – Equations given in Cartesian, polar and parametric forms.
Functions of several variables – Functional dependence- Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints-Method of Lagrange multipliers.

UNIT–II: Improper Integrals, Multiple Integration   **(12 lectures)**
Gamma and Beta Functions –Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.
Multiple integrals – double and triple integrals – change of order of integration- change of variables (polar, cylindrical and spherical) . Finding the area of a region using Double integration and volume of a region in space using triple integration.

UNIT–III: Vector Calculus   **(12 lectures)**
Vector Calculus: Scalar point function and vector point function, Gradient- Divergence- Curl and their related properties, - Laplacian operator, Line integral – Work done – Surface integrals –Volume integral. Green's Theorem, Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification). Solenoidal and irrotational vectors, Finding potential function.

UNIT–IV: First Order Ordinary Differential Equations   **(10 lectures)**
Linear and exact differential equations
Applications of first order differential equations – Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories and electrical circuits

UNIT-V: Higher Order Ordinary Differential Equations   **(10 lectures)**
Linear, homogeneous and non- homogeneous differential equations of second and higher order with constant coefficients.   Non-homogeneous term of the type e^{ax}, Sin ax, Cos ax, and x^n, $e^{ax}V(x)$, $x^n V(x)$. Method of variation of parameters. Applications: Bending of beams, Electrical circuits and simple harmonic motion.

Text books:
1) HIGHER ENGINEERING MATHEMATICS BY B S GREWAL, KHANNA PUBLICATIONS.
2) ENGINEERING MATHEMATICS BY ERWIN KREYSZIG, WIELY PUBLICATIONS.
3) VECTER ANALYSIS BY GHOSG & MAITY, NEW CENTRAL BOOK AGENCY.

References:
1) ENGINEERING MATHEMATICS BY SRIMANTAPAL & SUBODH C. BHUNIA, OXFORD UNIVERSITY PRESS.
2) ADVANCED ENGINEERING MATHEMATICS BY PETER V O'NEIL, CENGAGE LEARNING.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IDP (B.Tech. CSE & M.Tech. /MBA) I Year I-Sem   **L   T   P   C**
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ENGLISH

1. **INTRODUCTION:**
    In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

    In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

    The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read the topics selected for discussion on their own in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material, etc. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.*

2. **OBJECTIVES:**

    a. To improve the language proficiency of the students in English with emphasis on LSRW skills.
    b. To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
    c. To develop the study skills and communication skills in formal and informal situations.

    LEARNING OUTCOMES:

    1. Use of English Language - written and spoken.
    2. Enrichment of comprehension and fluency
    3. Gaining confidence in using language in verbal situations.

    SYLLABUS:

    Listening Skills:

    Objectives
    1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
    2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

    Students should be given practice in listening to the sounds of the language, to be able to recognize them, to distinguish between them, to mark stress and recognize and use the right intonation in sentences.

    - Listening for general content
    - Listening to fill up information
    - Intensive listening
    - Listening for specific information

Speaking Skills:

Objectives
1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students express themselves fluently and appropriately in social and professional contexts.
   - Oral practice
   - Describing objects/situations/people
   - Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: *Skills Annexe–Functional English for Success)*
   - Just A Minute (JAM) Sessions.

Reading Skills:

Objectives
1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences, etc.
   - Skimming the text
   - Understanding the gist of an argument
   - Identifying the topic sentence
   - Scanning
   - Inferring lexical and contextual meaning
   - Understanding discourse features
   - Recognizing coherence/sequencing of sentences

NOTE: *The students will be trained in reading skills using the prescribed text for detailed study.*
They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:
Objectives
1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.
   - Writing sentences
   - Use of appropriate vocabulary
   - Paragraph writing
   - Coherence and cohesiveness
   - Narration / description
   - Note Making
   - Formal and informal letter writing
   - Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Five Units**, are prescribed:

For Detailed study: **First Textbook: *"Skills Annexe -Functional English for Success***", Published by Orient Black Swan, Hyderabad

For Non-detailed study
Second Textbook *"Epitome of Wisdom",* Published by Maruthi Publications, Hyderabad.
- The course content and study material is divided into **Five Units.**

Unit –I

1. Chapter entitled '***Wit and Humour*'** from '**Skills Annexe' -Functional English for Success**, Published by Orient Black Swan, Hyderabad
2. Chapter entitled '***Mokshagundam Visvesvaraya*'** from **"*Epitome of Wisdom"*,** Published by Maruthi Publications, Hyderabad.

    L - Listening for Sounds, Stress and Intonation
    S - Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)
    R - Reading for Subject/ Theme- ***The Palm Islands*** from Epitome of Wisdom is for **Reading Comprehension**
    W - Writing Paragraphs
    G - Types of Nouns and Pronouns
    V - Homonyms, Homophones & Homographs

Unit –II

1. Chapter entitled "***Cyber Age"*** from "***Skills Annexe -Functional English for Success***" Published by Orient Black Swan, Hyderabad.
2. **Report Writing (First & Second Textbooks)**
    L - Listening for themes and facts
    S - Apologizing, interrupting, requesting and making polite conversation
    R- Reading for theme and gist- The 1 Thing Every Business Executive Must Understand about Social Media by Dave Kerpen from Skills Annexe is for **Reading Comprehension**
    W - Describing people, places, objects, events
    G - Verb forms
    V - Noun, Verb, Adjective and Adverb

Unit –III

1. Chapter entitled '***Risk Management*'** from **"*Skills Annexe -Functional English for Success***" Published by Orient Black Swan, Hyderabad
2. Chapter entitled '***Leela's Friend*'** by R.K. Narayan from **"*Epitome of Wisdom"*,** Published by Maruthi Publications, Hyderabad
    L - Listening for main points and sub-points for note taking
    S - Giving instructions and directions; Speaking of hypothetical situations
    R - Reading for details- *Sivakasi: Who to Blame for the Frequent Fire Accidents in India's Largest Fireworks Industry Hub?* by Amrutha Gayathri from Skills Annexe & *Forensic Science* from Epitome of Wisdom are for **Reading Comprehension**
    W - Note-making, Information transfer, Punctuation
    G - Present tense
    V - Synonyms and Antonyms

Unit –IV

1. **Letter Writing – Writing formal letters, letter of application along with curriculum vitae (First & Second Textbooks)**
2. Chapter entitled '***The Last Leaf*'** from **"*Epitome of Wisdom"*,** Published by Maruthi Publications, Hyderabad
    L - Listening for specific details and information
    S - Narrating, expressing opinions and telephone interactions
    R - Reading for specific details and information- *What I Cherish Most* by V. S. Srinivasa Sastri from Skills Annexe & *Choose How to Start Your Day* from Epitome of Wisdom are for **Reading Comprehension**
    W - Writing e-mails
    G - Past and Future tenses
    V - Vocabulary - Idioms and Phrasal verbs

Unit –V

1. Chapter entitled '***Sports and Health*'** from **"*Skills Annexe -Functional English for Success***" Published by Orient Black Swan, Hyderabad

2. Chapter entitled **'The Convocation Speech'** by N.R. Narayanmurthy' from **"Epitome of Wisdom"**, Published by Maruthi Publications, Hyderabad
   - L - Critical Listening and Listening for speaker's tone/ attitude
   - S - Group discussion and Making presentations
   - R - Critical reading, reading for reference - *Benefits of Physical Activity* from Skills Annexe & *What is meant by Entrepreneurship?* from Epitome of Wisdom are for **Reading Comprehension**
   - W - Project proposals; Project Reports and Research Papers
   - G - Adjectives, Prepositions and Concord
   - V - Collocations and Technical vocabulary, Using words appropriately
   - 🔸 **Exercises from the texts not prescribed shall be used for classroom tasks.**

REFERENCES:

1. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
2. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
3. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
4. Technical Communication, Meenakshi Raman, Oxford University Press
5. Practical English Usage, Michael Swan, Oxford University Press
6. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
7. English Grammar Practice, Raj N Bakshi, Orient Longman.
8. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
9. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
10. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
11. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO

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JNTUH COLLEGE OF ENGINEERING HYDERABAD

IDP (B.Tech. CSE & M.Tech. /MBA) I Year I-Sem	**L T P C**
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COMPUTER PROGRAMMING & DATA STRUCTURES

Prerequisites:
There are no prerequisites for this course, except that anyone who wants to learn C should have analytical skills and logical reasoning.

Objectives:
1. This course starts from the basics of computers and program development.
2. It covers various concepts of C programming language
3. It introduces searching and sorting algorithms
4. It provides an understanding of data structures such as stacks and queues.

Outcomes:
At the end of the course, the student will be able to:
1. Develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings; and data structures like stacks, queues and linked lists.
2. Implement searching and sorting algorithms

UNIT - I
Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT – II
Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.
Designing Structured Programs- Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

UNIT – III
Arrays and Strings – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

UNIT - IV
Derived types – Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

Input and Output – Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT – V
Sorting and Searching selection sort, bubble sort, insertion sort, linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:
1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education.
3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.

REFERENCES:

1. C & Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
4. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
5. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures,E.Balagurusamy,TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S.Chand & Co.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IDP (B.Tech. CSE & M.Tech. /MBA) I Year I-Sem   **L   T   P   C**
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ENGINEERING GRAPHICS

Pre-requisites: Nil

Course objectives:
- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Outcomes:
At the end of the course, the student will be able to:

- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT – I
INTRODUCTION TO ENGINEERING DRAWING :
Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid,
Involute. Scales – Plain, Diagonal and Vernier Scales.

UNIT- II
ORTHOGRAPHIC PROJECTIONS:
Principles of Orthographic Projections – Conventions – Projections of Points and Lines
Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III
Projections of Regular Solids – Auxiliary Views.

UNIT – IV
Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT – V
ISOMETRIC PROJECTIONS :
Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.
Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions
Auto CAD: Basic principles only

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and Graphics Rane and Shah/ Pearson Edu.

REFERENCE BOOKS:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics With Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai.
4. Text book on Engineering Drawing / KL Narayana/ P Kannaih/
   Scitech

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IDP (B.Tech. CSE & M.Tech. /MBA) I Year I-Sem   **L   T   P   C**
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ENVIRONMENTAL SCIENCE

Prerequisites : NIL

Objectives:
• Creating the awareness about environmental problems among students.
• Imparting basic knowledge about the environment and its allied problems.
• Developing an attitude of concern for the environment.
• Motivating students to participate in environment protection and environment improvement.

Outcomes:
At the end of the course, it is expected that students will be able to:
• Identify and analyze environmental problems as well as the risks associated with these problems
• Understand what it is to be a steward in the environment
• Studying how to live their lives in a more sustainable manner

UNIT- I
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - II
ECOSYSTEMS : Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - III
BIODIVERSITY AND ITS CONSERVATION : Introduction - Definition: genetic, species andecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - IV
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of:
a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution

e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - V
SOCIAL ISSUES AND THE ENVIRONMENT : From Unsustainable to Sustainable development - Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its
problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. –Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

FIELD WORK : Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple cosystemspond,
river, hill slopes, etc.

TEXT BOOK:
1   Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.,UniversitiesPress
2   Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE:
1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

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COMPUTER PROGRAMMING & DATA STRUCTURES LAB

Week 1:
1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.

Week 2:
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Week 3:
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices
    ii) Multiplication of Two Matrices

Week 4:
11. Write a C program that uses functions to perform the following operations:
    i)   To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or − 1 if S doesn't contain T.
14. Write a C program to count the lines, words and characters in a given text.

Week 5:
15. Write a C program to generate Pascal's triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:
    $1+x+x^2+x^3+\ldots\ldots\ldots+x^n$
    For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
    Print x, n, the sum
    Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

Week 6:
18. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
19. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 7:
20. Write a C program that uses functions to perform the following operations:
    i)   Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
    (Note: represent complex number using a structure.)

Week 8:
21. i) Write a C program which copies one file to another.
    ii) Write a C program to reverse the first n characters in a file.
        (Note: The file name and n are specified on the command line.)
22. i) Write a C program to display the contents of a file.
    ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Week 9:
23. Write a C program that uses functions to perform the following operations on singly linked list.:
    i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

Week 10:
24. Write C programs that implement stack (its operations) using
     i) Arrays   ii) Pointers
25. Write C programs that implement Queue (its operations) using
     i) Arrays   ii) Pointers

Week 11:
26. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
     i) Bubble sort   ii) Selection sort

Week 12:
27. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
     i) Linear search   ii) Binary search

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ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives
- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes
- Better Understanding of nuances of language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students

SYLLABUS

English Language Communication Skills Lab shall have two parts:
   a.   **Computer Assisted Language Learning (CALL) Lab**
   b.   **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the **English Language Communication Skills Lab**

Exercise – I
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session
Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise – II
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise - III
CALL Lab: Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Sequence of Tenses, Question Tags and One word substitutes.

Exercise – IV
CALL Lab: Intonation and Common errors in Pronunciation.
ICS Lab: Extempore- Public Speaking
Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice

ICS Lab: Information Transfer- Oral Presentation Skills
Reading Comprehension and Job Application with Resume preparation.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**
    The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.
    System Requirement (Hardware component):
    Computer network with Lan with minimum 60 multimedia systems with the following specifications:
    i)   P – IV Processor
         a) Speed – 2.8 GHZ
         b) RAM – 512 MB Minimum
         c) Hard Disk – 80 GB
    ii) Headphones of High quality
2. **Interactive Communication Skills (ICS) Lab :**
    The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Suggested Software:

*   **Cambridge Advanced Learners' English Dictionary with CD.**
*   **Grammar Made Easy by Darling Kindersley**
*   **Punctuation Made Easy by Darling Kindersley**
*   Clarity Pronunciation Power – Part I
*   Clarity Pronunciation Power – part II
*   **Oxford Advanced Learner's Compass, 8th Edition**
*   ***DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.***
*   Lingua TOEFL CBT Insider, by Dreamtech
*   TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
*   **English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge**
*   **English Pronunciation in Use** (Elementary, Intermediate, Advanced) Cambridge University Press
*   Raman, M & Sharma, S. 2011. Technical Communication, OUP
*   Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

SUGGESTED READING:

1. Rama Krishna Rao, A. *et al. English Language Communication Skills – A Reader cum Lab Manual Course Content and Practice.* Chennai: Anuradha Publishers
2. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories.* New Delhi: Foundation
3. *Speaking English Effectively* 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
4. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews.* Tata McGraw Hill
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
6. *English Pronunciation in Use. (Elementary, Intermediate & Advance).* Cambridge: CUP
7. Chris Redston, Gillie Cunningham, Jan Bell. *Face to Face* (2nd Edition). Cambridge University Press
8. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication.* New Delhi : Foundation
9. Soundararaj, Francis. 2012. *Basics of Communication in English. New Delhi: Macmillan*
10. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:
1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 30 sessional marks and 70 semester-end Examination marks. Of the 30 marks, 20 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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ENGINEERING WORKSHOP

Pre-requisites: **Practical skill**

Objectives:
• To Study of different hand operated power tools, uses and their demonstration.
• To gain a good basic working knowledge required for the production of various engineering products.
• To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
• To develop a right attitude, team working, precision and safety at work place.
• It explains the construction, function, use and application of different working tools, equipment and machines.
• To study commonly used carpentry joints.
• To have practical exposure to various welding and joining processes.
• Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
• To understanding the computer hardware and practice the Assembly of computer parts.
• To practice the process of Installation of operating system windows.

Outcomes:

At the end of the course, the student will be able to:
• Better understanding the process of assembly of computer parts and installation of different software's.
• Study and practice on machine tools and their operations
• Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
• Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
• Apply basic electrical engineering knowledge for house wiring practice.

I.   TRADES FOR EXERCISES :
      (Any **six** trades from the following with minimum of **two** exercises in each trade)
          1. Carpentry
          2. Fitting
          3. Tin-Smithy
          4. Black Smithy
          5. House-wiring
          6. Foundry
          7. Plumbing

II.   Trades for Demonstration & Exposure
          1. Demonstration of power tools & wiring
          2. Welding
          3. Machine Shop

III. **IT Workshop I:** Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.

      IT Workshop II: Installation of operating system windows and linux simple diagnostic exercises.

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MATHEMATICS – II
(Common to all Branches)

Pre Requisites: NIL

Objectives:
• Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

Outcomes:
At the end of the course, the student will be able to:
• gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

UNIT–I: Linear ODE with variable coefficients and series solutions   (8 lectures)
Equations reducible to constant coefficients-Cauchy's and Legendre's differential equations. Motivation for series solutions, Ordinary point and Regular singular point of a differential equation, Transformation of non-zero singular point to zero singular point. Series solutions to differential equations around zero, Frobenius Method about zero.

Unit-II: Special Functions   (8 lectures)
Bessel's Differential equation, Bessel functions properties: – Recurrence relations, Orthogonality, Generating function, Trigonometric expansions involving Bessel functions.

UNIT–III: Laplace Transform   (8 lectures)
Definition of Integral transform. Domain of the function and Kernel for the Laplace transforms, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied or divided by "t". Laplace transforms of derivatives and integrals of functions. – Unit step function – second shifting theorem – Dirac's delta function, Periodic function – Inverse Laplace transform by Partial fractions(Heaviside method) Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem-solving differential equations by Laplace transforms

UNIT – IV: Fourier series and Fourier Transforms   (8 lectures)
Definition of periodic function. Fourier expansion of periodic functions in a given interval of length, 2π,
Determination of Fourier coefficients – Fourier series of even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.
Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT-V: Partial Differential Equations   (10 lectures)
Introduction and Formation of   partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method).
Method of separation of variables for second order equations. Applications of Partial differential equations- one dimensional wave equation., Heat equation.

Text books:
1)   HIGHER ENGINEERING MATHEMATICS BY B S GREWAL, KHANNA PUBLICATIONS.
2)   ENGINEERING MATHEMATICS BY ERWIN KREYSZIG, WIELY PUBLICATIONS
References:
1)   ENGINEERING MATHEMATICS BY SRIMANTAPAL & SUBODH C. BHUNIA, OXFORD UNIVERSITY PRESS.
2)   ADVANCED ENGINEERING MATHEMATICS BY PETER V O'NEIL, CENGAGE LEARNING

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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Pre-requisite: Nil

Objectives:
• To introduce the concept of electrical circuits and its components.
• To introduce the characteristics of various electronic devices.
• To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

Outcomes:
At the end of the course, the student will be able to:
• To analyze and solve electrical circuits using network laws and theorems.
• To design & analyse various circuits using electronic components viz. diodes, transistors & other special purpose devices.

UNIT- I ELECTRICAL and SINGLE PHASE AC CIRCUITS
Electrical Circuits: R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Source Transformation – V-I relationship for passive elements, Kirchoff's Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis, **Single Phase AC Circuits:** R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

UNIT- II RESONANCE and NETWORK THEOREMS
Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.
Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity, Tellegen's, Millman's and Compensation theorems for DC and AC excitations.

UNIT- III P-N JUNCTION DIODE & DIODE CIRCUITS
P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.
Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT- IV BIPOLAR JUNCTION TRANSISTOR
Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations.
Transistor Biasing And Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors.
Transistor Configurations: BJT modeling, Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters, Comparison of CE, CB and CC configurations.

UNIT- V JUNCTION FIELD EFFECT TRANSISTOR & SPECIAL PURPOSE DEVICES
Junction Field Effect Transistor: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET.

Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR.

TEXT BOOKS:
1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J.Millman and C.C.Halkias, Satyabratajit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.

REFERENCES:
1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
2. Electronic Devices and Circuits - K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
3. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal –Wiley India Pvt. Ltd. 1/e 2009.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2nd edition by Raymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N.C.Jagan & C.Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

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APPLIED PHYSICS

Prerequisites: Nil

Course Objectives:
The course primarily aims at understanding the behavior of matter in the condensed state and tries to explore the causes with reference to micro level mechanism of the solid matter. The objective of the first chapter is to study the micro level behavior of the quantum particles of the matter and their nature as wave and particle and hence to estimate the statistics of the phenomenon arising out of their nature of existence. The second chapter aims at to assess the draw backs of the free electron theory leading to the introduction of the Band Theory of Solids. In the third, fourth, fifth, sixth, seventh and tenth chapters the different natures of the solid matter are taken as the main task discuss. In the eighth chapter, it is expected to understand the basic principles behind the coherent artificial light source (LASER) with reference to their construction, mechanism, operation and classification etc. The nineth chapter is explicitly aimed at to study an advanced communication system presently ruling the world throughout i.e. Fiber Optic communication system.

Outcomes:
The understanding of properties of matter is an essential part to utilize them in various applications in different walks of life. In most of the cases, the behavior of matter as solid material body purely depends upon the internal micro level nature, structure and characters. By studying first few chapters the students as graduates can acquire the knowledge of the connection between the micro level behavior of the matter as fundamental particles and the macro level real time characters of the material bodies. The quantum mechanism in phenomena can best be understood and analyzed by estimating the statistics of the phenomena. The study of chapters on Laser and fiber optics forms basis for understanding an advanced communication system. Other chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications.

UNIT-I
1. **Principles of Quantum & Statistical Mechanics:** Waves and Particles, De Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, G.P. Thomson Experiment, Heisenberg's Uncertainty principle, Schrodinger's Time -Independent Wave Equation, Physical Significance of the Wave Function, Particle in One Dimensional Potential Box.
Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (Qualitative).

2. **Electron theory of Metals:** Introduction, Classical Free Electron Theory of metals, Root Mean Square (RMS)velocity, Mean Free Path, Mean collision Time, Drift Velocity, Relaxation Time, Electrical Resistivity, Draw backs of Classical Free Electron Theory, Density of States, Calculation of Fermi energy, Quantum Free Electron Theory, Electron in a periodic Potential, Kronig-Penny Model (Qualitative Treatment), Origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semiconductors and insulators, Concept of Effective Mass of an Electron.

UNIT-II
3. **Semiconductor Physics:** Position of Fermi Level, Estimation of Carrier concentration in Intrinsic and Extrinsic (p-type & n-type) Semiconductors, Equation of Continuity, Direct and Indirect Band gap Semiconductors, Hall Effect.
4. **Physics of Semiconductor Devices:** Formation of PN Junction, Energy band Diagram and I-V Characteristics of PN Junction Diode, Diode Equation, LED, LCD and Photo Diodes, Solar Cells.

UNIT-III
5. **Dielectric Properties:** Basic definitions, Electronic, Ionic (Quantitative) and Orientation Polarizations(Qualitative) and Calculation of Polarizabilities - Internal Fields in Solids, Clausius - Mossotti Equation, Piezo-electricity, Pyro- electricity and Ferro - electricity.

6. **Magnetic Properties:** Basic definitions , Origin of Magnetic Moment, Bohr Magneton, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Domain Theory of Ferro magnetism on the basis of Hysteresis Curve , Soft and Hard Magnetic Materials, Properties of Anti – Ferro and Ferri Magnetic Materials.

7. **Superconductivity:** Introduction to Superconductivity, Properties of Superconductors, Meissner Effect, BCS theory, Type-I and Type –II Superconductors, Magnetic Levitation and Applications of Superconductors.

UNIT-IV

8. **Lasers:** Characteristics of Lasers, Spontaneous and stimulated Emission of Radiation, Meta-Stable state, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them, Ruby Laser, Helium- Neon Laser, Semiconductor Diode Laser and Applications of Lasers.

9. **Fiber Optics:** Principle & construction (structure) of an Optical Fiber, Acceptance Angle, Numerical Aperture, Types of Optical Fibers, Losses in Optical Fibers and Applications of Optical Fibers in communication.

UNIT-V

10. **Nanotechnology:** Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Precipitation, Combustion Methods; Top-Down Fabrication: Chemical Vapor Deposition, Physical Vapor Deposition, Characterization Techniques(XRD, SEM &TEM) and Applications of Nanotechnology.

Text books:
1. Principles of Physics by Halliday, Resnick, Walker, Wiley India Pvt Ltd, 9th Edition.
2. Introduction to Solid State Physics by Charles Kittel, Wiley India Pvt Ltd, 7th Edition
3. Engineering Physics by R.K.GAUR & S.L.GUPTA, Dhanpat Rai Publications.
4. Solid State Physics by A J Dekker, MACMILLAN INDIA LTD.

References:
1. Modern Engineering Physics by Dr.K.Vijaya Kumar, Dr. S. Chandralingam, S.CHAND & COMPANY LTD
2. Applied Physics by P.K.Mittal, I K International Publishers
3. Applied Physics by P.K. Palanisamy :Scitech publishers
4. Introduction to Nanotechnology by Charles P.Poole, Jr.Frank J ownes, John Wiley & sons
5. Applied Physics for Engineers by P. Madusudana Rao, Academic Publishing Company
6. Engineering Physics by Sanjay D Jain, Girish G Sahasrbudha: University Press.

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ENGINEERING CHEMISTRY

Prerequisites: Nil

Course objectives:
To inculcate the basic concepts of Chemistry required to make the student to develop the innovative materials for the development of technological arena. The latest techniques and skills for the treatment of raw water, facing the endanger of corrosion of structures and producing the polymers in varied applications.

Outcomes:
At the end of the course, the student will be able to:
• gain knowledge of various skills to control the corrosion of huge structures. The analysis of raw water and its treatment to provide soft water. The technologies to result polymers with multiple applications are understood. The principles of electrochemistry and batteries are clearly understood by the students.

Unit-I: Water and its treatment
Introduction – hardness of water – causes of hardness – types of hardness : temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of potable water - Disinfection of potable water by chlorination and Ozonization. Boiler feed water and its treatment – Calgon conditioning – Phosphate conditioning - Colloidal conditioning – External treatment of water – ion-exchange processes. Desalination of water – Reverse osmosis. Numerical problems – Sewage water - COD, BOD definitions and their significance. Treatment of sewage- Steps involved (Primary, secondary & tertiary treatments).

Unit-II: Electrochemistry and corrosion
Electrochemistry: Conductance - Specific, equivalent and molar conductance and their interrelationship . Ionic mobilities – Relationship between ionic conductance and ionic mobilities. Electro Chemical cells - electrode potential, standard electrode potential, types of electrodes – Standard hydrogen electrode, calomel and glass electrode. Nernst equation - electrochemical series and its applications.– Concept of concentration cell –Numerical problems.

Corrosion- Causes and effects of corrosion – theories of chemical and electrochemical corrosion - mechanism of electrochemical corrosion. Types of corrosion : Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion. Corrosion control methods – Cathodic protection - sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application of metallic coatings – Hot dipping , cementation, electroplating of copper, electro less plating of Nickel - Organic coatings: Paints – their constituents and functions.

Unit-III: High Polymers
Definition – Classification of polymers with examples – Types of polymerisation – Chain growth (free radical addition mechanism), step growth polymerization, Plastics, fibres and elastomers - definition and characteristics. Plastics – thermoplastic and thermosetting plastics, compounding of plastics. Fibre reinforced plastics. Preparation, properties and Engineering applications of PVC, Teflon, Bakelite, Nylon 6:6 and terylene (Dacron); Rubber – Natural rubber , its processing and vulcanization. Elastomers: Preparation, properties and applications of Styrene butadiene, butyl and thiokol rubbers. Conducting polymers – Classification with examples; mechanism of conduction in trans-polyacetylene and applications of conducting polymers. Biodegradable polymers – concept and advantages - Polylactic acid and its applications.

Unit-IV: Chemistry of Energy sources
Fuels :Classification of fuels - characteristics of a good fuel . Solid fuels: Coal – Analysis of coal by proximate and ultimate methods. Liquid fuels- Petroleum and its refining. Characteristics and uses of

petrol, diesel and kerosene. Synthetic petrol- Fischer-Tropsch's process. Cracking – thermal cracking and catalytic cracking. Fluid bed catalytic cracking, Knocking - octane and cetane numbers. Gaseous fuels – Composition, properties and uses of Natural gas, LPG and CNG .

Combustion – Definition, calorific value, HCV and LCV. Calculation of air quantity required for combustion of a fuel - Numerical problems.

Alternate Energy sources :Biodiesel - trans-esterification - advantages of biodiesel, fuel cells (H_2-O_2 and Methanol –O_2 fuel cell).

Unit-V : Batteries and Materials
Batteries : Cell and battery - Primary battery (dry cell, alkaline cell and Lithium cell). Secondary battery (lead acid, Ni-Cd and lithium ion cell)

Liquid crystal polymers : classification, characteristics and applications.

Insulators- Characteristics and applications of thermal and electrical insulators.

Nanomaterials : Introduction. Preparation of nanomaterials by top down and bottom up approaches. Carbon nano fibres, and fullerenes - Applications of nanomaterials.

Text Books:
1. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi, (15th Edition, 2005).
2. Engineering Chemistry by B.Rama Devi & Ch.Venkata Ramana Reddy ; Cengage Learning, 2012.

Reference Books:
1. A Text Book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co., New Delhi.(3rd Edition, 2003).
2. Engineering Chemistry by Y. Bharathi Kumari and C. Jyotsna, VGS Booklinks, 2012.
3. Text book of Engineering Chemistry by C P Murthy, C V Agarwal and A. Naidu; B.S.Publications, 2006.
4. Engineering Chemistry by M. Thirumala Chary and E. Lakshminarayana, Sci tech. Publications Pvt. Ltd., Chennai 2012.
5. Engineering Chemistry by B.Sivasankar, Tata McGraw-Hill Publishing Company Ltd., New Delhi 2008.
6. A Text Book of Engineering Chemistry by S.S. Dara, S.Chand Publications, (10th Edition ,2007).

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ENGINEEERING MECHANICS

Prerequisites: Nil

Objectives:
During this course, students should develop the ability to:
• Work comfortably with basic engineering mechanics concepts required for analyzing static structures
• Identify an appropriate structural system to studying a given problem and isolate it from its environment.
• Model the problem using good free-body diagrams and accurate equilibrium equations
• Identify and model various types of loading and support conditions that act on structural systems.
• Apply pertinate mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem.
• Understand the meaning of centers of gravity (mass)/centroids and moments of Inertia using integration methods.
• Communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.

Outcomes:
At the end of the course, the student will be able to:
• solve problems dealing with forces in a plane or in space and equivalent force Systems.
• solve beam and cable problems and understand distributed force systems.
• solve friction problems and determine moments of Inertia and centroid using intergration methods.
• understand and know how to solve three-dimension force and moment problems.
• understand and know how to use vector terminology.

UNIT – I
INTRODUCTION OF ENGINEERING. MECHANICS – Basic concepts System of Forces- Coplanar Forces – Components in Space – Resultant- Moment of Forces and its Application – Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributed and uniformly varying loading .

UNIT – II
FRICTION: Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction –Cone of limiting friction– Friction of wedge, block and Ladder – Screw jack – Differential screw jack - Motion of Bodies**.**

UNIT – III
CENTROID AND CENTER OF GRAVITY: Centrods – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies - Area moment of Inertia: – polar Moment of Inertia – Transfer – Theorems - Moments of Inertia of Composite Figures.
MOMENT OF INERTIA: Moment of Inertia of Areas and Masses - Transfer Formula for Moments of Inertia - Moment of inertia of composite areas and masses.

UNIT – IV
KINEMATICS: Introduction – Rectilinear motion – Motion with uniform and variable acceleration – Curvilinear motion – Components of motion – Circular motion – Projectiles- Instantaneous centre.

UNIT – V
KINETICS: Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principle of conservation of energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

TEXT BOOKS:
1. Engineering Mechanics by shames & Rao - Pearson Education.
2. Engineering Mechanics by M.V. Seshagiri rao and Durgaih; University Press.
3. Engineering Mechanics – B. Bhattacharya - Oxford University Publications.

REFERENCES:
1. Engineering Mechanics (Statics and Dynamics) by Hibbler; Pearson Education.
2. Engineering Mechanics by Fedrinand L. Singer – Harper Collings Publishers.
3. Engineering Mechanics by A. K. Tayal, Umesh Publication.
4. Engineering Mechanics – G. S. Sawhney, Printice Hall of India.
5. A text book of engineering mechanics by R. K. Bansal; Laxmi publications.
6. Engineering Mechanics by R. S. Khurmi ; S. Chand & Co.

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COMPUTATIONAL MATHEMATICS
(Common to all Branches)

Pre Requisites: NIL

Objectives:
• This course aims at providing the student with the concepts of matrices, numerical techniques and curve fitting.

Outcomes:
At the end of the course, the student will be able to:
• analyze engineering problems using the concepts of Matrices and Numerical Methods.

UNIT-I: Matrices and Linear Transformations   **(8 lectures)**
Real matrices – Symmetric, skew – symmetric, orthogonal. Complex matrices: Hermitian, Skew-Hermitian and Unitary Matrices. Idempotent matrix, Finding rank of a matrix by reducing to Echelon and Normal forms. Consistency of system of linear equations (homogeneous and non- homogeneous) using the rank of a matrix.
Cayley-Hamilton Theorem (without Proof) – Verification. Finding inverse of a matrix and powers of a matrix by Cayley-Hamilton theorem, Linear dependence and Independence of Vectors. Linear Transformation – Orthogonal Transformation. Eigen values and Eigen vectors of a matrix. Properties of Eigen values and Eigen vectors of matrices. Diagonolization of matrix – Quadratic forms upto three variables- Reduction of quadratic form to canonical form, Rank – Positive definite, negative definite – semi definite – index – signature of quadratic form.

UNIT–II: Interpolation and Curve fitting   **(5 lectures)**
Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols- Difference Equations – Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points-Lagrange's Interpolation formula. **Curve fitting**: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

UNIT–III: Numerical techniques   **(5 lectures)**
Solution of Algebraic and Transcendental Equations and Linear system of equations.
Introduction – Graphical interpretation of solution of equations .The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method .
Solving system of non-homogeneous equations by L-U Decomposition method(Crout's Method)Jacobi's and Gauss-Seidel Iteration method

UNIT- IV: Numerical Differentiation, Integration: **(5 lectures)**
 Numerical differentiation, Numerical integration – Trapezoidal rule, Simpson's 1/3rd and 3/8 Rule , Generalized Quadrature.

UNIT – V: Numerical solutions of First order differential equations   **(5 lectures)**
Numerical solution of Ordinary Differential equations: Solution by Taylor's series method –Picard's Method of successive Approximation- single step methods-Euler's Method-Euler's modified method, Runge-Kutta Methods.

Text Books:
1) INTRODUCTORY METHODS OF NUMERICAL ANALYSIS BY SS SASTRY
2) NUMERICAL AND STATISTICAL METHODS WITH PROGRAMMING IN C BY SUJATHA SINHA AND SUBHABRADA DINDA, SCITEC PUBLISHERS.
3) NUMERICAL METHODS, PRINCIPLES, ANALYSIS AND ALGORITHMS BY SRIMANTAPAL & SUBODH C. BHUNIA, OXFORD UNIVERSITY PRESS.

References:
1) ADVANCED ENGINEERING MATHEMATICS BY ALAN JEFFERY
2) APPLIED NUMERICAL METHODS USING MATLAB BY RAO.V.DUKKIPATI, NEW AGE PUBLISHERS
3) NUMERICAL METHODS IN SCIENCE AND ENGINEERING –APRACTICAL APPROACH BY S.RAJASEKHARAN, S.CHAND PUBLICATIONS

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

PART A: ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's

2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.

3. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

PART B: (For Laboratory examination – Minimum of 09 experiments to be conducted)
1. PN Junction diode characteristics   A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Input & Output characteristics of Transistor in CB / CE configuration
4. Full Wave Rectifier with & without filters
5. Input and Output characteristics of FET in CS configuration
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. SCR Characteristics.
8. Verification of KVL and KCL.
9. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
10. Verification of Superposition and Reciprocity theorems.
11. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
12. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

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APPLIED PHYSICS LAB

LIST OF EXPERIMENTS:

1. Study of characteristics of LED and LASER sources.
2. Magnetic field along the axis of current carrying coil-Stewart and Gee's method.
3. Study of characteristics of p-i-n diode detectors.
4. Determination of frequency of A.C Mains-Sonometer.
5. Torsional pendulum.
6. Energy gap of material of PN- junction.
7. Bending Losses of Fibers & Evaluation of numerical aperture of given fiber.
8. L-C-R circuit.
9. Time constant of an R-C Circuit.
10. Characteristics of solar cell

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COMPUTATIONAL MATHEMATICS LAB
(Common to all Branches)

UNIT- I: Interpolation
Programming Tasks:
A) Write a program to determine y for a given x, if two arrays of x and y of same size are given (using Newton's interpolation both forward and backward)
B) Write a program to determine y for a given x, if two arrays of x and y of same size are given.(using Lagrange 's interpolation)
C) Write a program to determine y for a given x, if two arrays of x and y of same size are given.(using Gauss interpolation)
(Selection criteria of the interpolation formula are important.)

UNIT- II: Curve fitting
Programming Tasks:
A) Write a program to find a line of best fit from the given two arrays of x and y of same size.
B) Write a program to find a curve of the form $y = Ae^{Bx}$ from the given two arrays of x and y of same size.
C) Write a program to find a curve of the form $y = Ax^B$ from the given two arrays of x and y of same size.
D) Write a program to find a curve of the form $y = Ax^2 + Bx + C$ from the given two arrays of x and y of same size.

UNIT- III: Solution of Algebraic and Transcendental Equations
Programming Tasks:
A) Write a program to find the root of a given equation using bisection method.
(Write this program such that the initial values given to the system are not usable, then the system should ask us to give new set of initial values).
B) Write a program to find the root of a given equation using method of false position(regula false position).
C) Write a program to find the root of a given equation using iteration method.
D) Write a program to find the root of a given equation using Newton Rophson method.

UNIT- IV: Linear system of equations
Programming Tasks:
A) Write a program to find the solution of given system of linear equations using L- U decomposition method.
B) Write a program to find the solution of given system of linear equations using jacobi's method.
C) Write a program to find the solution of given system of equations using Gauss sidel iteration method.
D) Write a program to find the solution of given system of equations using Gauss Jordan elimination method.

UNIT-V:Numerical Differentiation, Integration and Numerical solutions of First order differential equations
Programming Tasks:
A) Write a program to evaluate definite integral using trapezoidal rule, Simpson's 1/3rd rule and 3/8th rule.
B) Write a program to solve a given differential equation using Taylor's series.
C) Write a program to solve a given differential equation Euler's and modified Eulers method.
D) Write a program to solve a given differential equation using Ruge-Kutta method.

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MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Prerequisites
1. No prerequisites
2. An understanding of Math in general is sufficient.

Objectives
1. Introduces the elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Outcomes
1. Ability to understand and construct precise mathematical proofs
2. Ability to use logic and set theory to formulate precise statements
3. Ability to analyze and solve counting problems on finite and discrete structures
4. Ability to describe and manipulate sequences
5. Ability to apply graph theory in solving computing problems

UNIT-I: Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT-II: Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discreet Structures, Relations and Ordering, Functions.

UNIT-III: Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

UNIT-IV: Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT-V: Graph Theory: Basic Concepts, Isomorphism and Sub-graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

TEXT BOOKS:
1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE:
1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

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DIGITAL LOGIC DESIGN AND MICRO PROCESSORS

Prerequisites
1. A course on "Computer Programming and Data Structures"

Objectives
1. The aim of the course is to introduce the operations of logic gates and flip-flops; combinational and sequential circuits; design of digital circuits and systems; microprocessors and assembly language programming.
2. The topics include Boolean Algebra, Logic Gates, Flip-Flops, 8086 Architecture, Assembly Language Programming

Outcomes
1. Understand how digital circuits are designed.
2. Able to interconnect digital circuits to a microprocessors
3. Able to interpret and write assembly language programs

UNIT 1
Introduction to number systems: Binary codes, code conversion, Basic of Boolean algebra, Basic theorems and properties of Boolean algebra Canonical and standard form of Boolean function, all digital logic gates-map method of minimization of 4 and 5 variable functions, Don't-care map entries

UNIT II
NAND and nor implementation: Design of Binary adders Subtractors, comparator, decoder, encoder, multiplexers and De-multiplexers using gats/CS Introduction to sequential circuits, latches, Flip flops-SR,JK,JK master slave ,D and T type flip flops, Truth tables and excitation tables conversion of flip flops form

UNIT III
Concept of shift register, operation of shift register, its configuration, operation of asynchronous connotes, Design of Synchronous modulo N- connotes, Design and operation of Ring and twisted Ring connotes

UNIT IV
8086 Architecture: functional diagram, Register organization, memory segmentation, programming model, memory addressing, Physical memory organization, signal descriptions of 8086, interrupts of 8086

UNIT V
Instruction set and Assembly language programming of 8086: instruction formats, addressing models, Instruction set, simple programs involving logical, Branch all instructions, Solving, String manipulations

Text Books:
1. Switching theory and logic design –A. Anand Kumar PHI,2013
2. Advanced microprocessor & Pieperar-A. K. Ray and K.M. Bherchandavi, TMH, 2nd edition.

References:
1. Switching and Finite Automatic theory-Zvi Kohavi ,Niraj K.Jha Cambridge ,3rd edition
2. Digital Design –Morris Mano, PHI, 3rd edition
3. Microprocessor and Interfacing –Douglas V. Hall, TMGH 2nd edition.

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ADVANCED DATA STRUCTURES

Prerequisites
1. A course on "Computer Programming & Data Structures

Objectives
1. Introduces the basic concepts of Abstract Data Types.
2. Reviews basic data structures such as stacks and queues.
3. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs, and B-trees.
4. Introduces sorting and pattern matching algorithms

Outcomes
1. Ability to select the data structures that effeciently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and B-trees.

Unit I:
Review of basic data structures: The list, Stack, Queue, Implementation Using C.
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Unit II:
Hash table representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, and comparison of hashing and skip lists.
Priority Queues – Definition, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion.

Unit III:
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees.

UNIT-IV:
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Quick sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort, Multiway merge, Polyphase merge.

Unit V:
Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXTBOOKS:
1. Fundamentals of data structures in c, 2nd edition, E.Horowitz, S.Sahni and Susan Anderson Freed, University Press
2. Advanced Data Structures and Algorithms, N. Sridhar, R. Siva Ranjini, SMS Education, New Delhi, India.

REFERENCES:
1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press

3. Data structures: A Pseudocode Approach with C, 2nd edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning.
4. Introduction to data structures in c, 1/e Ashok Kamthane
5. Data structures using c – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Prerequisites
1. A course on "Computer Programming & Data Structures"

Objectives
1. Introduces object oriented programming concepts using the Java language.
2. Introduces the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes
3. Introduces the implementation of packages and interfaces
4. Introduces exception handling, event handling and multithreading
5. Introduces the design of Graphical User Interface using applets and swings

Outcomes
1. Develop applications for a range of problems using object-oriented programming techniques
2. Design simple Graphical User Interface applications

UNIT I:
Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II:
Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces, Exploring java.io.

UNIT III:
Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling,Exploring java.util.Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, auto boxing, annotations, generics.

UNIT IV:
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V:
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:
1. Java the complete reference, 7th editon, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Eduction.

REFERENCES:
1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch,
2. John Wiley & sons.
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

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COMPUTER ORGANIZATION AND ARCHITECTURE

Prerequisites
No prerequisites
Co-requisite
A Course on "Digital Logic Design and Microprocessors"

Objectives
1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Outcomes
1. Understand the basics of instructions sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers

UNIT I
Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.
Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.
Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

UNIT II
Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.
Central Processing Unit: General Register Organization, STACK organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT III
Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT IV
Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP).
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT V
Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication and synchronization, Cache Coherence.

Text Books:
1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

Reference:
1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson.

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GENDER SENSITIZATION LAB
(Common to All Branches)
(An Activity-based Course)

Objectives of the Course:
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes:
➢ Students will have developed a better understanding of important issues related to gender in contemporary India.
➢ Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
➢ Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
➢ Students will acquire insight into the gendered division of labour and its relation to politics and economics.
➢ Men and women students and professionals will be better equipped to work and live together as equals.
➢ Students will develop a sense of appreciation of women in all walks of life.
➢ Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER
Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals*: Unit -2)
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Unit-II: GENDER AND BIOLOGY
Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)
Two or Many? Struggles with Discrimination.

Unit-III: GENDER AND LABOUR
Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3)
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

Unit – IV: ISSUES OF VIOLENCE
Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.
Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)
Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

Unit – V: GENDER : CO-EXISTENCE
Just Relationships: Being Together as Equals (*Towards a World of Equals*: Unit -12)
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

<u>**Essential Reading:**</u> **All the Units in the Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender*" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.**

<u>**Note:**</u> **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

Reference Books:
1. Sen, Amartya. "More than One Million Women are Missing." New York Review of Books 37.20 (20 December 1990). Print. '*We Were Making History…' Life Stories of Women in the Telangana People's Struggle*. New Delhi: Kali for Women, 1989.
2. Tripti Lahiri. "By the Numbers: Where Indian Women Work." *Women's Studies Journal* (14 November 2012) Available online at: http:// blogs.wsj.com/ India real time/2012/11/14/by –the-numbers-where-Indan-women-work/>
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India,   Dossier   2:   Telugu   And   Kannada http://harpercollins.co.in/BookDetail.asp?Book_Code=3732
4. Vimala. "Vantillu (The Kitchen)*". Women Writing in India: 600 BC to the Present. Volume II*: The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. *Women's Work and its Impact on Child Health and Nutrition*, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. *"We Were Making History ….' Life Stories of Women in the Telangana People's Struggle*. New Delhi: Kali for Women, 1989.
7. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
8. Jayaprabha, A. "Chupulu (Stares)". *Women Writing in India: 600BC to the Present. Volume II*: The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayan and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis." *International Journal of Humanities and Social Science Invention* 2.4(2013)
10. Gautam, Liela and Gita Ramaswamy. "A 'conversation' between a Daughter and a Mother." *Broadsheet on Contemporary Politics*. Special Issue on *Sexuality and Harassment: Gender Politics on Campus Today*. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research Center for Women's Studies, 2014.
11. Abdulali   Sohaila.   "*I   Fought   For   My   Life…and   Won.*"Available   online   at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
12. Jeganathan Pradeep, Partha Chatterjee (Ed). "*Community, Gender and Violence Subaltern Studies XI*". Permanent Black and Ravi Dayal Publishers, New Delhi, 2000
13. K. Kapadia. The *Violence of Development: The Politics of Identity, Gender and Social Inequalities in India.* London: Zed Books, 2002
14. S. Benhabib. *Situating the Self: Gender, Community, and Postmodernism in Contemporary Ethics,* London: Routledge, 1992
15. Virginia Woolf. *A Room of One's Own.* Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997

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DIGITAL LOGIC DESIGN AND MICRO PROCESSOR LAB

Prerequisites
1. A course on "Computer Programming and Data Structures"

Objectives
1. The aim of the course is to introduce the operations of logic gates and flip-flops; combinational and sequential circuits; design of digital circuits and systems; microprocessors and assembly language programming.
2. The topics include Boolean Algebra, Logic Gates, Flip-Flops, 8086 Architecture, Assembly Language Programming

Outcomes
1. Understand how digital circuits are designed.
2. Able to interconnect digital circuits to a microprocessors
3. Able to interpret and write assembly language programs

Digital Logic Design Lab:

1. Implement of Logic gates using NAND and NOR gates
2. Design Full adder using gates
3. Design and implement of 4:1 MUX,8:1 MUX using gates /Ics.
4. Design and Implement of 3 to 8 decoder using gates
5. Design of 4 bit comparator using gates/IC
6. Design of Implement of 4 bit shift register using Flip flops
7. Design and Implement of Decode counter
8. Design and Implement of Asynchronous counter.

Computer Organization & Micro Processor Lab
Write assembly language programs for the following using MASAM.
1. Write assembly language programs to evaluate the expressions:
    i) a = b + c –d * e
    ii) z = x * y + w − v +u / k
    a. Considering   8-bit, 16 bit and 32 bit binary numbers as b, c, d, e.
    b. Considering 2 digit, 4digit and 8 digit BCD numbers.
    Take the input in consecutive memory locations and results also Display the results by using "int xx" of 8086. Validate program for the boundary conditions.
2. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.
    a. Arrange in ascending and descending order.
3. Find max and minimum
a. Find average
    Considering   8-bit, 16 bit binary numbers and 2 digit, 4digit and 8 digit BCD numbers. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.
4. Write an ALP of 8086 to take a string of as input (in 'C' format)and do the following Operations on it.
    a.   Find the length
    b.   Find it is Palindrome or n
5. Find whether given string substring or not.
    a.   Reverse a string
    b.   Concatenate by taking another sting
        Display the results by using "int xx" of 8086.
6. Write the ALP to implement the above operations as procedures and call from the main procedure.
7. Write an ALP of 8086 to find the factorial of a given number as a Procedure and call from the main program which display the result.

Text Books:
1. Switching theory and logic design –A. Anand Kumar PHI,2013
2. Advanced microprocessor & Pieperar-A. K. Ray and K. M. Bherchandavi, TMH, 2nd edition.

References:
1. Switching and Finite Automatic theory-Zvi Kohavi, Niraj K.Jha Cambridge ,3rd edition
2. Digital Design –Morris Mano, PHI, 3rd edition
3. Microprocessor and Interfacing –Douglas V. Hall, TMGH 2nd edition.

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ADVANCED DATA STRUCTURES THROUGH C LAB

Prerequisites
1. A course on Computer Programming & Data Structures"

Objectives
1. Introduces the basic concepts of Abstract Data Types.
2. Reviews basic data structures such as stacks and queues.
3. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs, and B-trees.
4. Introduces sorting and pattern matching algorithms

Outcomes
1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and B-trees.

1.   Write C programs to implement the following using an array.
        a) Stack   b) Queue

2.   Write C programs to implement the following using a singly linked list.
        a) Stack   b) Queue

3.   Write C programs to implement the deque (double ended queue) using a doubly linked list and an array.

4.   Write a C program to perform the following operations:
        a) Insert an element into a binary search tree.
        b) Delete an element from a binary search tree.
        c) Search for a key element in a binary search tree.

5.   Write C programs that use non-recursive functions to traverse the given binary tree in
        a) Preorder   b) Inorder and   c) Postorder.

6.   Write C programs for the implementation of BFS and DFS algorithms.

7.   Write C programs for implementing the following sorting methods:
        a) Merge sort   b) Heap sort

8.   Write a C program to perform the following operations
        a) Insertion into a B-tree   b) Deletion from a B-tree

9.   Write a C program to perform the following operations
        a) Insertion into an AVL-tree   b) Deletion from an AVL-tree

10.   Write a C program to implement all the functions of a dictionary using hashing.

11.   Write a C program for implementing Knuth-Morris- Pratt pattern matching algorithm.

12.   Write a C program for implementing Boyer – Moore Patten matching   algorithm

TEXTBOOKS:
1. Data structures: A Pseudocode Approach with C, 2nd edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning
2. Advanced Data Structures and Algorithms, N. Sridhar, R. Siva Ranjini, SMS Education, New Delhi, India.

REFERENCES:
1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Data Structures Using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson education.
4. Introduction to Data Structures in C, 1/e Ashok Kamthane
5. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson Freed, Universities Press

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Prerequisites
1. A course on "Computer Programming & Data Structures"
Co-requisite
1. A Course on "Object-Oriented Programming Through Java"

Objectives
1. Introduces object oriented programming concepts using the Java language.
2. Introduces the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes
3. Introduces the implementation of packages and interfaces
4. Introduces exception handling, event handling and multithreading
5. Introduces the design of Graphical User Interface using applets and swings

Outcomes
1. Develop applications for a range of problems using object-oriented programming techniques
2. Design simple Graphical User Interface applications

Use Eclipse or Netbean platform and get acquainted with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

1) Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box. [Use JOption Pane – Input dialog, Message dialog]

2) Write a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea () that prints the area of the given shape.

3) Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

4) Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.

5) Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.

6) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero

7) a) Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.

8) Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a Java program to display the table using Labels in Grid Layout.

9) Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

10) Implement the above program with the database instead of a text file.

11) Write a Java program that prints the meta-data of a given table

Text Books:
1. Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

References:
1. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.
2. Object Oriented Programming through Java, P. Radha Krishna, University Press.

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COMPUTER ORIENTED SATISTICAL METHODS

Prerequisites
    No pre requisites, Foundation course

Objectives
The aim of the course is to understand
    • The theory of Probability, and probability distributions of single and multiple random variables
    • The sampling theory and testing of hypothesis and making inferences
    • The regression and correlation

Outcomes
At the end of the course student is able to
    • Apply the concepts of probability and distributions to some case studies
    • Correlate the material of one unit to the material in other units
    • Resolve the potential misconceptions and hazards in each topic of study.

UNIT-I: Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule,
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence, Joint Probability Distributions.

UNIT-II: Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.
Discrete Probability Distributions: Introduction and Motivation, Binomial and Multinomial Distributions, Hypergeometric Distribution, Negative Binomial and Geometric Distributions, Poisson distribution.

UNIT-III: Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions, Chi-Squared Distribution, Beta Distribution, Lognormal Distribution.
Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S^2, t –Distribution, F-Distribution.

UNIT-IV: One and Two-Sample Estimation Problems: Introduction, Statistical Inference, Classical Methods of Estimation. **Single Sample**: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion. **Two Samples**: Estimating the Difference between Two Means, Paired Observations, Estimating the Difference between Two Proportions,Estimating the Ratio of Two Variances, Maximum Likelihood Estimation.
One and Two-Sample Tests of Hypotheses: Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, The Use of P-Values for Decision Making in Testing Hypotheses, Single Sample: Tests Concerning a Single Mean, Two Samples: Tests on Two Means, Choice of Sample Size for Testing Means, Graphical Methods for Comparing Means, One Sample: Test on a Single Proportion, Two Samples: Tests on Two Proportions, One- and Two-Sample Tests Concerning Variances.

UNIT-V: Linear Regression and Correlation
Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression

Coefficients, Prediction, Choice of a Regression Model, Analysis-of-Variance Approach, Test for Linearity of Regression: Data with Repeated Observations, Correlation.

TEXT BOOK:
1. PROBABILITY & STATISTICS FOR ENGINEERS & SCIENTISTS, 9th Ed. Pearson Pub, *by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye.*

REFERENCE:
1. FUNDAMENTALS OF PROBABILITY AND STATISTICS FOR ENGINEERS**,** *John Wiley & Sons, Ltd, 2004.* **T.T. Soong.**
2. Fundamentals of Mathematical statistics, khanna publications, **S C Gupta and V K Kapoor.**
3. Probability and statistics for Engineers and scientists, academic press**, Sheldon M Ross.**

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DESIGN AND ANALYSIS OF ALGORITHMS

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"

Objectives
1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Outcomes
1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT I:
Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis. **Divide and conquer**: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT II:
Disjoint Sets: Disjoint set operations, union and find algorithms, spanning trees. **Backtracking**: General method, applications ̶ n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles, connected components and bi connected components.

UNIT III:
Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT IV:
Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT V:
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.
NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

Text Books:
1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

References:
1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, Second Edition, T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and Sons.

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FORMAL LANGUAGES AND AUTOMATA THEORY

Prerequisites
1. A course on "Mathematical Foundations of Computer Science"

Objectives
1. Introduces the fundamental concepts of formal languages, grammars and automata theory.
2. Topics include finite automata, regular expressions, regular languages and their properties, context-free grammars, context-free languages and their properties, pushdown automata, Turing machines and un decidability.

Outcomes
1. Gain proficiency in classifying machines by their power in recognizing languages.
2. Learn to employ finite state machines for modeling and solving computing problems.
3. Comprehend the hierarchy of problems arising in computing

Unit I
Introduction to Finite Automata. Structural Representations. Automata and Complexity. The Central Concepts of Automata Theory Alphabets. Strings. Languages. Problems. **Deterministic Finite Automata.** Definition of a Deterministic Finite Automaton. How a DFA Processes Strings. Simpler Notations for DFA's. Extending the Transition Function to Strings. The Language of a DFA
Nondeterministic Finite Automata .Definition of Nondeterministic Finite Automata. The Extended Transition Function. The Language of an NFA. Equivalence of Deterministic and Nondeterministic Finite Automata. An Application: Text Search. Finding Strings in Text. Nondeterministic Finite Automata for Text Search. A DFA to Recognize a Set of Keywords. Finite Automata with Epsilon-Transitions. Uses of e-Transitions. The Formal Notation for an e-NFA. Epsilon-Closures .Extended Transitions and Languages for e-NFA's. Eliminating e-Transitions.

UNIT II
Regular Expressions: The Operators of Regular Expressions. Building Regular Expressions. Precedence of Regular-Expression Operators. Finite Automata and Regular Expressions. From DFA's to Regular Expressions. Converting DFA's to Regular Expressions by Eliminating States. Converting Regular Expressions to Automata. Applications of Regular Expressions. Regular Expressions in UNIX. Lexical Analysis. Finding Patterns in Text. Algebraic Laws for Regular Expressions. Associativity and Commutativity. Identities and Annihilators. Distributive Laws. The Idempotent Law. Laws Involving Closures. Discovering Laws for Regular Expressions.
The Pumping Lemma for Regular Languages. Pumping Lemma for Regular Languages. Applications of the Pumping Lemma
Closure Properties of Regular Languages. Closure of Regular Languages Under Boolean Operations. Reversal. Homomorphisms. Inverse Homomorphisms. Decision Properties of Regular Languages. Converting Among Representations. Testing Emptiness of Regular Languages. Testing Membership in a Regular Language.
Equivalence and Minimization of Automata. Testing Equivalence of States. Testing Equivalence of Regular Languages. Minimization of DFA's.

UNIT III
Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar. Leftmost and Rightmost Derivations. The Language of a Grammar. Sentential Forms. Parse Tress. Constructing Parse Trees. The Yield of a Parse Tree. Inference, Derivations, and Parse Trees. From Inferences to Trees. From Trees to Derivations. From Derivations to Recursive Inferences. Applications of Context-Free Grammars. Parsers. The YACC Parser-Generator. Mark-up Languages. XML and Document-Type Definitions.
Ambiguity in Grammars and Languages. Ambiguous Grammars. Removing Ambiguity From Grammars. Leftmost Derivations as a Way to Express Ambiguity. Inherent Ambiguity.

Push Down Automata: Definition of the Pushdown Automaton. The Formal Definition of Pushdown Automata. A Graphical Notation for PDA's. Instantaneous Descriptions of a PDA. The Languages of a PDA. Acceptance by Final State. Acceptance by Empty Stack. From Empty Stack to Final State. From Final State to Empty Stack Equivalence of PDA's and CFG's. From Grammar to Pushdown Automata. From PDA's to Grammars. Deterministic Pushdown Automata. Definition of a Deterministic PDA. Regular Languages and Deterministic PDA's. DPDA's and Context-Free Languages. DPDA's and Ambiguous Grammars.

UNIT IV
Normal Forms for Context-Free Grammars. Eliminating Useless Symbols. Computing the Generating and Reachable Symbols. Eliminating e-Productions. Eliminating Unit Productions. Chomsky Normal Form.
The Pumping Lemma for Context-Free Languages. The Size of Parse Trees. Statement of the Pumping Lemma. Applications of the Pumping Lemma for CFL's.
Closure Properties of Context-Free Languages. Substitutions. Applications of the Substitution Theorem. Reversal. Intersection with a Regular Language, Inverse Homomorphism, Decision Properties of CFL's. Complexity of Converting among CFG's and PDA's. Running
Introduction to Turing Machines.
Problems That Computers Cannot Solve. Programs The Turing Machine. Notation for the Turing Machine. Instantaneous Descriptions for the Turing Machines. Transition Diagrams for Turing Machines. The Language of a Turing Machine. Turing Machines and Halting. Programming Techniques for Turing Machines. Storage in the State. Multiple Tracks. Shifting Over. Multiple Turing Machines. Equivalence of One-Tape and Multi-tape Nondeterministic Turing Machines. Restricted Turing Machine Turing Machines With Semi-infinite Tapes. Multi-stack Machines. Counter Machines. The Power of Counter Machines. Turing Machines and Computers. Simulating a Turing Machine by Computer. Simulating a Computer by a Turing Machine.

UNIT V
Undecidability: A Language that is Not Recursively Enumerable. Enumerating the Binary Strings. Codes for Turing Machines .The Diagonalization Language. An Undecidable Problem That is RE. Recursive Languages. Complements of Recursive and RE Languages. The Universal Language. Undecidability of the Universal Language. Undecidable Problems about Turing Machines. Reductions. Turing Machines that Accept the Empty Language. Rice's Theorem and Properties of the RE Languages. Problems about Turing-Machine Specifications. Post's Correspondence Problem. Definition of Post's Correspondence Problem. The "Modified" PCP.Completion of the Proof of PCP Undecidability. Other Undecidable Problems. Problems about Programs.
Intractable Problems: The Classes P and NP. Problems Solvable in Polynomial Time. An Example: Kruskal's Algorithm. Nondeterministic Polynomial Time. An NP Example: The Traveling Salesman Problem. Polynomial-Time Reductions. NP-Complete Problems. An NP-Complete Problem. The Satisfiability Problem Representing SAT Instances NP-Completeness of the SAT Problem.
Additional Classes of Problems: Complements of Languages in NP. The Class of Languages CoNP.NP-Complete Problems and NP. Problems Solvable in Polynomial Space. Polynomial-Space Turing Machines. Relationship of PS and NPS to Previously Defined Classes. Deterministic and Nondeterministic Polynomial Space. A Problem That Is Complete for PS.

Text Book:
1. Introduction to Automata Theory, Languages, and Computation, 2nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education

References:
1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to Languages and The Theory of Computation, John C Martic, TMH

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SOFTWARE ENGINEERING

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Object Oriented Programming Through Java"

Objectives
1. The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Outcomes
1. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
2. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT-I:
Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.
A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.
Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT-II:
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.
System models: Context models, behavioral models, data models, object models, structured methods.

UNIT-III:
Design Engineering: Design process and design quality, design concepts, the design model.
Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT-IV:
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT-V:
Metrics for Process and Products: Software measurement, metrics for software quality.
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Text Books:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

References:
1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object oriented design using UML Meiler page-Jones: Pearson Education.

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OPERATING SYSTEMS

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Computer Organization and Architecture"

Objectives
1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
2. Introduce the issues to be considered in the design and development of operating system
3. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix

Outcomes
1. Will be able to control access to a computer and the files that may be shared
2. Demonstrate the knowledge of the components of computer and their respective roles in computing.
3. Ability to recognize and resolve user problems with standard operating environments.
4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT I:
Operating System Introduction, Structures - Simple Batch, Multi programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls, Virtual Machines, System Design and Implementation.
UNIX/LINUX Utilities - Introduction to Unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, text processing utilities and backup utilities.

UNIT II:
Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling, Real-Time Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT – III:
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.
Inter process Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory, semaphores.

UNIT IV
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT V:
File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Unix/LINUX Files: File structure, directories, files and devices, System calls, library functions, low level file access, usage of open, create, read, write, close, lseek, stat, ioctl.

TEXT BOOKS:
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:
1. Operating Systems – Internals and Design Principles Stallings,   Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach-Crowley,TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
5. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.

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SCRIPTING LANGUAGES LAB

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Object Oriented Programming through Java"

Objectives
1. This course provides an introduction to the script programming paradigm, and introduces scripting languages such as Perl, PHP and Python.

Outcomes
1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, PHP and Python; and select an appropriate language for a solving a giving problem

Practical Extraction Reporting Language (PERL)
1. a) Write a Perl script to find the largest number among three numbers.
   b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
2. Write a Perl program to implement the following list of manipulating functions
   a) Shift
   b) Unshift
   c) Push
3. a) Write a Perl script to substitute a word, with another word in a string.
4. b) Write a Perl script to validate IP address and email address.
5. Write a Perl script to print the file in reverse order using command line arguments

Personal Home Page (PHP).
1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
   a. Find the length of a string.
   b. Count no of words in a string.
   c. Reverse a string.
   d. Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.

Python.
1. Write a python program to solve a quadratic equation.
2. a) Write a python program to find the factorial of a number.
   b) Write a python program to generate Fibonacci series.
3. Write a python program to make a simple calculator.
4. a). Write a python program to sort words in alphabetical order.
5. b) Write a python program to add two matrices.

Text Books:
1. Programming Perl, 4th edition. Larry Wall, Tom Christiansen, and Jon Orwant. O'Reilly, 2012.
2. Programming PHP, 3rd edition. Rasmus Lerdorf, Kevin Tatroe, and Peter MacIntyre. O'Reilly, 2013.
3. Programming Python, 4th edition. Powerful Object-Oriented Programming. Mark Lutz. O'Reilly, 2010.

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OPERATING SYSTEMS LAB
(Using UNIX/LINUX)

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Computer Organization and Architecture"

Co-requisite
1. A course on "Operating Systems"

Objectives
1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix

Outcomes
1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to write C programs using Unix system calls

Week 1
　　1. Write C programs to simulate the following CPU Scheduling algorithms:
　　　　a. FCFS　b.　SJF　c.　Round Robin　d.　priority

Week 2
　　1. Write C programs to illustrate the following system calls of UNIX/LINUX operating system:
　　(fork, exec, getpid, exit, wait)

Week 3
　　1. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

Week 4
　　1. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

Weeks 5 &6
　　1. Write C programs to illustrate the following IPC mechanisms:
　　　　a. Pipes　b.　FIFOs　c.　Message queues　d.　Shared memory

Weeks 7 & 8
　　1. Write C programs to simulate the following memory management techniques:
　　　a. Variable Memory　　　　b. Fixed Memory　　　　c.　Paging　d.　Segmentation
　　　 technique　　　　　　　　　Technique
Week 9
　　1. Write programs using the I/O system calls of UNIX/LINUX operating system:
　　(open, read, write, close, fcntl, seek, stat, opendir, readdir)

Weeks 10 & 11
　　1. Write C programs to simulate the following file organization Techniques:
　　　　a. Single level　b.　Two level　c.　Hierarchical　d.　DAG

Week 12
　　1. Write C programs to simulate the following file allocation strategies:
　　　　　　　　a. Sequential　　　b.　Linked　c.　Indexed

Week 13
1. Write C programs to simulate the following Page Replacement Techniques:
    a.   FIFO   b.   LRU   c.   Optimal

TEXT BOOKS:
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W. R. Stevens, Pearson education.

REFERENCE BOOKS:
1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005,
2. Pearson Education/PHI
3. Operating System A Design Approach-Crowley,TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI
5. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
6. Unix Internals The New Frontiers, U. Vahalia, Pearson Education.

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SOFTWARE ENGINEERING LAB

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Object Oriented Programming Through Java"

Co-requisite
1.   A Course on "Software Engineering"

Objectives
1. To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Outcomes
1. Ability to translate end-user requirements into system and software requirements
2. Ability to generate a high level design of the system from the software requirements
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

LIST OF EXPERIMENTS

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1) Development of problem statement.
2) Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3) Preparation of Software Configuration Management and Risk Management related documents.
4) Study and usage of any Design phase CASE tool
5) Performing the Design by using any Design phase CASE tools.
6) Develop test cases for unit testing and integration testing
7) Develop test cases for various white box and black box testing techniques.

Sample Projects:
1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Text Books:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

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HUMAN VALUES AND PROFESSIONAL ETHICS

Course Objectives
1. To introduce the basic concepts of universal human values
2. To familiarize the students with desirable business and professional ethics, rights and responsibilities
3. To prepare students against possible gaps and unethical practices in contemporary times
4. To sensitise the students so that they can protect themselves and the organization from the possible professional crime malpractices

Learning Outcomes
1. The students learn about diverse ethical issues rooted in society, trade, business, and environment on local as well as a global platform.
2. The students appreciate their role as a responsible citizen, professional, and as managers, advisors, experts and consultants.
3. The students will reflect and learn major values and ethics from their observations of a spiritual discourse and a visit to a business organization as a practical part of this course.

Unit I Human Values: Morals, values, ethics – integrity – work ethics –service learning –civic virtue – respect for others- living peacefully - Caring –sharing –honesty – courage –valuing time – cooperation – commitment –empathy – self-confidence –spirituality – character- Mini-Cases

Unit II Professional Ethics: Profession- and professionalism - Two models of professionalism – Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards –Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct of Institute of Engineers. Mini-cases.

Unit III Professional Responsibilities: Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks- Risk benefit analysis– congeniality, collegiality and loyalty. Respect for authority – conflicts of interest –Mini-Cases.

Unit IV Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Regulatory compliances, Monitoring and control- Mini-Cases

Unit V Ethics in global context: Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – negotiating taxes. Mini-Cases.

Mini-projects
Project 1: The student of this course should invariably attend (or watch on internet/any TV channel/ Youtube/ social media) two speeches of 30 minutes duration each dealing with spiritual discourse and submit a report on the contents of the lecture proceedings.

Project 2: Visit any organization (including shops/ hotels or shopping malls in your region) of your choice and observe how the professionals perform the given job with a focus on professional ethics and human values.

References
1. Aryasri, *Human Values and Professional Ethics*, Maruthi Publications.
2. S B George, *Human Values and Professional Ethics,* Vikas Publishing.
3. KR Govindan & Saenthil Kumar:Professional *Ethics and Human Values*, Anuradha Publications.
4. S K Chakraborthy & D.Chakraborthy: *Human Values and Ethics*, Himalaya.
5. M. Govindarajan, S. Natarajan, & V.S. Senthilkumar: *Engineering Ethics(Includes Human Values),* HI Learning Pvt. Ltd., New Delhi – 110001

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COMPUTER NETWORKS

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Design and Analysis of Algorithms"

Objectives
1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.
3. The following topics are included: Reference models, the physical layer (transmission media); the data link layer (error detection and correction, point-to-point protocols); the medium access layer protocols; the network layer (routing algorithms, congestion control); internetworking (addressing, internetwork routing and protocols, quality of service); the transport layer (connection-oriented transport layer services and protocols); application layer protocols

Outcomes
1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be appled in network design and implementation.

UNIT-I
Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT-II
Data link layer: Design issues, framing, Error detection and correction.
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT-III
Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT –IV
Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT –V
Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:
1. Computer Networks -- Andrew S Tanenbaum, David. J. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:
1. An Engineering Approach to Computer Networks-S.Keshav,2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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COMPILER DESIGN

Prerequisites
1. A course on "Formal Languages and Automata Theory"
2. A course on "Computer Programming and Data Structures"

Objectives
1. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
2. Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis.

Outcomes
1. Demonstrate the ability to design a compiler given a set of language features.
2. Demonstrate thE knowledge of patterns, tokens & regular expressions for lexical analysis.
3. Acquire skills in using lex tool & yacc tool for developing a scanner and parser.
4. Design and implement LL and LR parsers
5. Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
6. Design algorithms to generate machine code.

Unit 1
Introduction: The structure of a compiler, the science of building a compiler, programming language basics
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

Unit II
Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

Unit III
Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

Unit IV
Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.
Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

Unit V
Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

Text Book:
1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

References:
1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson..

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DATABASE MANAGEMENT SYSTEMS

Prerequisites
1. A course on "Advanced Data Structures"

Objectives
1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Outcomes
1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques

UNIT I:
Database System Applications: database system Vs. file system, view of data, data abstraction, instances and schemas, data models, the ER model, relational model, other models, database languages, DDL, DML, database access for application programs, database users and administrator, transaction management, database system structure, storage manager, the query processor, history of data base systems, data base design and ER diagrams, beyond ER design entities, attributes and entity sets, relationships and relationship sets, additional features of ER model, concept design with the ER Model, conceptual design for large enterprises.

UNIT II:
Introduction to the Relational Model: integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views, form of basic SQL query, examples of basic SQL queries, introduction to nested queries, correlated nested queries, set comparison operators, aggregation operators, NULL values, comparison using null values, logical connectivity's, AND, OR and NOT, impact on SQL constructs, outer joins, disallowing NULL values, complex integrity constraints in SQL, triggers and active data bases, Oracle, SQL Server, DB2.

UNIT III:
Relational Algebra: Selection and projection, set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.
Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, dependency preserving decomposition, schema refinement in database design, multi valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT IV:
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity.
Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with loss of nonvolatile storage, Advance Recovery systems, Remote Backup systems.

UNIT V:
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File

Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

References:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
4. Oracle for Professionals, the X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Aim:
1. To understand the concepts and importance of economics in managerial problems
2. To understand the basic financial management concepts including the principles of financial analysis

Learning outcomes:
➢ Students will be able to apply the principles of economics for managerial decisions.
➢ The students will be able to analyse the financial position of a company with the techniques of financial accounting and ratio analysis

Unit I Introduction & Demand Analysis: Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. *Elasticity of Demand*: Types, Measurement and Significance of Elasticity of Demand. *Demand Forecasting*- methods of demand forecasting.

Unit II Production & Cost Analysis: *Production Function* – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III Markets & Forms of Business Organisations: Types of competition and Markets, Features of Perfect competition and Monopoly. Price-Output Determination in case of Perfect Competition and Monopoly. *Pricing*: Objectives and Policies of Pricing. Methods of Pricing. *Business:* Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Limited companies.

Unit IV Capital Budgeting: Methods and sources of raising capital - Capital Budgeting: Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Unit V Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions -Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). *Financial Analysis***:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

TEXT BOOKS:
1. Aryasri: Managerial Economics and Financial Analysis, TMH,.
2. Vijay Kumar & Appa Rao Managerial Ecoconomics & Financial Analysis, Cengage.
3. J. V. Prabhakar Rao & P.V. Rao Managerial Economics & Financial Analysis, Maruthi Publishers,

REFERENCES:
1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson,
3. Lipsey & Chrystel, Economics, Oxford University Press, Domnick Salvatore: Managerial Economics In a Global Economy, Thomson,.
4. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI, 2012.

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DATABASE MANAGEMENT SYSTEMS LAB

Co-requisites
1. Co-requisite of course "Database Management Systems"

Objectives
1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

Outcomes
1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers

List of Experiments:-
1) Concept design with E-R Model

2) Relational Model

3) Normalization

4) Practicing DDL commands

5) Practicing DML commands

6) Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)

7) Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.

8) Triggers (Creation of insert trigger, delete trigger, update trigger)

9) Procedures

10) Usage of Cursors

Text Books:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

References:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition

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COMPILER DESIGN LAB

Prerequisites
1. A course on "Formal Languages and Automata Theory"
2. A course on "Computer Programming and Data Structures"

Co-requisite
1. A course on "Compiler Design"

Objectives
1. To provide practical programming skills necessary for constructing a compiler.

Outcomes
1. Ability to design a compiler given a set of language features.
2. Ability to use the knowledge of patterns, tokens & regular expressions for lexical analysis.
3. Able to use lex tool & yacc tool to develop a scanner & parser.
4. Design and implement LL(1), SLR, LR(1), LALR and operator precedence parsers
5. Generation of machine code

List of Experiments:-

1. Design a DFA to accept all strings containing a substring(01)

2. Write a LEX Program to scan reserved word & Identifiers of C Language

3. Write a LEX Program to scan integers as Float Numbers in C Language

4. Implement Predictive Parsing algorithm

5. Implement RD Parser for the Grammar

    S->AB

    A->a/E

    B->b/E

6. Write a C program to generate three address code.

7. Implement SLR(1) Parsing algorithm

8. Write a YACC program to parse the Strings.

Text Books:
1. Compilers: Principles, Techniques and Tools: Alfred V.Aho,Ravi Sethi, Jeffrey D. Ullman; Pearson Education
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

References:
1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Louden, Thomson..

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COMPUTER NETWORKS LAB

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Design and Analysis of Algorithms"

Co-requisite
1. A course on "Computer Networks"

Objectives
1. Intended to provide practical exposure of the concepts in computer networks.
2. Provide hands on experience of designing, modeling, and evaluation of computer networks

Outcomes
1. Implement data link layer framing methods.
2. Implement error correction and detection techniques.
3. Implement data link layer protocols
4. Implement routing and congestion algorithms
5. Implement encryption algorithms
6. Able to create a scenario and study the performance of computer networks and protocols

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.

2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP

3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.

4. Implement Dijsktra's algorithm to compute the shortest path through a network

5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.

6. Implement instance vector routing algorithm for obtaining routing tables at each node.

7. Implement data encryption and data decryption.

8. Using a simulation software

   i. Create a scenario and study the performance of CSMA/CD protocol
   ii. Create a scenario and study the performance of token bus and token ring
   iii. Study Transmission Control Protocol

TEXT BOOK:
1. Computer Networks -- Andrew S Tanenbaum, David. J. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:
1. An Engineering Approach to Computer Networks-S.Keshav,2nd Edition,Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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DATA WAREHOUSING AND DATAMINING

Prerequisites
1. A course on "Database Management Systems"
2. Knowledge of probability and statistics

Objectives
1. This course presents the techniques for preprocessing data before mining, and describes the concepts related to data warehousing, On-Line Analytical Processing (OLAP), and data generalization.
2. It also presents methods for mining frequent patterns, associations, and correlations.
3. It then describes methods for data classification and prediction, and data-clustering approaches.

Outcomes
1. Examine the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
2. Apply preprocessing statistical methods for any given raw data.
3. Devise efficient and cost effective methods for designing and maintaining data warehouses.
4. Extract interesting patterns from large amounts of data that can be used for further analysis, for example in machine learning and prediction.
5. Discover the role played by data mining in various fields.
6. Choose and employ suitable data mining algorithms to build analytical applications
7. Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT-I Data mining
Data-Types of Data-, Data Mining Functionalities- Interestingness Patterns-Classification of Data Mining systems- Data mining Task primitives -Integration of Data mining system with a Data warehouse-Major issues in Data Mining-Data Preprocessing.

UNIT-II Data warehouse and business analysis
Data Warehouse-Data Warehouse Architecture- Multidimensional Data Model-Data cube and OLAP Technology-Data Warehouse Implementation -DBMS schemas for Decision support - Efficient methods for Data cube computation.

UNIT-III Association rule mining and classification
Mining Frequent Patterns-Associations and correlations- Mining Methods- Mining Various kinds of Association Rules- Correlation Analysis- Constraint based Association mining.-Classification and Prediction- Basic concepts-Decision tree induction-Bayesian classification, Rule-based classification - classification by Back propagation,-Support vector machines-.Associative Classification, Lazy learners-Other classification methods – Prediction.

UNIT-IV Clustering and applications
Cluster analysis-Types of Data in Cluster Analysis-Categorization of Major Clustering Methods-Partitioning Methods,-Hierarchical Methods- Density-Based Methods,-Grid-Based Methods,-Model-Based Clustering Methods- Clustering high dimensional data-Constraint- Based cluster analysis-Outlier Analysis

UNIT V Mining data streams, time-series and sequence data
Basic concepts- Mining data streams-Mining Time-series data--Mining sequence patterns in Transactional databases-.Mining Object- Spatial- Multimedia-Text and Web data- Spatial Data mining- Multimedia Data mining--Text Mining- Mining the World Wide Web.

Text Books:
1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Elsevier.
2. Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007

References:
1. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.
2. Data Mining Introductory and Advanced topics–Margaret H Dunham, Pearson Education.

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WEB TECHNOLOGIES

Prerequisites
1. A course on "Computer Programming and Data Structures"
2. A course on "Objected-Oriented Programming Through Java"

Objectives
1. To learn the basic web concepts and Internet protocols
2. To introduce XML and processing of XML data
3. To introduce client side scripting with Javascript and DHTML
4. To introduce server side programming with Java servlets and JSP

Outcomes
1. Ability to create dynamic and interactive web sites
2. Gain knowledge of client side scripting using java sript and DHTML.
3. Demonstrate understanding of what is XML and how to parse and use XML data
4. Able to do server side programming with Java Servelets and JSP

UNIT I: Introduction
Web Essentials - Clients, Servers and Communication:
The Internet, Basic Internet Protocols: TCP/IP, UDP, DNS, The World Wide Web: Hypertext Transport Protocol, HTTP Request Message, HTTP Response Message, Web Clients, Web Servers.
Markup Languages – **HTML**: Basic Tags, Forms, Style sheets

UNIT II: Client-Side Programming
Introduction to JavaScript, JavaScript in Perspective, Basic Syntax, Variables and Data Types, Statements, Operators, Literals, Functions, Objects, Arrays, Built-in Objects, JavaScript Debuggers.
Host Objects - Browsers and the DOM: Introduction to the Document Object Model, Intrinsic Event Handling, Modifying Element Style, The Document Tree, DOM Event Handling.

UNIT III: Server-Side Programming
Java Servlets: Servlet Architecture, Servlets Generating Dynamic Content, Servlet Life Cycle, Parameter Data, Sessions, Cookies, URL Rewriting, Case Study.

UNIT IV: Representing Web Data
XML: XML Documents and Vocabularies, XML Versions and the XML Declaration, XML Namespaces, DOM-Based XML Processing, Event-oriented Parsing: SAX, Transforming XML Documents, Selecting XML Data: XPath, Template-based Transformation: XSLT, Displaying XML Documents in Browsers, Case Study .

UNIT V: Separating Programming and Presentation
JSP Technology: Introduction to JavaServer Pages, Running JSP Applications, Basic JSP, JavaBeans Classes and JSP, Tag Libraries and Files, Support for the Model-View-Controller Paradigm, Case Study.

TEXT BOOKS:
1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCES:
1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel,"Java How to Program", Prentice Hall of India, 8th Edition
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

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PROFESSIONAL ELECTIVE - I
ARTIFICIAL INTELLIGENCE

Prerequisites

1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"
3. A course on "Design and Analysis of Algorithms"
4. A course on "Mathematical Foundations of Computer Science"

Objectives

1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, expert systems, machine learning and natural language processing

Outcomes

1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimaate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem
4. Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.

UNIT I
Introduction:
AI problems, The Underlying Assumption, AI Techniques, The Level of the Model, Criteria for Success
Problems, Problem Spaces and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs
Heuristic Search Techniques:
Generate – and – Test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT II
Knowledge Representation:
Issues in Knowledge Representation, Representing Simple Facts in Predicate Logic, Representing Instance and ISA Relations, Computable Functions and Predicates, Resolution, Natural Deduction
Representing Knowledge Using Rules: Procedural Vs Declarative Knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge
Weak Slot – and – Filler Structures: semantic nets, frames
Strong Slot – and – Filler Structures: conceptual dependency, scripts, CYC

UNIT III
Reasoning Techniques: Introduction to Non-monotonic reasoning, Logics for Non-monotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation of Depth First Search and Breadth First Search, Probability and Bayes Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks.

UNIT IV
Game Playing: Overview, Minimax Search, Alpha – Beta Cutoffs
Planning System: Overview, The Blocks World, Components of a Planning System, Goal Stack Planning, Hierarchical Planning
Understanding: Understanding as constraint satisfaction, Waltz Algorithm
Natural Language Processing: Introduction, Syntactic Processing, Augmented Transition Networks, Semantic Analysis

UNIT V
Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees
Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

Text Books:
1)　Artificial Intelligence" 3rd Edn. , E.Rich and K.Knight (TMH)

References:
1)　Artificial Intelligence A Modern Approach, Second Edition, Stuart Russell, Peter Norvig, PHI/ Pearson Education.
2)　Artificial Intelligence and Expert systems – Patterson PHI

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Professional Elective - I
COMPUTER GRAPHICS

Prerequisites
1. Familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.
2. A course on "Computer Programming and Data Structures"

Objectives
1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Outcomes
1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT-I:
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid-point circle and ellipse algorithms
Filled area primitives: Scan-line polygon fill algorithm, boundary-fill and flood-fill algorithms

UNIT-II:
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm, Polygon Filling

UNIT-III:
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT-IV:
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT-V:
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications
Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Text Books:
1. "Computer Graphics *C version*", Donald Hearn and M.Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

References:
1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

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Professional Elective -I
SOFTWARE PROJECT MANAGEMENT

Prerequisites
1. A course on "Software Engineering"

Objectives
1. To develop skills in software project management
2. The topics include-software economics; software development life cycle; artifacts of the process; workflows; checkpoints; project organization and responsibilities; project control and process instrumentation;

Outcomes
1. Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation.
2. Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.
3. Design and develop software product using conventional and modern principles of software project management

UNIT I
Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software economics, pragmatic software cost estimation.

UNIT II
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT III
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. **Model based software architectures:** A Management perspective and technical perspective. **Work Flows of the process:** Software process workflows, Iteration workflows.

UNIT IV
Checkpoints of the process: Major milestones, Minor Milestones, Periodic status assessments. Iterative Process Planning**:** work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation**:** Automation building blocks, The Project Environment.

UNIT V
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process**:** Process discriminates.
Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions.
Case Study: The command Center Processing and Display system- Replacement (CCPDS-R).

Text Books:
1. Software Project Management, Walker Royce: Pearson Education, 2005.

References:
1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

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Professional Elective -I
SPEECH PROCESSING

Prerequisites
1. A course on "Mathematics II"
2. A course on "Computer Oriented Statistical Methods"
3. Generally, a basic knowledge of signals and systems, linear algebra, and probability and statistics and programming experience in a high-level language is required.

Objectives
1. The aim of the course is to familiarize students with the basic characteristics of the speech signal with regard to the production and perception of speech by humans.
2. To describe the basic techniques and practical aspects of speech analysis.
3. To present an overview of speech processing applications (such as speech recognition and speaker recognition)
4. The course includes the topics such as speech production, speech analysis, speech enhancement, speech and speaker recognition

Outcomes
1. Ability to understand and describe the mechanisms of speech production.
2. Ability to determine speech sound from the acoustic characteristics.
3. Ability to analyze the speech signal in time and frequency domains, and in terms of the parameters of a source-filter model.
4. Describe and implement methods for speech enhancement.
5. Design a simple speech processing system that recognizes a limited number of isolated words; and a speaker recognition system.

UNIT I: Fundamentals of Digital Speech Processing: Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform Lossless Tube Model, Effect of Losses In Vocal Tract, Effect of Radiation at Lips, Digital Models for Speech Signals.

UNIT II: Time Domain Models for Speech Processing: Introduction, Window Considerations, Short-Time-Energy and Average Magnitude Short Time Average Zero Crossing Rate, Speech Vs Silence Discrimination Using Energy and Zero Crossing, Pitch Period Estimation using a Parallel Processing Approach, The Short Time Autocorrelation Function, The Short Time Average Magnitude Difference Function, Pitch Period Estimation using The Autocorrelation Function.

UNIT III: Linear Predictive Coding (LPC) Analysis: Basic Principles of Linear Predictive Analysis, The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution For the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection Using LPC Parameters, Formant Analysis Using LPC Parameters.

UNIT IV: Homomorphic Speech Processing: Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder
Speech Enhancement: Nature of Interfering Sounds, Speech Enhancement Techniques: Single Microphone Approach: Spectral Subtraction, Enhancement by Re-synthesis, Combo Filter, Wiener Filter, Multi Microphone Approach.

UNIT V: Automatic Speech & Speaker Recognition: Basic Pattern Recognition Approaches, Parametric Representation of Speech, Evaluating the Similarity of Speech Patterns, Isolated Digit Recognition System, Continuous Digit Recognition System
Hidden Markov Model (HMM) For Speech: Hidden Markov Model (HMM) for Speech Recognition, Viterbi algorithm, Training and Testing using HMMS

Speaker Recognition: Recognition techniques, Features That Distinguish Speaker, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:
1. Digital Processing of Speech Signals: **L.R Rabiner and R W Jhaung**, 1978, Pearson Education.
2. Digital Processing of Speech Signals: **L.R. Rabiner and S. W. Schafer,** Pearson Education.
3. Speech Communications: **Human & Machine - Douglas O'Shaughnessy**, 2nd Ed., Wiley India, 2000.

REFERENCE BOOKS:
1. Discrete Time Speech Signal Processing: Principles and Practice - **Thomas F. Quateri**, 1st Ed., PE.
2. Speech & Audio Signal Processing: **Ben Gold & Nelson Morgan**, 1st Ed., Wiley.

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PROFESSIONAL ELECTIVE-I
PRINCIPLES OF PROGRAMMING LANGUAGES

Prerequisites
1. A course on "Mathematical Foundations of Computer Science"
2. A course on "Computer Programming and Data Structures"

Objectives
1. Introduce important paradigms of programming languages
2. To provide conceptual understanding of high level language design and implementation
3. Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logic programming languages; and scripting languages

Outcomes
1. Acquire the skills for expressing syntax and semantics in formal notation
2. Identify and apply a suitable programming paradigm for a given computing application
3. Gain knowledge of and able to compare the features of various programming languages

UNIT-I
Preliminary Concepts: reasons for studying concepts of programming languages, programming domains, language evaluation criteria, influences on language design, language categories, language design trade-offs, implementation methods, programming environments
Major Programming Languages –LISP, ALGOL-60, COBOL, BASIC, PL/I, APL, SNOBOL, SIMULA67, ALGOL 68, Prolog, Ada, C++, Java, Scripting Languages, C#, Markup/Programming Hybrid Languages.
Syntax and Semantics: general problem of describing syntax and semantics, formal methods of describing syntax attribute grammars, describing the meanings of programs

UNIT-II
Names, Bindings, and Scopes: introduction, names, variables, concept of binding, scope, scope and lifetime, referencing environments, named constants
Data types: introduction, primitive, character string types, user defined ordinal types, array, associative arrays, record, union, tuple types, list types, pointer and reference types, type checking, strong typing, type equivalence
Expressions and Statements: arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions, short circuit evaluation, assignment statements, mixed-mode assignment
Control Structures – introduction, selection statements, iterative statements, unconditional branching, guarded commands.

UNIT-III
Subprograms and Blocks: Fundamentals of sub-programs, design issues for subprograms, local referencing environments, parameter passing methods, parameters that are subprograms, calling subprograms indirectly, overloaded subprograms, generic subprograms, design issues for functions, user defined overloaded operators, closures, co routines
Implementing subprograms: general semantics of calls and returns, implementing simple subprograms, implementing subprograms with stack-dynamic local variables, nested subprograms, blocks, implementing dynamic scoping
Abstract Data types: The concept of abstraction, introductions to data abstraction, design issues, language examples, parameterized ADT, encapsulation constructs, naming encapsulations

UNIT-IV
Concurrency: introduction, introduction to subprogram level concurrency, semaphores, monitors, message passing, Java threads, concurrency in function languages, statement level concurrency.

Exception Handling and Event Handling: Introduction, exception handling in Ada, C++, Java, introduction to event handling, event handling with Java and C#.

UNIT-V
Functional Programming Languages: Introduction, mathematical functions, fundamentals of functional programming language, LISP, support for functional programming in primarily imperative languages, comparison of functional and imperative languages
Logic Programming Language: Introduction, an overview of logic programming, basic elements of prolog, applications of logic programming.
Scripting Language: Pragmatics, Key Concepts, Case Study : Python – Values and Types, Variables , Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

Text Books:
1. Concepts of Programming Languages Robert .W. Sebesta 10/e, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech, 2007.

References:
1. Programming Languages, 2nd Edition, A.B. Tucker, R.E. Noonan, TMH.
2. Programming Languages, K. C.Louden, 2nd Edition, Thomson,2003.

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PROFESSIONAL ELECTIVE-II
MACHINE LEARNING AND PATTERN RECOGNITION

Prerequisites
1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of Digital Signal Processing is desirable.
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Objectives
1. This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning.
2. Topics include: Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering, and an application of hand-written digit recognition.

Outcomes
1. Understand the theory, benefits, inadequacies and possible applications of various machine learning and pattern recognition algorithms
2. Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.

UNIT-I: Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition.
Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT-II: Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection.
Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT-III: Hidden Markov Models: Markov Models for Classification, Hidden Markov Models, Classification using HMMs.
Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Over-fitting and Pruning, Examples of Decision Tree Induction.

UNIT-IV: Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification.
Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT-V: Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets.
An Application-Hand Written Digit Recognition: Description of the Digit Data, Pre-processing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

TEXT BOOK:
1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub,1st Ed.

REFERENCES:
1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice-Hall Pub.

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PROFESSIONAL ELECTIVE-II
SOFTWARE TESTING METHODOLOGIES

Prerequisites
1. A course on "Software Engineering"

Objectives
1. To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
2. To develop skills in software test automation and management using latest tools.

Outcomes
1. Design and develop the best test strategies in accordance to the development model.

UNIT-I:
Introduction:- Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs
Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II:
Transaction Flow Testing:-transaction flows, transaction flow testing techniques.
Dataflow testing:- Basics of data flow testing, strategies in data flow testing, application of dataflow testing.
Domain Testing:-domains and paths, nice & ugly domains, domain testing, domains and interfaces' testing, domain and interface testing, domains and testability.

UNIT-III:
Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.

UNIT-IV:
State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips.

UNIT-V:
Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

Text Books:
1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

References:
1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

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PROFESSIONAL ELECTIVE-II
SOCIAL NETWORK ANALYSIS

Prerequisites
1. A course on "Web Technologies"
2. A course on "Computer Networks"
3. A course on "Data Warehousing and Data Mining"

Objectives
1. It introduces the concepts of social media
2. It provides the mechanisms for social network analysis
3. Includes the concepts that allow for better visualization and analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

Outcomes
1. Ability to construct social network maps easily
2. Gain skills in tracking the content flow through the social media

UNIT I:
Introduction: Social Media and Social Networks
Social Media: New Technologies of Collaboration
Social Network Analysis: Measuring, Mapping, and Modeling collections of Connections.

UNIT-II:
NodeXL, Layout, Visual Design, and Labeling, Calculating and Visualizing Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

UNIT-III:
CASE STUDIES-I:
Email: The lifeblood of Modern Communication**.**
Thread Networks: Mapping Message Boards and Email Lists
Twitter: Conversation, Entertainment and Information

UNIT-IV:
CASE STUDIES-II:
Visualizing and Interpreting Face Book Networks, WWW Hyperlink Networks
Flickr: Linking People, Photos, Tags

UNIT-V:
CASE STUDIES-III:
You Tube: Contrasting Patterns of Content Interaction, and Prominence**.**
Wiki Networks: Connections of Creativity and Collaboration

Text Books:
1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 2011.
2. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.
3. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and Using Metrics, 1stEdition, MGH, 2011

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PROFESSIONAL ELECTIVE-II
DIGITAL IMAGE PROCESSING

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Prerequisites
1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of Digital Signal Processing is desirable.
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Objectives
1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
2. The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Outcomes
1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. Demonstrate the knowledge of filtering techniques.
3. Demonstrate the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.

UNIT I: Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

UNIT II: Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT III: Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT IV: Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT V: Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:
1. Digital Image Processing: **R.C. Gonzalez & R.E. Woods**, Addison Wesley/ Pearson Education, 2nd Ed, 2004.

REFERENCES:
1. Fundamentals of Digital Image Processing: **A.K.Jain** , PHI.
2. Digital Image Processing using MAT LAB: **Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins**: Pearson Education India, 2004.
3. Digital Image Processing: **William K. Pratt, John Wilely**, 3rd Edition, 2004.

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WEB TECHNOLOGIES LAB

Prerequisites
1. A Course on "Computer Programming and Data Structures"
2. A Course on "Objected Oriented Programming through Java"

Co-requisites
1. A course on "Web Technologies"

Objectives
1. To provide hands-on experience on web technologies
2. To develop client-server application using web technologies
3. To introduce server side programming with Java servlets and JSP
4. To introduce client side scripting with Javascript and AJAX

Outcomes
1. Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML
2. Apply client-server principles to develop scalable and enterprise web applications.

List of Experiments:
1. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages.
   - a) Home page
   - b) Registration and user Login
   - c) User Profile Page
   - d) Books catalog
   - e) Shopping Cart
   - f) Payment By credit card
   - g) Order Conformation

2. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

3. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

4. Bean Assignments
   a. Create a JavaBean which gives the exchange value of INR (Indian Rupees) into equivalent American/Canadian/Australian Dollar value.
   b. Create a simple Bean with a label - which is the *count* of number of clicks. Then create a BeanInfo class, such that only the "*count*" property is visible in the Property Window.
   c. Create two Beans-   a) KeyPad.   b) DisplayPad.
   After that integrate the two Beans to make it work as a Calculator.
   d. Create two Beans: Traffic Light(Implemented as a Label with only three background colors - Red, Green, Yellow) and Automobile (Implemented as a TextBox which states its state/movement). The state of the Automobile should depend on the following Light Transition Table.

Light Transition	Automobile State
Red ---> Yellow	Ready
Yellow ---> Green	Move
Green --> Red	Stopped

5. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

6. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXT BOOKS:
1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCES:
1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel, "Java How to Program", Prentice Hall of India, 8th Edition
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

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DATA WAREHOUSING AND DATA MINING LAB

Prerequisites
1. A course on "Database Management Systems"

Objectives
1. The course is intended to obtain hands-on experience using data mining software.
2. Intended to provide practical exposure of the concepts in data mining algorithms

Outcomes
1. Apply preprocessing statistical methods for any given raw data.
2. Gain practical experience of constructing a data warehouse.
3. Implement various algorithms for data mining in order to discover interesting patterns from large amounts of data.

LIST OF EXPERIMENTS:-
Experiments using Weka & Clementine Tools
1. Data Processing Techniques:

    (i) Data cleaning   (ii) Data transformation - Normalization (iii) Data integration

2. Partitioning - Horizontal, Vertical, Round Robin, Hash based

3. Data Warehouse schemas – star, snowflake, fact constellation

4. Data cube construction – OLAP operations

5. Data Extraction, Transformations & Loading operations

6. Implementation of Attribute oriented induction algorithm

7. Implementation of apriori algorithm

8. Implementation of FP – Growth algorithm

9. Implementation of Decision Tree Induction

10. Calculating Information gain measures

11. Classification of data using Bayesian approach

12. Classification of data using K – nearest neighbour approach

13. Implementation of K – means algorithm

14. Implementation of BIRCH algorithm

15. Implementation of PAM algorithm

16. Implementation of DBSCAN algorithm

Text Books:
1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER, Elsevier.
2. Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007

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ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (ACS) LAB

1.   Introduction
The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:
   •   Gathering ideas and information to organize ideas relevantly and coherently.
   •   Engaging in debates.
   •   Participating in group discussions.
   •   Facing interviews.
   •   Writing project/research reports/technical reports.
   •   Making oral presentations.
   •   Writing formal letters.
   •   Transferring information from non-verbal to verbal texts and vice-versa.
   •   Taking part in social and professional communication.

2.   Objectives:
This Lab focuses on using multi-media instruction for language development to meet the following targets:
   •   To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
   •   Further, they would be required to communicate their ideas relevantly and coherently in writing.
   •   To prepare all the students for their placements.

Learning Outcomes
   ✍   Accomplishment of sound vocabulary and its proper use contextually.
   ✍   Flair in Writing and felicity in written expression.
   ✍   Enhanced job prospects.
   ✍   Effective Speaking Abilities

3. Syllabus:
The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:
   1.   **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
   2.   **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective goggling.
   3.   **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.
   4.   **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. **Minimum Requirement**:
The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:
- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. **Suggested Software**:   The software consisting of the prescribed topics elaborated above should be procured and used.
- Oxford Advanced Learner's Compass, 8th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from 'train2success.com'
  ➢ Preparing for being Interviewed
  ➢ Positive Thinking
  ➢ Interviewing Skills
  ➢ Telephone Skills
  ➢ Time Management

6. **Books Recommended:**
1. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. **Speak Well** published by Orient Black Swan Private Limited, Hyderabad.
4. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. **Business and Professional Communication:** Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
6. **The Basics of Communication: A Relational Perspective**. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
7. **English Vocabulary in Use** series, Cambridge University Press 2008.
8. **Management Shapers Series** by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. **Handbook for Technical Communication** by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
10. **Communication Skills** by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
11. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
12. **Job Hunting** by Colm Downes, Cambridge University Press 2008.
13. **Master Public Speaking** by Anne Nicholls, JAICO Publishing House, 2006.
14. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.**
15. Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/ Cambridge University Press.
16. **International English for Call Centres** by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:
Advanced Communication Skills Lab Practical Exam:
1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 30 sessional marks and 70 End Examination marks. Of the 30 marks, 20 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation
                1. Seminar/ Professional Presentation
                2. A Report on the same has to be prepared and presented.
*   **Teachers may use their discretion to choose topics relevant and suitable to the needs of students.**
*   **Not more than two students to work on each mini project.**
*   **Students may be assessed by their performance both in oral presentation and written report.**

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GRID AND CLOUD COMPUTING

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Prerequisites
- A course on Operating Systems,
- A Course on Computer Organization & Architecture
- A Course on Computer Networks

Objectives
- The course will provide an insight for achieving cost efficient high performance system. The course will deal with design and architecture of grid computing

Outcomes
- To implement the techniques and tools for Grid Computing
- To understand any kind of heterogeneous resources over a network using open standards
- To implement management of several service models

UNIT-I:
Grid Computing Concept, History of Distributed Computing, Computational Grid Applications, Grid Computing Infrastructure Development Large-Scale U.S. Grids, National Grids ,Multi-National Grids, Campus Grids, Grid Computing Courses, Grid Computing Software Interface

UNIT –II: GRID SECURITY
Introduction, Grid Environment ,Authentication and Authorization Aspects for a Grid ,Grid Security Infrastructure (GSI) Component Parts ,GSI Communication Protocols, GSI Authentication ,GSI Authorization, Delegation ,The Need for Delegation ,Proxy Certificates My Proxy Grid Credential Repository, Higher-Level Authorization Tools, Security Assertion Markup Language (SAML), Using Certificates for Authorization

SCHEDULERS
Scheduler Features, Scheduling, Monitoring Job Progress, Additional Scheduler Features, Scheduler Examples, Sun Grid Engine, Condor, Grid Computing Meta-Schedulers, Condor-G, Grid Way ,Distributed Resource Management Application (DRMAA).

UNIT –III
Introduction to virtualization and virtual machine, Virtualization in cluster/grid context Virtual network, Information model & data model for virtual machine, Software as a Service (SaaS), SOA, On Demand Computing.
Cloud computing: Introduction, What it is and What it isn't, from Collaborations to Cloud, Cloud application architectures, Value of cloud computing, Cloud Infrastructure models, Scaling a Cloud Infrastructure, Capacity Planning, Cloud Scale.

UNIT – IV
Defining Clouds for the Enterprise- Storage-as-a-Service, Database-as-a-Service, Information-as-a-Service, Process-as-a-Service, Application-as-a-Service, Platform-as-a-Service, Integration-as-a-Service, Security-as-a-Service, Management/Governance-as-a-Service, Testing-as-a-Service
Infrastructure-as-a-Service

UNIT – V
Data Center to Cloud: Move into the Cloud, Know Your Software Licenses, The Shift to a Cloud Cost Model, Service Levels for Cloud Applications
Security: Disaster Recovery, Web Application Design, Machine Image Design, Privacy Design, Database Management, Data Security, Network Security, Host Security, Compromise Response
Disaster Recovery, Disaster Recovery, Planning, Cloud Disaster Management
Case study: Types of Clouds, Cloudcentres in detail, Comparing approaches, Xen   Open Nebula , Eucalyptus, Amazon, Nimbus

Text Books:
1. Barry Wilkison "Grid Computing Techniques and Applications", CRC Press 2010
2. Cloud Computing – Web Based Applications That Change the way you Work and Collaborate Online – Michael Miller, Pearson Education.

Reference Book:
1. Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide David S. Linthicum Addison-Wesley Professional.
2. Enterprise Web 2.0 Fundamentals by Krishna Sankar; Susan A. Bouchard, Cisco Press

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Professional Elective III
DESIGN PATTERNS

Prerequisites
1. A Course on Software Engineering"
2. A Course on "Object Oriented Programming Through Java"

Objectives
1. The aim of the course is to appreciate the idea behind Design Patterns in handling common problems faced during building an application
2. This course covers all pattern types from creational to structural, behavioral to concurrency and highlights the scenarios when one pattern must be chosen over others.

Outcomes
1. Create software designs that are scalable and easily maintainable
2. Understand the best use of Object Oriented concepts for creating truly OOP programs
3. Use creational design patterns in software design for class instantiation
4. Use structural design patterns for better class and object composition
5. Use behavioral patterns for better organization and communication between the objects
6. Use refactoring to compose the methods for proper code packaging
7. Use refactoring to better organize the class responsibilities of current code

UNIT I:
Introduction: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT II:
Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary

UNIT III:
Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT IV:
Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

UNIT V:
Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

Text Book:
1. Design Patterns, Erich Gamma, Pearson Education

Reference Books:
1. Pattern's in Java, Vol –I, Mark Grand, Wiley DreamTech.
2. Pattern's in Java, Vol-II, Mark Grand, Wiley DreamTech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley DreamTech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

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Professional Elective III
ADVANCED DATABASES

Prerequisites
1. A course on "Database Management Systems"

Objectives
1. The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems.
2. Introduce basic principles and implementation techniques of distributed database systems.
3. Equip students with principles and knowledge of parallel and object oriented databases.
4. Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Outcomes
1. Understand theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database system.
3. Understand the design aspects of object oriented database system and related development.

UNIT I:
Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL,DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER diagrams,. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views –Altering Tables and Views, Relational Algebra, Basic SQL Queries, Nested Queries, Complex Integrity Constraints in SQL, Triggers

UNIT II:
Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT III:
Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT IV:
 Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

UNIT V:
Distributed databases: Introduction to distributed databases, Distributed DBMS architectures, Storing data in a distributed DBMS, Distributed catalog management, Distributed query processing Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery

TEXT BOOKS:
1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

REFERENCE BOOKS:
1. Introduction to Database Systems, C.J.Date,Pearson Education.
2. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
3. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
4. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
5. Database-Principles, Programming, andPerformance, P.O'Neil&E.O'Neil, 2nd ed., ELSEVIER
6. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.

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Professional Elective III
MOBILE COMPUTING

Prerequisites:
1. A course on "Computer Networks"

Objectives:
• To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
• To understand the typical mobile networking infrastructure through a popular GSM protocol
• To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
• To understand the database issues in mobile environments & data delivery models.
• To understand the ad hoc networks and related concepts.
• To understand the platforms and protocols used in the mobile environment.

Outcomes:
• Able to think and develop new mobile application.
• Able to take any new technical issue related to this new paradigm and come up with a solution(s).
• Able to develop new ad hoc network applications and/or algorithms/protocols.
• Able to understand & develop any existing or new protocol related to the mobile environment

UNIT I Introduction
Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.
GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT –II (Wireless) Medium Access Control (MAC)
Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)
Mobile Network Layer
IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –III Mobile Transport Layer
Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.
Database Issues
Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT IV Data Dissemination and Synchronization
Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

UNIT V Mobile Ad hoc Networks (MANETs)
Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.
Protocols and Platforms for Mobile Computing
WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

Text Books:
1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

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Professional Elective III
BUSINESS INTELLIGENCE & BIG DATA

Prerequisites
1. Data Mining

Objectives
1. The purpose of this course is to provide the students with the knowledge of Business Intelligence principles and techniques.
2. This course is also designed to give an exposure of the frontiers of BI-intensive Big data computing

Outcomes
1. Explain the foundations, definitions, and capabilities of Big Data and Business Intelligence.
2. Apply Big Data technologies in Business Intelligence.
3. Ability to program using HADOOP

UNIT-I:
Business Intelligence, Data mining and Decision making, Business Intelligence Architecture, Distributed Computing, Cloud and Big Data, Cloud Storage , Virtualization, Cloud Models, Cloud Services

UNIT-II:
Introduction Big Data, Big Data Storage, Big Data Architecture, Big Data Computation, Relational database in Big Data, Google Big Data Services, Open Stock, Microsoft AZURE, Integrating Data source.

UNIT-III:
Information Management, Big Data Management, Geo-Spatial Intelligence, Business analytics, Data Analytics, Big data Analytics, Big Data Technology.

UNIT-IV:
Exploring the World of HADOOP, HDFS, Name Nodes, Data Nodes, Map Reduce Programming

UNIT-V:
Advanced Analytics, Operational Analytics, Monetizing Analytics, NOKIA, NASA, Consumption of Analytics, 360 Modelling

Text Books:
1. Big Data and Big Analytics by Michael Minelli and Michell Chambers
2. Big Data for DUMMIES by Alan Nugent Dr. Fern Halper

References:
1. Business Intelligence Data Miming and Optimization for decision making [Author: Carlo-Verellis] [Publication: (Wiley)]

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PROBLEM SOLVING WITH ALGORITHMS AND DATA STRUCTURES
PGC-I

Prerequisites
- A course on "Computer Programming & Data Structures"
- A course on " Design & Analysis of Algorithms"

Objectives
- Introduces the notations for analysis of the complexities of algorithms
- Introduces the amortized analysis
- Introduces the heap data structures such as leftist trees, binomial heaps, fibonacci and min-max heaps
- Introduces the randomized, approximation and non deterministic algorithms
- Introduces a variety of data structures such as disjoint sets, hash tables, search structures and digital search structures

Outcomes
- Ability to analyze the performance of algorithms
- Ability to select the data structures that efficiently model the information in a problem
- Ability to understand how the choice of data structures impact the performance of programs
- Ability to design programs using a variety of data structures, including hash tables, search structures and digital search structures

UNIT-I
Algorithm analysis: Asymptotic notations, Recurrence analysis, Masters Theorem, Amortized analysis, Disjoint sets,Randomized Algorithms –Introduction, n-queens problem, quick sort.

UNIT-II
Heap Structures- Min-Max Heaps, Leftist trees, Binomial Heaps, Fibonacci heaps.
Hashing.

UNIT-III
Search Structures- OBST, AVL trees, Red-Black trees, Splay trees, B-trees.

UNIT-IV
Digital Search Structures - Digital Search trees, Binary tries and Patricia, Multiway Tries, Suffix trees.
Approximation Algorithms: Planar graph colouring, Job Scheduling, TSP.

UNIT-V
NP-Hard and NP-complete: Non-deterministic algorithms – Searching, Sorting, Knapsack decision problem, Satisfiability problem, NP - Complete Problems- clique problem, Vertex cover problem, TSP.

Text Book:
1. Fundamentals of Data structures in C++ Sahni, Horowitz,Mehatha, Universities Press.

References:
1. Introduction to Algorithms, TH Cormen, PHI
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
4. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

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INFORMATION RETRIEVAL SYSTEMS
PGE-I

Prerequisites:
- Data Structures

Objectives:
- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Outcomes:
- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT I Introduction:
Motivation, Basic Concepts, Past-Present and Future, the Retrieval Process
Modeling :
Introduction, A Taxonomy of Information retrieval Models, Retrieval: Ad hoc and Filtering, A Formal Characteristics of IR Models, Classic Information Retrieval, Alternative Set Theory Models, Alternative Probabilistic Models, Structured Text Retrieval Models, Model for Browsing

UNIT II Retrieval Evaluation
Introduction, retrieval Performance Evaluation, Reference Collections ,Query languages Introduction, Keyword-Based Querying, Pattern Matching, Structural Queries, Query Protocols Query Operations , User Relevance Feedback, Automatic Local Analysis, Automatic global Analysis
Text Operations
Introduction, Document Preprocessing, Document Clustering, Text Compression, Comparing text Compression Techniques

UNIT III
Indexing and Searching Introduction, Inverted Files, Other Indices for Text, Boolean queries, Sequential Searching, pattern Matching, Structural Queries, Compression Searching the Web
Introduction, Challenges, Characterizing the Web, Search Engines, Browsing, Metasearches, Finding the Needle in the Haystack, Searching using Hyperlinks

UNIT IV User Interfaces and Visualization
Introduction, human-Computer Interaction, The Information Access Process, Starting Points, Query Specification, Context, User Relevance Judgments, Interface Support for the Search Process

UNIT V
Multimedia IR: Models and Languages Introduction, Data Modeling, Query Languages Multimedia IR: Indexing and |Searching Introduction, Background-Spatial Access Methods,A Generic Multimedia Indexing Approach, One Dimentional Time Series, wo dimential Color Images, Automatic Feature Extraction.

Text Book
1. Modern Information Retrival By Yates and Neto Pearson Education.

Reference:
1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
3. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons.

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ADHOC & SENSOR NETWORKS
PGE-I

Prerequisites
- Computer Networks
- Distributed Systems
- Mobile Computing

Objectives
- To understand the concepts of sensor networks
- To understand the MAC and transport protocols for adhoc networks
- To understand the security of sensor networks
- To understand the applications of adhoc and sensor networks

Outcomes
- Understanding the state of the art research in emerging subject of ad hoc and wireless sensor networks (ASN)
- Ability to solve the issues in real-time application development based on ASN
- Ability to conduct further research in the ASN domain

UNIT I
Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.
Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, *Topology-based* routing algorithms-Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; *Position-based* routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT II
Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR and Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR.

UNIT III
TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc Basics of Wireless, Sensors and Applications Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT IV
Data Retrieval in Sensor Networks
Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

UNIT V
Security - Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

Text Books:
1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P.Aggarwal,* World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

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EMBEDDED SYSTEMS
PGE-I

Prerequisites:
- Assembly language and C programming language.
- Sequential Logic Concepts
- Basic Computer Organization

Objectives:
- To introduce the students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around.
- To introduce RTOS and its application.

Course Outcomes:
Students are able to
- Describe the differences between the general computing system and embedded system, also recognize the classification of embedded systems..
- Design the real time embedded systems using the concepts of RTOS.
- Analyze various examples of embedded systems
- Develop programs in C/C++ for embedded systems.

UNIT - 1 : INTRODUCTION TO EMBEDDED SYSTEMS
Definition and Classification - Overview of Processors and hardware units in an embedded system - Software embedded into the system - Exemplary Embedded Systems - Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

UNIT - 2 : DEVICES AND BUSES FOR DEVICES NETWORK
I/O Devices - Device I/O Types and Examples - Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - '12C', 'USB', 'CAN' and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT - 3 : PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++
Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls - Multiple function calls in a Cyclic Order in the Main Function Pointers - Function Queues and Interrupt Service Routines Queues Pointers - Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming - Embedded Programming in C++, 'C' Program compilers - Cross compiler - Optimization of memory codes.

UNIT - 4 : REAL TIME OPERATING SYSTEMS - PART - 1
Definitions of process, tasks and threads - Clear cut distinction between functions - ISRs and tasks by their characteristics - Operating System Services- Goals - Structures- Kernel - Process Management - Memory Management - Device Management - File System Organisation and Implementation - I/O Subsystems - Interrupt Routines Handling in RTOS, REAL TIME OPERATING SYSTEMS : RTOS Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics - Co-operative Round Robin Scheduling - Cyclic Scheduling with Time Slicing (Rate Monotonics Co-operative Scheduling) - Preemptive Scheduling Model strategy by a Scheduler - Critical Section Service by a Preemptive Scheduler - Fixed (Static) Real time scheduling of tasks - INTER PROCESS COMMUNICATION AND SYNCHRONISATION - Shared data problem - Use of Semaphore(s) - Priority Inversion Problem and Deadlock Situations - Inter Process Communications using Signals - Semaphore Flag or mutex as Resource key - Message Queues - Mailboxes - Pipes - Virtual (Logical) Sockets - Remote Procedure Calls (RPCs).

UNIT - 5 : REAL TIME OPERATING SYSTEMS - PART - 2
Study of Micro C/OS-II or Vx Works or Any other popular RTOS - RTOS System Level Functions -
Task Service Functions - Time Delay Functions - Memory Allocation Related Functions - Semaphore
Related Functions - Mailbox Related Functions - Queue Related Functions - Case Studies of
Programming with RTOS - Understanding Case Definition - Multiple Tasks and their functions -
Creating a list of tasks - Functions and IPCs - Exemplary Coding Steps.

TEXT BOOK
1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First
   reprint Oct. 2003

REFERENCES
1. Steve Heath, Embedded Systems Design, Second Edition-2003
2. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian
   Reprint 2000.
3. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design -
   Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001
4. Frank Vahid and Tony Givargis, Embedded Systems Design - A nified Hardware
   Software Introduction, John Wiley, 2002.

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NATURAL LANGUAGE PROCESSING
PGE-I

Prerequisites:
- Finite automata
- Data structures,
- probability theory

Objectives:
- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Outcomes:
- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques.

UNIT I
Finding the Structure of Words Words and Their Components, Issues and Challenges, Morphological Models ,Finding the Structure of Documents
Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT II
Syntax Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT III
Semantic Parsing Introduction, Semantic Interpretation, System Paradigms, Word Sense Recourse, Systems, Software.

UNIT IV
Predicate-Argument Structure, Meaning Representation Recourse, Systems, Software.

UNIT V
Language Modelling Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

Text Book:
1. Multilingual natural Language Processing Applications : From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

Reference:
1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

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ETHICAL HACKING
PGE-II

Prerequisites:
- Information security

Objectives:
- To learn about how systems vulnerabilities manifest themselves and why hackers continue to enjoy success breaking into systems, despite increasing attention paid to cyber defense.
- To gain experience with a systematic hacking methodology.
- To learn about and experiment with hacking tools that can be applied at different stages of the hacking process

Outcomes:
- Understand the Security Triad – Confidentiality, Integrity, and Availability – as they form the basis on which all security is built.
- Realize that ethical hackers differ from hackers in that ethical hackers perform activities only after obtaining written permission from the client and that different types of test can be performed.

UNIT I
Introduction to Ethical Hacking, Ethics, and Legality:
Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Hacktivism, Types of Hacker Classes, Skills Required to Become an Ethical Hacker, Vulnerability Research, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks, Testing Types, Ethical Hacking Report.
Footprinting and Social Engineering:
Footprinting , Information Gathering Methodology, Competitive Intelligence, DNS Enumeration Who is and ARIN Lookups, Types of DNS Records, Traceroute, E-Mail Tracking, Web Spiders, Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.

UNIT II
Scanning and Enumeration
Scanning, types of Scanning , CEH Scanning Methodology ,Ping Sweep Techniques, Nmap Command Switches, SYN, Stealth, XMAS, NULL, IDLE, and FIN Scans, TCP Communication Flag Types, War-Dialing Techniques, Banner Grabbing and OS Fingerprinting Techniques, Proxy Servers, Anonymizers , HTTP Tunneling Techniques, IP Spoofing Techniques, Enumeration, Null Sessions, SNMP Enumeration, Windows 2000 DNS Zone Transfer, Steps Involved in Performing Enumeration.
System Hacking
Understanding Password-Cracking Techniques, Understanding the LAN Manager Hash Cracking Windows 2000 Passwords, Redirecting the SMB Logon to the Attacker SMB Redirection, SMB Relay MITM Attacks and   Countermeasures NetBIOS DoS Attacks, Password-Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Nonelectronic Attacks, Understanding Keyloggers and Other Spyware Technologies Understand Escalating Privileges, Executing Applications, Buffer Overflows, Understanding Rootkits Planting Rootkits on Windows 2000 and XP Machines, Rootkit Embedded TCP/IP Stack Rootkit Countermeasures, Understanding How to Hide Files, NTFS File Streaming   NTFS Stream Countermeasures, Understanding Steganography Technologies, Understanding How to Cover Your Tracks and Erase Evidence, Disabling Auditing, Clearing the Event Log.

UNIT III
Trojans, Backdoors, Viruses, and Worms
Trojans and Backdoors, Overt and Covert Channels, Types of Trojans, Reverse-Connecting Trojans, Netcat Trojan, Indications of a Trojan Attack, Wrapping, Trojan Construction Kit and Trojan Makers, Countermeasure Techniques in   preventing Trojans, Trojan-Evading Techniques, System File

Verification Sub-objective to Trojan Countermeasures Viruses and Worms, Difference between a Virus and a Worm ,Types of Viruses, Understand Antivirus Evasion Techniques, Understand Virus Detection Methods.
Sniffers
Protocols Susceptible to Sniffing, Active and Passive Sniffing, ARP Poisoning, Ethereal Capture and Display Filters, MAC Flooding, DNS Spoofing Techniques, Sniffing Countermeasures.
Denial of Service and Session Hijacking
Denial of Service, Types of DoS Attacks, DDoS Attacks, BOTs/BOTNETs, "Smurf" Attack, "SYN" Flooding, DoS/DDoS Countermeasures, Session Hijacking, Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Prevention of Session Hijacking.

UNIT IV
Hacking Web Servers, Web Application Vulnerabilities, and Web-Based Password Cracking Techniques
Hacking Web Servers, Types of Web Server Vulnerabilities, Attacks against Web Servers, IIS Unicode Exploits, Patch Management Techniques, Web Server Hardening Methods Web Application Vulnerabilities, Objectives of Web Application Hacking, Anatomy of an Attack, Web Application Threats, Google Hacking, Web Application Countermeasures Web-Based Password Cracking Techniques, Authentication Types, Password Cracker, Password Attacks: Classification, Password-Cracking Countermeasures.
SQL Injection and Buffer Overflows
SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection Countermeasures Buffer Overflows, Types of Buffer Overflows and Methods of Detection, Stack-Based Buffer Overflows, Buffer Overflow Mutation Techniques.

UNIT V
Linux Hacking
Linux Basics, Compile a Linux Kernel, GCC Compilation Commands, Install Linux Kernel Modules, Linux Hardening Methods.
Penetration Testing Methodologies
Security Assessments, Penetration Testing Methodologies, Penetration Testing Steps, Pen-Test Legal Framework, Automated Penetration Testing Tools, Pen-Test Deliverables.

TEXT BOOK:
1. CEH official Certified Ethical Hacking Review Guide, Wiley India.

REFERENCE BOOKS:
1. Hacking Exposed Web 2.0, by Rich Annings, Himanshu Dwivedi, Zane Lackey, Tata Mc Graw hill Edition.
2. Ethical Hacking & Network Defense, Michael T. Simpson edition.
3. Hacking Exposed Windows, Joel Scambray, cissp, Stuart Mcclure, Cissp, Third Edition, Tata Mc Graw hill edition.
4. Hacking Exposed Window server 2003, Joel Scambray Stuart Mcclure, Tata Mc Graw hill edition.

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WEB MINING
PGE-II

Prerequisites:
> Data Mining ,Discrete Maths & Statistics, Database Management Systems

Objectives:
> Introduce students to the basic concepts and techniques of Information Retrieval, Web Search, Data Mining, and Machine Learning for extracting knowledge from the web.
> Develop skills of using recent data mining software for solving practical problems of Web Mining.
> Gain experience of doing independent study and research

Outcomes:
> To become familiar with classic and recent developments in Web search and data mining;
> To acquire statistical techniques to analyze complex information and social networks;
> To study several models to interpret emergent features such as the structure and evolution of the Web graph, its traffic patterns, and the spread of information

UNIT I
Introduction to Web Data Mining and Data Mining Foundations Introduction – World Wide Web (WWW), A Brief History of the Web and the Internet,Web Data Mining-Data Mining, Web Mining.
Data Mining Foundations – Association Rules and Sequential Patterns – Basic Concepts of Association Rules,Apriori Algorithm- Frequent Itemset Generation,Association Rule Generation, Data Formats for Association Rule Mining, Mining with multiple minimum supports – Extended Model, Mining Algorithm,Rule Generation, Mining Class Association Rules, Basic Concepts of Sequential Patterns, Mining Sequential Patterns on GSP, Mining Sequential Patterns on PrefixSpan, Generating Rules from Sequential Patterns.

UNIT II
Supervised and Unsupervised Learning Supervised Learning - Basic Concepts, Decision Tree Induction – Learning Algorithm, Impurity Function, Handling of Continuous Attributes, Classifier Evaluation, Rule Induction – Sequential Covering, Rule Learning, Classification Based on Associations, Naïve Bayesian Classification , Naïve Bayesian Text Classification - Probabilistic Framework, Naïve Bayesian Model .
Unsupervised Learning – Basic Concepts , K-means Clustering – K-means Algorithm, Representation of Clusters, Hierarchical Clustering – Single link method , Complete link Method, Average link method, Strength and Weakness. Web Mining

UNIT III
Information Retrieval and Web Search Basic Concepts of Information Retrieval, Information Retrieval Methods - Boolean Model, Vector Space Model and Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Preprocessing – Stopword Removal, Stemming, Web Page Preprocessing, Duplicate Detection, Inverted Index and Its Compression – Inverted Index, Search using Inverted Index, Index Construction, Index Compression, Latent Semantic Indexing – Singular Value Decomposition, Query and Retrieval, Web Search, Meta Search, Web Spamming.

UNIT IV
Link Analysis and Web Crawling Link Analysis - Social Network Analysis, Co-Citation and Bibliographic Coupling, Page Rank Algorithm, HITS Algorithm, Community Discovery-Problem Definition, Bipartite Core Communities, Maximum Flow Communities, Email Communities.
Web Crawling – A Basic Crawler Algorithm- Breadth First Crawlers, Preferential Crawlers,
Implementation Issues – Fetching, Parsing, Stopword Removal, Link Extraction, Spider Traps, Page Repository, Universal Crawlers, Focused Crawlers, Topical Crawlers, Crawler Ethics and Conflicts.
UNIT V

Opinion Mining and Web Usage Mining, Opinion Mining - Sentiment Classification – Classification based on Sentiment Phrases, Classification Using Text Classification Methods, Feature based Opinion Mining and Summarization – Problem Definition, Object feature extraction, Feature Extraction from Pros and Cons of Format1, Feature Extraction from Reviews of Format 2 and 3, Comparative Sentence and Relation Mining, Opinion Search and Opinion Spam.

Web Usage Mining - Data Collection and Preprocessing- Sources and Types of Data, Key Elements of Web usage Data Preprocessing, Data Modeling for Web Usage Mining, Discovery and Analysis of Web usage Patterns -Session and Visitor Analysis, Cluster   Analysis and Visitor Segmentation, Association and Correlation Analysis, Analysis of Sequential and Navigation Patterns.

TEXT BOOK:
1. Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data by Bing Liu (Springer Publications).

REFERENCE BOOKS:
1. Data Mining: Concepts and Techniques, Second Edition Jiawei Han, Micheline Kamber (Elsevier Publications)
2. Web Mining: Applications and Techniques by Anthony Scime
3. Mining the Web: Discovering Knowledge from Hypertext Data by Soumen Chakrabarti

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BIO-INFORMATICS
PGE-II

Prerequisites
- A course on "Database Management Systems"
- A course on "Data Warehousing and Data Mining"
- A course on "Computer Programming and Data Structures"

Objectives
- To impart the knowledge of theoretical and practical concepts of bioinformatics.
- To develop skills in designing biological database and retrieving.
- To apply appropriate sequence analysis methods for analyzing bio-molecular sequences.

Outcomes
- Demonstrate the knowledge on concepts of biological databases, Genomes and Proteome.
- Ability to analyze biological database management system.
- Ability to select and apply appropriate techniques and tools to manage the biological data.

UNIT I

INTRODUCTION:- Definition – Overview- Major databases in Bio Informatics- Molecular biology – Central Dogma- Data retrieval tools – Data mining of Databases – Gene Analysis – Prokaryotic and Eukaryotic Genomes – Sequence Assembly – Gene mapping – Physical maps – cloning – ORF – amino acids – DNA, RNA sequences – Genetic code.

UNIT II

DNA and PROTEIN SEQUENCES:-DNA: working with single DNA sequence : removing vector sequences- verifying restriction maps – PCR design – GC content – counting words – internal repeats – protein coding regions – ORFing – Genome scan, Protein: predicting properties – primary structure analysis – transmembrane segments – PROSITE patterns –interpreting scanprosite results- finding domains – CD server results – pfscan results.

UNIT III

ALIGNMENT OF PAIR OF SEQUENCES:- Terminology – Global and Local alignment – Dot matrix – dynamic programming – using scoring matrices –PAM matrices – BLOSUM, Working with FASTA – Algorithm – output – E-values – Histogram, Working with BLAST – algorithm – output – services – gapped BLAST- PSIBLAST – comparison of FASTA and BLAST.

UNIT IV

MULTIPLE SEQUENCE ALIGNMENT:- Criteria for Multiple sequence alignment – applications – choosing the right sequences; FASTA, ClustalW, TCoffee methods – interpreting multiple sequence alignment – getting in right format – converting formats – using Jalview – preparing for publication.

UNIT V

PROTEIN CLASSIFICATION & STRUCTURE PREDICTION:- Structure of amino acids – primary structure – secondary structure – folds and motifs – alpha and beta helix –structure based protein classification – protein structure Data bases – folding problem – PROPSEARCH –primary structure analysis and prediction – secondary structure analysis and prediction – motifs – profiles –patterns and fingerprints

TEXT BOOKS
1. S.C Rostogi , Mehenndirata, P.Rasogi, " *BioInformatics: methods and applications*",second edition, PHI 2006.
2. Jean Mickel Clavere & Cadrienotredom "*Bio Informatics– A beginners guide*" Wiley DreamTech, 2003.

REFERENCE BOOKS
1. T.K. Attwood and D.J Perry Smith, *" Introduction to Bio Informatics*", Pearson Education, 1st Edition, 2001.
2. Dan E.Krane, Michael L.Raymer, "*fundamental concepts of BioInformatics* ", Pearson Education, 2004.

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SIMULATION AND MODELING
PGE-II

Prerequisites

1. A course on "Computer Oriented Statistical Methods"

Objectives

1. The course is intended to provide a thorough understanding of methods, techniques and tools for modeling, simulation and performance analysis of complex systems
2. The topics include system models and studies; random number generation; simulation of continuous and discrete systems; simulation of queuing systems and pert networks.

Outcomes

1. Acquire proficiency in constructing a model for a given system/set of data.
2. Ability to generate and test random number variates and employ them in developing simulation models.
3. Ability to infer from the model and apply the results to resolve issues in a real world environment

Unit-I: System Models and Studies

System Models: Concepts of a System, System Environment, Stochastic Activities, Continuous and Discrete Systems, System Modeling, Types of Models, Static Physical Models, Dynamic Physical Models, Static Mathematical Models, Dynamic Mathematical Models, Principles Used in Modeling.

System Studies: Subsystems, A Corporate Model, Environment Segment, Production Segment, Management Segment, The Full Corporate Model, Types of System Study, System Analysis, System Design, System Postulation

Unit-II: Random Numbers

Random Number Generation: Properties, Generation of Pseudo-Random Numbers, Techniques of generating random numbers, tests for random numbers

Random-Variate Generation: Inverse-Transform Technique, Acceptance-Rejection Technique, Special Properties.

Unit-III: Simulation of Continuous and Discrete Systems

Simulation of Continuous Systems: A chemical reactor, Numerical integration vs. continuous system simulation, Selection of an integration formula, Runge-Kutta integration formulas, Simulation of a servo system, Simulation of a water reservoir system, Analog vs. digital simulation.

Discrete System Simulation: Fixed time-step vs. event-to-event model, On simulating randomness, Generation of random numbers, Generation of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

Unit-IV: System Simulation

Simulation of Queueing Systems: Rudiments of queueing theory, Simulation of a single-server queue, Simulation of a two-server queue, Simulation of more general queues.

Simulation of a Pert Network: Network model of a project, Analysis of activity network, Critical path computation, Uncertainties in activity durations, Simulation of activity network, Computer program for simulation, Resource allocation and cost considerations.

Unit-V: Simulation Experimentation

Design and Evaluation of Simulation Experiments: Length of simulation runs, Variance reduction techniques, Experimental layout, Validation.

Simulation Languages: Continuous and discrete simulation languages, Continuous simulation languages, Block-structured continuous simulation languages, Expression-based languages, Discrete-system simulation languages, GPSS.

Text Books

1. System Simulation, Geoffrey Gordon, Prentice-Hall of India Private Limited, Second Edition, 1978. (for Unit-I: Chapters 1 and 2)
2. Discrete-Event System Simulation, Jerry Banks, John S. Carson II, Barry L. Nelson, David M.Nicol, Pearson, Fifth Edition, 2010. (for Unit-II: Chapters 7 and 8)
3. System Simulation with Digital Computer, Narsingh Deo, Prentice-Hall of India Private Limited, 1979. (for Unit-III to V: Chapters 2 to 5 and 7,8).

Reference Books

1. System Modeling and Simulation - An Introduction Frank L. Severance, Wiley Publisher, 2005

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ROBOTICS
PGE-III

Prerequisites:
- A course on object oriented programming

Objectives:
- Covers the theory of AI and robotics from the hierarchical to the hybrid deliberative/reactive paradigm for organizing intelligence.
- Includes sensing and programming techniques for reactive behaviors, in order to permit a class to get covers, the coordination and control of teams of multi-agents.
- Covers architectures that provide exemples of how to transfer the principles of the paradigm into a coherent, reusable implementation on a single robot or teams of robots.
- Focuses on navigation, a critical ability for a robot that claims to be mobile

Outcomes:
- Enables students to embark on a serious robot project.
- Ability to integrate the sensor with robots.
- Ability to design an appropriate path paling and navigation of Robot.

UNIT-I:
From Teleoperation To Autonomy: How Can a Machine Be Intelligent? What Can Robots Be Used For? A Brief History of Robotics, Teleoperation, The Seven Areas of AI.
The Hierarchical Paradigm: Attributes of the Hierarchical Paradigm, Closed World Assumption and the Frame Problem, Representative Architectures, Advantages and Disadvantages, Programming Considerations.

UNIT-II:
Biological Foundations of the Reactive Paradigm :What Are Animal Behaviors? Coordination and Control of Behaviors , Perception in Behaviors , Schema Theory, Principles and Issues in Transferring Insights to Robots.
The Reactive Paradigm: Attributes of Reactive Paradigm, Subsumption Architecture, Potential Fields Methodologies, Visualizing potential fields, Evaluation of Reactive Architectures.
Designing a Reactive Implementation : Behaviors as Objects in OOP, Steps in Designing a Reactive Behavioral System, Case Study.

UNIT-III:
Common Sensing Techniques for Reactive Robots : Logical sensors, Behavioral Sensor Fusion, Designing a Sensor Suite, Proprioceptive Sensors, Proximity Sensors, Computer Vision, Range from Vision.
The Hybrid Deliberative/Reactive Paradigm: Attributes of the Hybrid Paradigm, Architectural Aspects, Managerial Architecture, State-Hierarchy Architectures, Model-Oriented Architectures, Other Robots in the Hybrid Paradigm, Evaluation of Hybrid Architectures, Interleaving Deliberation and Reactive Control.
Multi-agents: Heterogeneity, Control, Cooperation, Goals, Emergent Social Behavior.

UNIT-IV:
Topological Path Planning: Landmarks and Gateways, Relational Methods, Associative Methods, Case Study of Topological Navigation with a Hybrid Architecture.
Metric Path Planning, Configuration Space,Cspace Representations, Graph Based Planners, Wavefront Based Planners, Interleaving Path Planning and Reactive Execution.

UNIT-V:
Localization and Map Making: Sonar Sensor Model, Bayesian, Dempster-Shafer Theory, HIMM, Comparison of Methods, Localization, Exploration.
On the Horizon: Shape-Shifting and Legged Platforms , Applications and Expectations.

Text Book:
1. Introduction to AI Robotics, Robin R. Murphy

Reference Books:
1. The Robotics Primer By Maja J. Mataric, MIT Press.
2. A Mathematical Introduction to Robotic Manipulation by Richard M. Murray, Zexiang Li and S. Shankar Sastry, CRC Press.

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LINUX INTERNALS
PGE-III

Prerequisites
- Operating System Principles
- Knowledge of C programming language

Objectives
- Ability to know how kernel works and how to customize kernel
- Ability to design and develop new kernel modules
- To Provide basic understanding of Linux scheduler, process management, Kernel synchronization primitives, Kernel memory management, Kernel virtual memory, kernel time keeping architecture, virtual file systems and page/buffer cache

Outcomes
Students will be able to
- configure, compile, and install a Linux kernel from sources
- design and implement own/new kernel module
- design and implement device driver from the scratch

UNIT I
Introduction to linux kernel, getting started with kernel Process Management: process descriptor and the task structure, process creation, Linux implementation of threads, process termination
Process scheduling: Multitasking, process scheduler, policy, scheduling algorithm, scheduling implementation, process selection, preemption and context switching, real-time scheduling policies, scheduler related system calls.

UNIT II
System calls: sys calls, system call handler, system call implementation, system call context
Interrupts and Interrupt handlers: Interrupts, interrupt handlers, Registering an interrupt handler, writing interrupt handler, interrupt context, implementing interrupt handlers, interrupt control.

UNIT III
Kernel Synchronization: Critical regions and race conditions, locking, deadlocks, contention and scalability, atomic operations, spin locks, reader writer spin locks, semaphores, reader writer semaphores, mutexes , sequential locks, preemption disabling, ordering and barriers
Timers and time management: kernel notion of time, tick rate, jiffies, hardware clocks and timers, timer interrupt handler, timers, delaying execution.

UNIT IV
Memory Management: Pages, Jones, getting pages, Kmalloc (), vmalloc (), Slab layer, statically allocating on the stack, high memory mappings, per-CPU allocations, per-CPU interface,
Virtual File System: common file system interface, file system abstraction layer, Unix file systems, VFS objects and their data structures, the super block object and operations, inode object and operations.

UNIT V
Blocl I/O layer: anatomy of a block device, buffers and buffer heads, the bio-structure, request queues, I/O schedulers ,Process Address Space: Address spaces, memory descriptor, virtual memory areas, manipulating memory areas, Page cache and page write back: approaches to caching, linux page cache the buffer cache, flusher threads.

TEXT BOOKS:
1. Linux Kernel Development by Robert Love, Third Edition, Pearson Education.

REFERENCE BOOKS:
1. Linux Kernel programming by Michael Beck, Harald Bohme et al., Third Ed., Pearson Education

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COMPUTER FORENSICS
PGE-III

Prerequisites: Nil

Objectives:
- To understand the cyberspace
- To gain knowledge on fundamentals of computer forensics
- To understand the evidence capturing process
- To understand the preservation of digital evidence

Outcomes:
- Ability to understand the computer forensics evidence, capture and data recovery
- Ability to understand the current computer forensics tools
- Ability to apply forensics tools in the event of cyber crime.

UNIT I :
Computer Forensics Fundamentals: Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists, Who Can Use Computer Forensic Evidence?.Types of Computer Forensics Technology : Types of Military Computer Forensic Technology, Types of Law Enforcement Computer Forensic Technology, Types of Business Computer Forensics Technology.

UNIT II :
Computer Forensics Evidence and Capture: Data Recovery: Data Recovery Defined, Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution, Case Histories. Evidence Collection and Data Seizure: Why Collect Evidence?, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collecting and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody.

UNIT III:
Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene, Computer Evidence Processing Steps, Legal Aspects of Collecting And Preserving Computer Forensic Evidence. Computer Image Verification and Authentication : Special Needs of Evidential Authentication, Practical Considerations, Practical Implementation.

UNIT IV:
Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool, Identification of Data: Timekeeping, Time Matters,Forensic Identification and Analysis of Technical Surveillance Devices. Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, A Technical Approach, Destruction of Email, Damaging Computer Evidence, International Principles Against Damaging of Computer Evidence, Tools Needed for Intrusion Response to the Destruction of Data, Incident Reporting and Contact Forms.

UNIT V:
Current Computer Forensics Tools: Evaluating Computer Forensics Tool Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software.

TEXT BOOKS:
1. "Computer Forensics : Computer Crime Scene Investigation", JOHN R. VACCA, Firewall Media.
2. "Guide to Computer Forensics and Investigations"4e, Nelson, Phillips Enfinger, Steuart, Cengage Learning.

REFERENCES:
1. "Computer Forensics and Cyber Crime", Marjie T Britz, Pearson Education.

2. "Computer Forensics", David Cowen, Mc Graw Hill.

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MOBILE APPLICATION DEVELOPMENT
PGE-III

Prerequisites:
- A Course on JAVA
- A Course on DBMS

Objectives:
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Outcomes:
- Student will be able to develop, deploy and maintain the mobile Applications
- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces

UNIT I
J2ME Overview: Inside J2ME, J2ME and Wireless Devices,Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

UNIT II
J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device requirement, Run Time Environment, Midlet Programming, Java Language for J2ME, J2ME Software Development Kits, examples, multiple MIDlets in a MIDlet suite, J2ME Wireless Toolkit.

UNIT III
Commands Items and Event Processing: J2ME User Interfaces, Display Class, the Palm OS Emulator, Command Class, Item Class, Exception Handling.

UNIT IV
High- Level Display: Screens: Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.
Low Level Display: Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation.

UNIT V
Android
Introduction: Background, Android, An Open Platform for Mobile Development, Native Android applications, Android SDK features, Development Framework.
Developing for Android: Developing for Mobile and Embedded device Android Development Tools
Creating Applications and Activities: Application Manifest File, Android Application Lifecycle, Android Application Class, Android Activities.

Text Books:
1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
2. Professional Android^{TM} 4 Application Development, Reto Meier, John Wiley.

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GRID AND CLOUD COMPUTING LAB
PC(UG)

Prerequisites: Nil

Objectives:
The student should be made to:
- Be exposed to tool kits for grid and cloud environment.
- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop

Outcomes
At the end of the course, the student should be able to
- Use the grid and cloud tool kits.
- Design and implement applications on the Grid.
- Design and Implement applications on the Cloud.

LIST OF EXPERIMENTS:

GRID COMPUTING LAB

Use Globus Toolkit or equivalent and do the following:

1. Develop a new Web Service for Calculator.

2. Develop new OGSA-compliant Web Service.

3. Using Apache Axis develop a Grid Service.

4. Develop applications using Java or C/C++ Grid APIs

5. Develop secured applications using basic security mechanisms available in Globus Toolkit.

6. Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

CLOUD COMPUTING LAB

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.

2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.

3. Install a C compiler in the virtual machine and execute a sample program.

4. Show the virtual machine migration based on the certain condition from one node to the other.

5. Find procedure to install storage controller and interact with it.

6. Find procedure to set up the one node Hadoop cluster.

7. Mount the one node Hadoop cluster using FUSE.

8. Write a program to use the API's of Hadoop to interact with it.

9. Write a wordcount program to demonstrate the use of Map and Reduce tasks

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PROBLEM SOLVING WITH ALGORITHMS AND DATA STRUCTURES LAB
PG Core Lab

Prerequisites
- A course on "Computer Programming & Data Structures" and " Advanced Data Base Engineering".

Objectives
- Introduces the basic concepts of abstract data types (ADTs).
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps,   graphs, B-trees.
- To understand the basic concepts of relational database.
- To master the basics of mySQL and construct queries using mySQL.
- Topics include datamodels, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Outcomes
- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Design programs using a variety of data structures, including binary and general tree structures, search trees, tries, heaps and B-trees.
- Understand the fundamentals of Relational database design and normal forms
- Master the basics of mySQL for retrieval and management of data.
- Ability to understand the basics of transaction processing and concurrency control.
- Ability to handle the database storage structures and access techniques

Experiments for ADS:

1.   Write a program to implement the Randomized n-Queens problem

2.   Write a program to implement the Randomized Quick sort

3.   Write a program to implement the Optimal Binary Search Tree

4.   Write a program to implement the operations of AVL trees

5.   Write a program to implement the operations of Leftist tree

6.   Write a program to implement the operations of Fibonacci Heap

7.   Write a program to implement the Operations of Digital Search trees

8.   Write a program to implement the Operations of Binary Tries

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MANAGEMENT SCIENCE

Objective
The course introduces the basic concepts of Management Science and Operations Management and its application to business. The topics include human resource management, project and strategic management; the course develops problem solving and spreadsheet skills, an invaluable tool for modern business.

Learning outcome
- To enable students to gain an insight into different managerial decisions using standard techniques and problem structuring methods
- Students will be able to gain an understanding of the core concepts of Management Science and Operations Management;
- To understand the management issues in different functional areas of management namely operations and Human resources, strategy, marketing and project management.

Unit I Introduction to Management & Organisation: Concepts of Management and organization-nature, importance and Functions of Management, Systems Approach to Management - Taylor's Scientific Management Theory – Fayal's Principles of Management – Maslow's theory of Hierarchy of Human Needs – Douglas McGregor's Theory X and Theory Y – Hertzberg Two Factor Theory of Motivation - Leadership Styles, Social responsibilities of Management. Designing Organisational Structures: Basic concepts related to Organisation - Departmentation and Decentralisation, Types and Evaluation of mechanistic and organic structures of organisation and suitability.

Unit II Operations & Marketing Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement – Business Process Reengineering (BPR) - Statistical Quality Control: control charts for Variables and Attributes (simple Problems) and Acceptance Sampling, TQM, Six Sigma, Deming's contribution to quality. Objectives of Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records – JIT System, Supply Chain Management, Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Unit III Human Resources Management (HRM): Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating – Capability Maturity Model (CMM) Levels – Performance Management System.

Unit IV Project Management *(PERT/CPM)*: Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

Unit V *Strategic Management and Contemporary Strategic Issues*: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

TEXTBOOKS:
1. Aryasri: *Management Science*, McGraw Hill, 2012.
2. Vijay Kumar and Appa Rao, *Management Science*, Cengage, 2012.

REFERENCES :
1. Kotler Philip & Keller Kevin Lane: Marketing Management, Pearson, 2012.
2. Koontz & Weihrich: *Essentials of Management*, McGraw Hill, 2012.
3. Thomas N.Duening & John M.Ivancevich *Management—Principles and Guidelines,* Biztantra, 2012.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2012.
5. Samuel C.Certo: *Modern Management*, 2012.
6. Schermerhorn, Capling, Poole & Wiesner: *Management*, Wiley, 2012.
7. Parnell: *Strategic Management*, Cengage,2012.
8. Lawrence R Jauch, R.Gupta &William F.Glueck: *Business Policy and Strategic Management*, Frank Bros.2012.

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ADVANCED DATABASES ENGINEERING

Prerequisites
1. A course on "Database Management Systems"

Objectives
1. The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems.
2. Introduce basic principles and implementation techniques of distributed database systems.
3. Equip students with principles and knowledge of parallel and object oriented databases.
4. Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Outcomes
1. Understand theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database system.
3. Understand the design aspects of object oriented database system and related development.

UNIT-I
Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.
Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.
Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT-II
Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.
Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT-III
Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT –IV
Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.
Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT-V
Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.
Object Oriented Data Model : Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

Text Books:
1. M.Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

Reference Books:
1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition

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WEB SERVICES & SERVICE ORIENTED ARCHITECTURE
PGE-IV

Pre-requisites: Object Oriented Programming ,Web Technologies

Objectives:
- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design
- To learn the concepts such as SOAP, registering and discovering services.

Outcomes:
At the end of this course, students are expected to gain the following learning:
- Get the foundations and concepts of service based computing
- Advocate the importance and means of technology alignment with business
- Understanding the basic operational model of web services,
- Gain the knowledge of key technologies in the service oriented computing arena
- Apply and practice the learning through a real or illustrative project/case study.

UNIT- I
Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

UNIT -II
Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services. Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

UNIT III
Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.

UNIT – IV
Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification.

UNIT - V
SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.

Text Book:
1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.

References:
1. Introduction to Algorithms, TH Cormen, PHI XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly, SPD.
4. McGovern, et al., "Java web Services Architecture", Morgan Kaufmann Publishers, 2005.
5. J2EE Wer Services, Richard Monson-Haefel, Pearson Education.

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INFORMATION SECURITY
PGE-IV

Prerequisites

❧ A Course on Computer Networks and a course on Mathematics

Objectives

❧ To understand the fundamentals of Cryptography
❧ To understand various key distribution and management schemes
❧ To understand how to deploy encryption techniques to secure data in transit across data networks
❧ To apply algorithms used for secure transactions in real world applications

Outcomes

❧ Demonstrate the knowledge of cryptography, network security concepts and applications.
❧ Ability to apply security principles in system design.
❧ Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

UNIT I
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security.
Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

UNIT II
Public key Cryptography   Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.
Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

UNIT III
Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications,Kerberos, X.509 Directory Authentication Services , Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT IV
IP Security:
Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT V
Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

TEXT BOOKS:

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

REFERENCE BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

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                                RESEARCH METHODOLOGIES   **4 0   0   4**

Prerequisite: NIL

Objective:
- Introduces research paper writing and publication skills.

Outcome:
Gain the sound knowledge of the following important elements:
- Ability to distinguish research methods
- Ability to write and publish a technical research paper.
- Ability to review papers effectively

UNIT I
Introduction, Technical Research Paper Writing and Publication

UNIT II
Research Paper Search

UNIT III
Research Ethics, Research Methods in Computer Science and Engineering, Research Methods for Software Engineering, Research Methods (deductive methods and proofs)

UNIT IV
Paper Publishing and Reviewing, Measured-based research methods in Computer Engineering

UNIT V
Preparation & Presentation of a scientific paper

Text Book :
1. A Computer Scientist's Guide to Writing and Publishing Technical Articles, Paul Martin, Technical Report, CS-TR-95-4, Dept of CS, Victoria University of Wellington, New Zealand, 1995.

Reference

1. Marcia Martens Pierson, Bion L. Pierson, Beginnings and Endings: Keys to Better Engineering Technical Writing, IEEE Transactions on Professional Communication (IEEE T-PC), Vol. 40, No. 4, pp 299 - 304 December 1997

SOFTWARE DESIGN AND ENGINEERING
PGE-IV

Prerequisite:
- Computer Programming using C and C++

Objectives:
- To develop in students the knowledge, understanding, skills and values to solve problems through the creation of software solutions
- To design and experiment with software prototypes
- To elicit, analyze and specify software requirements through a productive working relationship with project stakeholders.
- To build solutions using different technologies, architectures and life-cycle approaches.
- The context of different organizational structures.

Outcomes:
- Understanding of the historical developments that have led to current practices in software design and development, and of emerging trends and technologies in this field.
- Acquiring and applying the skills in designing and developing software solutions.
- Acquiring and using the skills required to schedule a software project.

UNIT I
Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths.
A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.
Process models: The waterfall model, Incremental process models, Evolutionary process models, Specialized process models, The Unified process.
Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT II
Software Design
The nature of the design process, transferring design knowledge, constraints upon the design process and product, recording design decisions, designing with others, context for design, economic factors, assessing design qualities, quality attributes of the design product, assessing the design process. Representing abstract ideas, design view points, the architecture concept, design methods, design patterns, design representations, rationale for design methods.
Design Processes and Strategies : The role of strategy in design methods, describing the design process – The D – Matrix, design by top-down decomposition, design by composition, organizational influences upon design.

UNIT III
Designing with objects and components
Designing with objects : Design practices for object-oriented paradigm, Object-oriented paradigm, Object-oriented frame works, Hierarchical object oriented design process and heuristics, the fusion method, the unified process.
Component - based design:
The component concept, designing with components, designing components, COTS.
User Interface design
The Golden rules, Interface analysis and design models, user and task analysis, analysis of display content and work environment, applying interface design issues, design evaluation.

UNIT IV
Concepts Of Software Projects
Project Management: The management spectrum: people, product, process and project, W5HH principle, Critical practices, Metrics for Process and Projects : Process metrics, project metrics, size-oriented metrics, function-oriented metrics, Object-oriented and use-case metrics, metrics for software quality, integrating metrics with in software process.

UNIT V
Project Scheduling and Management
Project Scheduling: Basic concepts, project scheduling , defining a task set and task network, timeline charts, trackimg the schedule, tracking the progress for an OO project, Earned value analysis.
Risk Management: Reactive Vs. Proactive risk strategies, software risks, risk identification, risk projection,risk refinement, risk mitigation and monitoring, the RMMM plan.

Text Books:
1. Software design, David Budgen, second edition, Pearson education,2003
2. Software Engineering:A practitioner's Approach, Roger S Pressman, sixth edition. McGrawHill International Edition, 2005

Reference Books:
1. Applying domain- driven design and patterns, jimmy Nilsson, Pearson education,2006
2. Software Engineering Foundations, Ian Sommerville, seventh edition, Pearson education,2004.
3. Software Project Managenent , Bob Hughes & Mike Cotterell, Fourth edition, Tata Mc Gr aw Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
4. The Art of Project Management, Scott Berkun, O'Reilly, 2005.
5. Software Engineering, Project Management , Richard H. Thayer & Edward Yourdon, second edition, Wiley india, 2004.
6. Software Engineering foundations,Yingxu Wang Auerbach publications, 2008.
7. Applied Software Project Management , Andrew Stellman & Jennifer Greene, O'Reilly, 2006.

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ADVANCED DATABASE ENGINEERING LAB
(PGC LAB)

1. Payroll processing system - Database design using E-R model

2. Applying Normalization techniques on Payroll processing systems.

3. Integrity constraints enforcement, High level language extension with Triggers on Payroll processing systems

4. Implement query processing algorithms: nested loop join, merge join, hash join, hybrid hash join.

5. Implement Dynamic programming algorithm for join order optimization.

6. Image storage and retrieval in MySQL database

7. Transaction Processing activities – application program development – concurrent executions

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SOFT COMPUTING
PGC-III

Prerequisites
-NIL-

Objectives
- This course explains AI problems and search techniques.
- To understand the supervised and unsupervised learning networks
- Introduces classical sets and fuzzy sets.
- To understand genetic algorithms.

Outcomes
- Comprehend the differences between classical sets and fuzzy sets
- Able to provide solutions to general pattern reorganization problem.
- Get the skill for application of search techniques to solve AI problems
- Able to design a genetic algorithms based solution for solving real time problems

UNIT-I
AI Problems and Search: AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic and Rules.

UNIT-II
Artificial Neural Networks: Introduction, Basic models of ANN, impotant terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Backpropogation Network. Associative Memory Networks. Traing Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-III
Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propogation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-IV
Introduction to Classical Sets (crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalence relations.
Membership functions- Features, Fuzzification, membership value assignments, Defuzzification.

UNIT-V
Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making
Fuzzy Logic Control Systems. Genetic Algorithm- Intrduction and basic operators and terminology.Applications: Optimization of TSP, Internet Search Technique

Text Books:
1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,. Pearson Edition, 2004.

References :
1. Artificial Intelligence and SoftComputing- Behavioural and Cognitive Modelling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991, rp2008.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.
4. A first course in Fuzzy Logic-Hung T Nguyen and Elbert A Walker, CRC. Press Taylor and Francis Group.

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INFORMATION SYSTEMS CONTROL & AUDIT
PGE-V

Prerequisites
-NIL-

Objectives
- ✎ Introduces the basic concepts of information system auditing..
- ✎ To understand the management control frameworks and the application control framework.

Outcomes
- ✎ Understand functions of information systems audit and management
- ✎ Acquire skills for the evidence collection & evaluation

Unit -I
Overview of Information System Auditing-Conducting an Information Systems Audit, Overview & steps in an Audit.

Unit-II
The Management Control Framework-I: Introduction, Systems Development Management Controls, Security Management Controls, Operations management Controls, Quality assurance Management Controls.

Unit -III
The Application Control Framework-I : Boundary Controls, Input Controls, Processing Controls, Database Controls, output Controls.

Unit -IV
Evidence Collection & Evaluation: Audit Software, Code Review, Test Data, and Code Comparison, Concurrent Auditing techniques, Interviews, Questionnaires ,and Control Flowcharts. Performance Management tools. Evaluating Asset Safeguarding and Data Integrity, Evaluating System Effectiveness, Efficiency.

Unit-V
Information Systems Audit and Management: Managing the Information Systems Audit Function, Introduction, Planning Function, Organising Function, Staffing Function, Leading Function, Controlling Function, Some Features of Information Systems Auditing.

Text Book:
1.   Ron Weber: Information Systems Control and Audit, Pearson, 2006.

References:
1. James A.Hall: Information Technology Auditing and Assurance, Cengage. 2008.
2. Davis: IT Auditing, TMH, 2007
3. David Ricchiute: Auditing and Assurance Services, 7/e, Cengage, 2008.
4. Cannon, Bergmann, Pamplin: CICA- Certified Information Systems Auditor, Study Guide, 1/e , Sybex, WILEY- India, 2006.
5. Ronald, Russel: The CISSP prep Guide, 2/e. Wiley, Dreamtech, 2006.
6. Alter: Information Systems, Pearson, 20

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INTERNET OF THINGS
PGE-V

Prerequisites: NIL

Objectives:
- To introduce the terminology, technology and its applications
- To introduce the raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

Outcomes:
- Understand the new computing technologies
- Able to apply the latest computing technologies like cloud computing technology and Big Data
- Ability to introduce the concept of M2M (machine to machine) with necessary protocols
- Get the skill to program using python scripting language which is used in many IoT devices

Unit I
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

Unit II
IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

Unit III
Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit IV
IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Unit V
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

Text Books:
1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

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ADVANCED COMPUTER ARCHITECTURE
PGE-V

Prerequisites: Computer Organization
Objectives:

- To impart the concepts and principles of parallel and advanced computer architectures.

- To develop the design techniques of parallel and advanced computer architectures.

- To Apply the concepts and techniques of parallel and advanced computer architectures to design modern computer systems

Outcomes:
On successful completion of this course the students will be able to Gain knowledge of:

- Computational models and Computer Architectures.

- Concepts of parallel computer models.

- Scalable Architectures, Pipelining, Superscalar processors, multiprocessors

UNIT - I:
Fundamentals of Computer Design:Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.
Instruction set principles and examples-Introduction, classifying instruction set-memory addressing-type and size of operands, Operations in the instruction set.

UNIT –II: Pipelines:
Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties
Memory Hierarchy Design:Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT -III: Instruction Level Parallelism (ILP)
The Hardware Approach:Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, High performance instruction delivery-Hardware based speculation.
ILP Software Approach:
Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT –IV:
Multi Processors and Thread Level Parallelism:Multi Processors and Thread level Parallelism-Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributedshared Memory architecture, Synchronization.

UNIT –V: Inter Connection and Networks:
Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters. Intel Architecture:Intel IA-
64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:
1. John L. Hennessy, David A. Patterson -Computer Architecture: A Quantitative Approach, 3rd Edition, an Imprint of Elsevier.

REFERENCE BOOKS:
1. John P. Shen and Miikko H. Lipasti -, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing -Kai Hwang, Faye A.Brigs., MC Graw Hill.

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USER INTERFACE TECHNOLOGIES
PGE-V

Prerequisites : Nil

Objectives
- To understand the design principles of developing a Human Computer Interface HCI).
- To learn tools and devices required for designing a good interface

Outcomes
After the successful completion of this course, the student will be able to
- Acquire knowledge on principles and components of HCI.
- Analyze product usability evaluations and testing methods.
- Design an effective user interface for software application using the building tools and techniques.

UNIT I
INTRODUCTION
Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT II
HUMAN COMPUTER INTERACTION
User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating   Menus–   Graphical   Menus.

UNIT III
WINDOWS
Characteristics–   Components–   Presentation   Styles–   Types–   Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination   Control–   Custom   Control–   Presentation   Control.

UNIT IV
MULTIMEDIA
Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization–   Accesssibility–   Icons–   Image–   Multimedia – Coloring.

UNIT V
WINDOWS LAYOUT– TEST
Prototypes – Kinds Of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.

TEXT BOOKS:
1. Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", John Wiley& Sons, 2001.
2. Ben Sheiderman, "Design The User Interface", Pearson Education, 1998.

REFERENCE:
1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.

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INFORMATION STORAGE AND MANAGEMENT
PGE-VI

Prerequisite: NIL
Objectives:
- To make students well verse in the concepts of storage networks.
- To enable the students in perceiving storage as an infrastructure
- To handle the transition from storage infrastructure planning and design to store operations.
- To prepare the students for handling rapid changes in business processes and in the applications and technical infrastructure that enable them.

Outcomes:
- Ability to plan, install and manage a successful storage network
- Ability to analyze network file systems, volume managers, and database storage challenges used in storage networks
- Ability to integrate storage networking solutions with structured and unstructured data using data center models
- Ability to learn I/O workload planning and estimate storage networking capacities and requirements.

UNIT – I
Concepts of storage networking: the data storage and data access problem, storage networking, business applications, benefits of storage networks on business applications, the effects of storage networks on IT organizations.
Decoupling the storage component: NAS -Data-centric world, distributing computer processing, distributing I/O processing, SAN - idea, evolution and development , operational overview, caveats.

UNIT – II
Storage Architectures: storage elements, storage systems, peripheral connectivity components and concepts, host adapter, controller, magnetic disk storage, disk systems, magnetic tape storage
Connectivity options: connections, bus evolution, bus operations, PCI, SCSI bus, Fibre channel, USB and Firewire, creative connection strategies;Data organizational methods.

UNIT – III
Network Attached Storage: architecture – hardware, software architectures, network connectivity, NAS as a storage system; NAS hardware devices; NAS software components; NAS connectivity options.
Storage Area Network: architecture; hardware devices; software components; configurations for SANs

UNIT – IV
Defining the I/O workload: storage planning and capacity planning, definition and characterization of workloads, I/O content and workloads, consideration for I/O workloads in storage networking.
Applying the SAN solution: workload characterization, OLTP workloads, Web transactional workloads, data warehouse workloads, conclusions.
Applying the NAS solution: workload characterization, Departmental workloads, Web workloads, specialized workloads, conclusions.
Integrating SAN and NAS: similarities, differences, need to integrate, future storage connectivity, storage integration.

UNIT – V
Storage Management: Planning business continuity; Managing availability; Maintaining serviceability.
Capacity planning, security considerations: overview, security methods, storage security -technology, challenges, Fibre channel SAN security, NAS security, Best practices for security.

TEXT BOOK:
1. Storage Networks: The Complete Reference by – Robert Splading (TMH 2003).

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PROFESSIONAL ETHICS
PGE-VI

Prerequisites: Nil

Objectives
- To introduce the basic concepts of universal human values
- To familiarize the students with desirable business and professional ethics, rights and responsibilities
- To prepare students against possible gaps and unethical practices in contemporary times
- To sensitise the students so that they can protect themselves and the organization from the possible professional crime malpractices

Outcomes
- The students learn about diverse ethical issues rooted in society, trade, business, and environment on local as well as a global platform.
- The students appreciate their role as a responsible citizen, professional, and as managers, advisors, experts and consultants.
- The students will reflect and learn major values and ethics from their observations of a spiritual discourse and a visit to a business organization as a practical part of this course.

Unit 1
Human Values: Morals, values, ethics – integrity – work ethics –service learning –civic virtue – respect for others- living peacefully - Caring –sharing –honesty – courage –valuing time – cooperation – commitment –empathy – self-confidence –spirituality – character- Mini-Cases

Unit II
Professional Ethics: Profession- and professionalism - Two models of professionalism –Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards – Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct of Institute of Engineers. Mini-cases.

Unit III
Professional Responsibilities: Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks- Risk benefit analysis– congeniality, collegiality and loyalty. Respect for authority – conflicts of interest –Mini-Cases.

Unit IV
Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Regulatory compliances, Monitoring and control- Mini-Cases

Unit V
Ethics in global context: Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – negotiating taxes. Mini-Cases.
Mini-projects

Project 1:
The student of this course should invariably attend (or watch on internet/any TV channel/youtube/social media) two speeches of 30 minutes duration each dealing with spiritual discourse and submit a report on the contents of the lecture proceedings.

Project 2:
Visit any organization (including shops/ hotels or shopping malls in your region) of your choice and observe how the professionals perform the given job with a focus on professional ethics and human values.

References
1. Aryasri, *Human Values and Professional Ethics*, Maruthi Publications.
2. S B George, *Human Values and Professional Ethics,* Vikas Publishing.
3. KR Govindan & Saenthil Kumar:Professional *Ethics and Human Values*, Anuradha Publications.
4. S K Chakraborthy & D.Chakraborthy: *Human Values and Ethics*, Himalaya.
5. M. Govindarajan, S. Natarajan, & V.S. Senthilkumar: *Engineering Ethics(Includes Human Values),* HI Learning Pvt. Ltd., New Delhi – 110001

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SECURITY IN COMPUTING
PGE-VI

Prerequisites
- A Course on "Information Security"

Objectives
- To understand various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To apply algorithms used for secure transactions in real world applications

Outcomes
- Demonstrate the knowledge of network security concepts and applications.
- Ability to apply security principles in system design.
- Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

Unit I
Security Problem in Computing
Computer Security, Threats, Attacks, Computer Criminals, Defense Methods,
Cryptography
Symmetric and Public-key Encryption, Uses of Encryption.

Unit II
Program Security
Secure Programs, Viruses and other Malicious Code, Control against Program Threats
Protection in General-Purpose OS
Protected Objects and Methods of Protection, Memory and Address Protection, Control of Access to General Objects, File Protection Mechanism, User Authentication.

Unit III
Designing Trusted OS
What is Trusted System?, Security Policies, Models of Security, Trusted Operating System Design
Database and Data Mining Security
Security Requirements, Reliability and Integrity, Sensitive Data, Inference, Multilevel Databases, Proposals for Multilevel Security, Data Mining

Unit IV
Security in Networks
Threats in Networks, Network Security Controls, Firewalls, Intrusion Detection System, Secure E-Mail
Administering Security
Security Planning, Organizational Security Policies, Physical Security
Economics of Cybersecurity
Quantifying Security, Modeling Cybersecurity, Current Research and Future directions

Unit V
Privacy in Computing
Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Privacy on the Web
Legal and Ethical Issues in Computer Security
Protecting Programs and Data, Computer Crime, Ethical Issues in Computer Security, Case Studies of Ethics
Security in Service-Oriented Architecture (SOA)
Web Services, XML Firewalls

Prescribed Text Book
1. C. P. Fleeger and S. L. Fleeger, Security in Computing, Pearson Education.

References
1. M.Bishop and S. S. Venkatramanaya, Introduction to Computer Security, Pearson Education Asia, 2005.
2. Atul Khate, Cryptography and Network Security, Tata McGraw-Hill.
3. Stallings W., Cryptography and Network Security Principles and Practice, 3/e, Pearson Education Asia, 2003.
4. C K Shyamala, N Harini, Dr T R Padmanabham, Cryptography and Network Security, Wiley India

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HIGH PERFORMANCE COMPUTING
PGE-VI

Prerequisites
- Computer Organization & Architecture
- Operating System Programming

Objectives
- To Improve the system performance
- To learn various distributed and parallel computing architecture
- To learn different computing technologies

Outcomes
- Understanding the concepts in grid computing
- Ability to set up cluster and run parallel applications
- Ability to understand the cluster projects and cluster OS
- Understanding the concepts of pervasive computing & quantum computing.

Unit I
Grid Computing: Data & Computational Grids, Grid Architectures And Its Relations To Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (Ibm).

Unit II
Cluster Setup & Its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging Systems. Process Scheduling, Load Sharing And Balancing; Distributed Shared Memory, Parallel I/O.

Unit III:
Example Cluster System – Beowlf; Cluster Operating Systems: Compas And Nanos
Pervasive Computing Concepts & Scenarios; Hardware & Software; Human – Machine Interface.

Unit IV
Device Connectivity; Java For Pervasive Devices; Application Examples.

Unit V
Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms.

Text Book:
1. "Selected Topics In Advanced Computing" Edited By Dr. P. Padmanabham And Dr. M.B. Srinivas, 2005 Pearson Education.

References:
1. J. Joseph & C. Fellenstien: 'Grid Computing ', Pearson Education
2. J. Burkhardt et.al: 'pervasive computing' Pearson Education
3. Marivesar:' Approaching quantum computing', pearson Education.
4. Raj kumar Buyya:'High performance cluster computing', pearson Education.
5. Neilsen & Chung L:'Quantum computing and Quantum Information', Cambridge University Press.
6. A networking approach to Grid Computing , Minoli , Wiley

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CRYPTANALYSIS
PGE-VII

Prerequisites
- A Course on Network Security, Mathematics"

Objectives
- To understand the importance of cryptanalysis in our increasingly computer-driven world.
- To understand the fundamentals of Cryptography
- To understand the Lattice- based cryptanalysis and elliptic curves and pairings
- To understand birthday- based algorithms for functions and attacks on stream ciphers
- To apply the techniques for secure transactions in real world applications

Outcomes
- Ability to apply cryptanalysis in system design to protect it from various attacks.
- Ability to identify and investigate vulnerabilities and security threats and the mechanisms to counter them.
- Ability to analyze security of cryptographic algorithm against brute force attacks, birthday attacks.

UNIT-I
A bird's – eye view of modern Cryptography: Preliminaries, Defining Security in Cryptography
Mono alphabetic Ciphers: Using Direct Standard Alphabets, The Caesar Cipher, Modular arithmetic, Direct Standard alphabets, Solution of direct standard alphabets by completing the plain component, Solving direct standard alphabets by frequency considerations, Alphabets based on decimations of the normal sequence, Solution of decimated standard alphabets, Mono alphabets based on linear transformation.
Poly alphabetic Substitution: Poly alphabetic ciphers, Recognition of poly alphabetic ciphers, Determination of number of alphabets, Solution of individual alphabets if standard, Poly alphabetic ciphers with a mixed plain sequences, Matching alphabets , Reduction of a poly alphabetic cipher to a mono alphabetic ciphers with mixed cipher sequences

UNIT- II
Transposition : Columnar transposition, Solution of transpositions with Completely filled rectangles, Incompletely filled rectangles, Solution of incompletely filled rectangles – Probable word method, Incompletely filled rectangles general case, Repetitions between messages ; identical length messages.
Sieve algorithms: Introductory example: Eratosthenes's sieve, Sieving for smooth composites

UNIT- III
Brute force Cryptanalysis: Introductory example: Dictionary attacks , Brute force and the DES Algorithm, Brute force as a security mechanism, Brute force steps in advanced cryptanalysis, Brute force and parallel computers.
The birthday paradox: Sorting or not?: Introductory example: Birthday attacks on modes of operation, Analysis of birthday paradox bounds, Finding collisions, Application to discrete logarithms in generic groups.

UNIT- IV
Birthday- based algorithms for functions: Algorithmic aspects, Analysis of random functions, Number-theoretic applications, A direct cryptographic application in the context of blockwise
Security, Collisions in hash functions.
Attacks on stream ciphers: LFSR- based key stream generators, Correlation attacks, Noisy LFSR model, Algebraic attacks, Extension to some non- linear shift registers, The cube attack.

UNIT-V
Lattice- based cryptanalysis: Direct attacks using lattice reduction, Coppersmith's small roots attacks. Elliptic curves and pairings: Introduction to elliptic curves, The Weil pairing, the elliptic curve factoring method.

Text Books:
1. "Elementary Cryptanalysis A Mathematical Approach" by Abraham Sinkov, The mathematical Association of America (lnc).
2. "Algorithmic Cryptanalysis" by Antoine joux, CRC Press'

References:
1. Algebraic Cryptanalysis, Bard Gregory, Springer, 2009
2. Cryptanalysis of Number Theoretic Ciphers, Sameul S. Wag staff, Champan & Hall/CRC
3. Cryptanalysis: A Study of Cipher and Their Solution, Helen F. Gaines,1989

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DATA ANALYTICS
PGE-VII

Prerequisites

☞ Data Mining

Objectives

☞ The purpose of this course is to provide the students with the knowledge of Data Analytics principles and techniques
☞ This course is also designed to give an exposure of the frontiers of Big data Analytics

Outcomes

☞ Ability to explain the foundations, definitions, and challenges of data analytics and various tools.
☞ Ability to program using HADOOP and Map reduce, NOSQL
☞ Ability to understand importance of Big Data in Social Media and Mining.

UNIT - 1:
Foundations of Business Analytics, Introduction to Business Analytics, Analytics on Spreadsheets

UNIT – 2 :
Descriptive Analytics, Visualizing and Exploring Data, Descriptive Statistical Measures, Probability Distributions and Data Modelling, Sampling and Estimation, Statistical Inference

UNIT – 3:
Predictive Analytics, Predictive Modelling and Analysis, Regression Analysis, Forecasting Techniques, Simulation and Risk Analysis, Introduction to Data Mining

UNIT – 4:
Prescriptive Analytics, Linear Optimization, Applications of Linear Optimization, Integer Optimization, Nonlinear and Non Smooth Optimization, Optimization Models with Uncertainty

UNIT – 5:
Making Decisions, Decision Analysis

TEXT BOOK
1. Joel R Evans, "Business Analytics – Methods, Models and Decisions", Pearson 2013.

REFERENCES
1. Chris Eaton, Dirk Deroos, Tom Deutsch et al., "Understanding Big Data", McGrawHIll, 2012.
2. "Understanding the Predictive Analytics Lifecycle", Wiley, 2014. Eric Siegel, Thomas H. Davenport, "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die", Wiley, 2013
3. R. N. Prasad, Seema Acharya, "Fundamentals of Business Analytics", Wiley, 2015.
4. S M Ross, "Introduction to Probability and Statistics for Engineers and Scientists", Academic Foundation, 2011.
5. David Hand, Heiki Mannila, Padhria Smyth, "Principles of Data Mining", PHI 2013.
6. Spyros Makridakis, Steven C Wheelwright, Rob J Hyndman, "Forecasting methods and applications", Wiley 2013(Reprint).
7. David Hand, Heikki Mannila, Padhraic Smyth, "Principles of Data mining", PHI 2013.
8. http://cran.r-project.org/doc/manuals/R-intro.html
9. W.N. Venables, D.M Smith, "An introduction to R",
10. R in Nutshell , O Reilly**,**

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IDP (B.Tech. CSE & M.Tech. /MBA) V Year I-Sem   **L   T   P   C**
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REAL TIME OPERATING SYSTEMS
PGE-VII

Prerequisites:
- Computer Organization
- Microprocessors
- Operating Systems

Objectives:
- To provide students with a thorough understanding of the principles behind the structure and operation of real-time operating systems.

Outcomes:
- Distinguish a real-time system from other systems
- Identify the functions of operating system
- Evaluate the need for real-time operating system
- Implement the real-time operating system principles

UNIT – I:
Introduction to Real Time Operating Systems: Brief History of OS, Defining an RTOS, The Scheduler, Objects, Services, Key Characteristics of an RTOS
Tasks: Defining a Task, Task States and Scheduling, Typical Task Operations, Typical task Structure, Synchronization, Communication and Concurrency.
Semaphores: Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - II:
Message Queues: Defining Message Queues, Message Queue states, Message Queue content, Message Queue Storage, Typical Message Queue operations, Typical Message Queue use Kernel Objects: Pipes, Event Registers, Signals, Condition Variables ,RTOS Services: Building Blocks, Component Configuration

UNIT- III:
Exceptions and Interrupts: What are Exceptions and Interrupts, Application of exceptions and Interrupts, A closer look at Exceptions and Interrupts, Processing General Exceptions, Nature of Spurious Exceptions,Timer and Timer Services: Real Time Clocks, Programmable Interval Timers, Timer Interrupt Service Routines, A Model for Implementing the Soft-Timer Handling Capacity, Timing Wheels

UNIT IV:
I/O Subsystem: Basic I/O Concepts, The I/O subsystem Memory Management: Dynamic Memory allocation In Embedded Systems, Fixed Size Memory management, Blocking Vs NON-Blocking Memory Functions

UNIT V:
Synchronization and Communication: Synchronization, Communication, Resource Synchronozation Methods, Common Practical Design Patterns
Case Studies: RT Linux, MicroC/OS-II, Vx Works

TEXT BOOKS:
1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS:
1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

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DIGITAL IMAGE PROCESSING
PGE-VII

Prerequisite Subject: ---Nil---

Course Objectives:
1. To comprehend the relation between human visual system and machine perception and processing of digital images.
2. To provide a detailed approach towards image processing applications like enhancement, segmentation and compression.

Course Outcomes:
1. Exploration of the limitations of the computational methods on digital images.
2. Expected to implement the spatial and frequency domain image transforms on enhancement and restoration of images.
3. Elaborate understanding on image enhancement techniques.
4. Expected to define the need for compression and evaluate the basic compression algorithms.

UNIT I
Fundamental steps of image processing, components of an image processing of system, the image model and image acquisition, sampling and quantization, station ship between pixels, distance functions, scanner.

UNIT II
Statistical and spatial operations, Grey level transformations, histogram equalization, smoothing & sharpening-spatial filters, frequency domain filters, homomorphic filtering, image filtering & restoration. Inverse and weiner filtering. FIR weiner filter.Filtering using image transforms, smoothing splines and interpolation.

UNIT III
Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and laplace operators, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.

UNIT IV
Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding.
Basics of color image processing, pseudocolor image processing, color transformation, color smoothing and sharpening, color segmentation, color image compression, compression standards.

UNIT V
Image Transforms -Fourier, DFT, DCT, DST, Haar, Hotelling, Karhunen -Loeve, Walsh, Hadamard, Slant. Representation and Description -Chain codes, Polygonal approximation, Signatures Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors,PCA.

TEXT BOOK:
1. Digital Image Processing–by Rafael.C.Gonzalez & Richard E.Woods, 3rd edition, Pearson Education, 2008.

REFERENCE BOOKS
1. Digital Image Processing, M.Anji Reddy, Y.Hari Shankar, BS Publications.
2. Fundamentals of Digital Image Processing –by A.K. Jain, PHI.
3. Digital Image Processing -William K, Part I -John Wiley edition.
4. Digital Image Processing using MATLAB by Rafael.C.Gonzalez, Richard E.Woods, & Steven L.Eddins, Pearson Education, 2006
5. Digital Image Processing, Kenneth R. Castleman, Pearson Education, 2007

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DISASTER MANAGEMENT
OPEN ELECTIVE-I

Pre Requisites: NIL

Course Objectives:
The subject provide different disasters, tools and methods for disaster management

Course Outcomes:
Estimate, perform quantity survey & valuate various engineering works

UNIT 1 : Understanding Disaster
Concept of Disaster
Different approaches
Concept of Risk
Levels of Disasters
Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerability
Natural and man-made hazards; response time, frequency and forewarning levels of different hazards
Characteristics and damage potential or natural hazards; hazard assessment
Dimensions of vulnerability factors; vulnerability assessment
Vulnerability and disaster risk
Vulnerabilities to flood and earthquake hazards

UNIT 2 : Disaster Management Mechanism
Concepts of risk management and crisis managements
Disaster Management Cycle
Response and Recovery
Development, Prevention, Mitigation and Preparedness
Planning for Relief

UNIT 3: Capacity Building
Capacity Building: Concept
Structural and Nonstructural Measures
Capacity Assessment; Strengthening Capacity for Reducing Risk
Counter-Disaster Resources and their utility in Disaster Management
Legislative Support at the state and national levels

UNIT 4: Coping with Disaster
Coping Strategies; alternative adjustment processes
Changing Concepts of disaster management
Industrial Safety Plan; Safety norms and survival kits
Mass media and disaster management

UNIT 5: Planning for disaster management
Strategies for disaster management planning
Steps for formulating a disaster risk reduction plan
Disaster management Act and Policy in India
Organizational structure for disaster management in India
Preparation of state and district disaster management plans

Text Books
1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

References
1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.
4. Chakrabarty, U.K. Industrial Disaster Management and Emergency Response, Asian Book Pvt. Ltd., New Delhi 2007.
5. Disaster Management in India, Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. National Policy on Disaster Management, NDMA, New Delhi, 2009
7. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.
8. District Disaster Management Plan-Model Template, NIDM, New Delhi, 2005.
9. Disaster Management, Future challenge and opportunities, Edited by Jagbir singh, I.K. International publishing home Pvt, Ltd.

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NON CONVENTIONAL POWER GENERATION
OPEN ELECTIVE-I

Pre-requisite: Nil.

Objectives:
- To introduce various types of renewable technologies available.
- The technologies of energy conversion from these resources and their quantitative analysis.

Outcomes:
- The student will be able analyse solar thermal and photovoltaic systems and related technologies for energy conversion.
- Wind energy conversion and devices available for it.
- Biomass conversion technologies.
- Geo thermal resources and energy conversion principles and technologies.
- Power from oceans (thermal, wave, tidal) and conversion and devices.
- Fundamentals of fuel cells and commercial batteries.

UNIT - I
Fundamentals of Solar Energy-Solar spectrum- Solar Radiation on Earth's surface-Solar radiation geometry-Solar radiation measurements- Solar radiation data- Solar radiation on horizontal and tilted surfaces. Solar Thermal conversion- Flat plate collectors- concentrated collectors- construction and thermal analysis- Solar applications- Solar ponds- Heliostat systems-water heater-air heater-solar still.

UNIT - II
Solar-Electric Power generation- Photovoltaic cells- Equivalent circuit- V-I Characteristics- Photovoltaic modules – constructional details- design considerations- Tracking- Maximum power point tracking - Solar Thermo electric conversion.

UNIT - III
Wind Energy- Fundamentals of wind energy-power available in wind- Betz Limit-Aerodynamics of wind turbine- Wind turbines- Horizontal and vertical axis turbines –their configurations- Wind Energy conversion systems.

UNIT - IV
Energy from Bio Mass- Various fuels- Sources-Conversion technologies-Wet Processes – Dry Processes- Bio Gas generation – Aerobic and anaerobic digestion - Factors affecting generation of bio gas - Classification of bio gas plants-Different Indian digesters- Digester design considerations - Gasification process - Gasifiers – Applications. Geothermal Energy - sources- Hydrothermal convective - Geo-pressure resources - Petro-thermal systems (HDR) - Magma Resources-Prime Movers.

UNIT - V
OTEC Systems- Principle of operation - Open and closed cycles, Energy from Tides - Principle of Tidal Power - Components of tidal Power plants - Operation Methods - Estimation of Energy in Single and double basin systems - Energy and Power from Waves-Wave energy conversion devices - Fuel Cells - Design and Principle of operation - Types of Fuel Cells - Advantages and disadvantages - Types of Electrodes – Applications - Basics of Batteries - Constructional details of Lead acid batteries - Ni-Cd Batteries.

TEXT BOOKS
1. John Twidell & Wier, Renewable Energy Resouces, CRC Press, 2009.
2. G.D.Rai – Non Conventional Energy sources, Khanna publishers.

REFERENCE BOOKS

1. D.P .Kothari, Singal,Rakesh, Ranjan, Renewable Energy sources and Emerging Technologies, PHI, 2009.
2. F.C.Treble, Generating Electricity from Sun.
3. C.S.Solanki, Solar Photo volatics- Fundamentals- Principles and Applications, PHI 2009
4. S.P.Sukhatme, Solar Energy Principles and Application - TMH

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ELECTRICAL ENGINEERING MATERIALS
OPEN ELECTIVE-I

Pre-requisites: Nil

Objectives: To understand the importance of various materials used in electrical engineering and obtain a qualitative analysis of their behavior and applications.

OUTCOMES: Will be able to
1. Understand various types of dielectric materials, their properties in various conditions.
2. Evaluate magnetic materials and their behavior.
3. Evaluate semiconductor materials and technologies.
4. Materials used in electrical engineering and applications.

UNIT- I
DIELECTRIC MATERIALS: Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials.

UNIT – II
MAGNETIC MATERIALS: Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. factors effecting permeability and hysteresis

UNIT – III
SEMICONDUCTOR MATERIALS: Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI).

UNIT – IV
MATERIALS FOR ELECTRICAL APPLICATIONS: Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetals fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid, Liquid and Gaseous insulating materials, Effect of moisture on insulation.

UNIT – V
SPECIAL PURPOSE MATERIALS: Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI

TEXT BOOKS
1. R K Rajput: A course in Electrical Engineering Materials, Laxmi Publications. 2009
2. T K BasaK: A course in Electrical Engineering Materials:, New Age Science Publications 2009
3. TTTI Madras: Electrical Engineering Materials
4. Adrianus J.Dekker: Electrical Engineering Materials, THM Publication.

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NANO-TECHNOLOGY
OPEN ELECTIVE-I

Pre-requisites: Nil

OBJECTIVES:
To enable the student to understand fundamentals of nano materials and technologies for these materials and their manufacturing, applications in various fields.

OUTCOMES:
* To evaluate electronic structural studies of nano materials and different synthesis methods to obtain nano structures.
* Understand characterization techniques through various measurements to study electrical, mechanical,thermal properties of nano materials.
* Applications of nano materials for specific purposes like MEMS, NEMS, nano electronics, energy storage.

UNIT - I
Background of Nanotechnology: Scientific Revolutions, Nanotechnology and Nanomachines - The Periodic Table, Atomic Structure, Molecules and Phases, Energy, Molecular and Atomic size, Surfaces and Dimensional Space, Top down and Bottom up approach.

UNIT - II
Molecular Nanotechnology: Atoms by inference, Electron Microscopes, Scanning electron microscope, Modern transmission electron microscope, Scanning probe microscope-atomic force microscope, scanning, tunneling microscope, Self Assembly.

UNIT - III
Nanopowders and Nanomaterials: Preparation, Plasma arcing, chemical vapor deposition, Sol-gels, Electrodeposition, Ball milling, using natural nanoparticles, Applications of nanomaterials.

UNIT - IV
Nanoelectronics: Approaches to nanoelectronics, Fabrication of integrated circuits, MEMS, NEMS, Nano circuits, Quantum wire, Quantum well, DNA-directed assembly and application in electronics.

UNIT - V
Applications: MEMS, NEMS, Coatings, Optoelectronic Devices, Environmental Applications, Nanomedicine.

TEXT BOOKS
1. Introduction to Nanoscience and Nanotechnology Gabor L. Hornyak, **NanoThread, Inc., Golden, Colorado, USA**; H.F. Tibbals, **University of Texas Southwestern Medical Center, Dallas, USA**; Joydeep Dutta, **Asian Institute of Technology, Pathumthani, Thailand**; John J. Moore, **Colorado School of Mines, Golden, USA**
2. Introduction to Nanotechnology by Charles P. Poole Jr and Frank J.Owens Wiley India Pvt Ltd.
3. Introduction to Nanoscience and Nanotechnology, Chatopadhyaya.K.K, and Banerjee A.N,
4. Introduction to nano tech by phani kumar
5. Introduction to Nano Technology by Charles P. Poole Jr and Frank J. Owens. Wiley India Pvt Ltd.
6. Introduction to Nanoscience and Nanotechnology, Chatopadhyaya.K.K, and Banerjee A.N,
NANOTECHNOLOGY Basic Science and EmergingTsechnologies by Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse- CHAPMAN & HALL/CRC PRESS 2002.

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OPERATIONS RESEARCH
OPEN ELECTIVE-I

Prerequisites: None

Objectives:
Understanding the mathematical importance of development of model in a particular optimization model for the issue and solving it.

Outcomes:
Understanding the problem, identifying variables & constants, formulas of optimization model and applying appropriate optimization Techniques

UNIT – I
Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.
ALLOCATION: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

UNIT – II
TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.
Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

UNIT – III
SEQUENCING – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines-graphical model
REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.

UNIT – IV
THEORY OF GAMES: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.
INVENTORY: Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks –Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

UNIT – V
WAITING LINES: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.
DYNAMIC PROGRAMMING:
Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming-shortest path problem – linear programming problem.

TEXT BOOK :
1.   Operation Research /J.K.Sharma/ MacMilan.
2.   Operations Research/A.C.S.Kumar/Yesdee
REFERENCE BOOKS :
1.   Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
2.   Operations Research /A.M.Natarajan, P.Balasubramaniam, A. Tamilarasi/Pearson Education.
3.   Operations Research / Wagner/ PHI Publications.
4.   Introduction to O.R/Hillier & Libermann (TMH).
5.   Introduction to O.R /Taha/PHI

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BASICS OF THERMODYNAMICS
OPEN ELECTIVE-I

Pre-requisite: Engineering Chemistry and Physics

Course Objective: To understand the treatment of classical Thermodynamics and to apply the First and Second laws of Thermodynamics to engineering applications

Course Outcomes:
At the end of the course, the student should be able to
• Understand and differentiate between different thermodynamic systems and processes
• Understand and apply the laws of Thermodynamics to different types of systems undergoing various processes
• Understand and analyze the Thermodynamic cycles

UNIT – I
Introduction: Basic Concepts:
System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle, Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility

UNIT II
Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale

UNIT – III
First and Second Laws of Thermodynamics: First Law: Cycle and Process, Specific Heats (cp and cv), Heat interactions in a Closed System for various processes, Limitations of First Law, Concept of Heat Engine (H.E.) and Reversed H.E. (Heat Pump and Refrigerator), Efficiency/COP, Second Law: Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, Statement of Clausius Inequality, Property of Entropy, T-S and P-V Diagrams

UNIT IV
Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas const.
Atmospheric air - Psychrometric Properties – Dry bulb Temperature,   Wet Bulb Temperature, Dew point Temperature, , Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation ,Psychrometric chart.

UNIT - V
Power Cycles : Otto, Diesel cycles - Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis
Refrigeration Cycles:
Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.
TEXT BOOKS :
1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Thermodynamics / C.P.Arora.
REFERENCE BOOKS:
1. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
2. Fundamentals of Classical Thermodynamics – G. Van Wylan & R.E. Sonntag – John Wiley Pub.
3. Thermodynamics – J.P.Holman / McGrawHill
4. Engineering Thermodynamics – Jones & Dugan
5. Thermodynamics & Heat Engines – Yadav – Central Book Depot, Allahabad.

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FABRICATION PROCESSES
OPEN ELECTIVE-I

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Prerequisites: Nil

Objectives:
Understand the philosphipies of various Manufacturing process.

Outcomes:
For given product, one should be able identify the manufacturing process.

UNIT – I
Casting : Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.
Methods of Melting - Crucible melting and cupola operation – Defects in castings;
Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

UNIT – II
Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.
Inert Gas Welding _ TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non-destructive testing of welds.

UNIT – III
Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth.
Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning.
Types of presses and press tools. Forces and power requirement in the above operations.

UNIT – IV
Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

UNIT – V
Forging Processes : Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS :
1. Manufacturing Technology / P.N. Rao/TMH

REFERENCE BOOKS :
1. Production Technology / R.K. Jain
2. Metal Casting / T.V Ramana Rao / New Age
3. Principles of Metal Castings / Rosenthal.
4. Welding Process / Parmar /
5. Production Technology /Sarma P C /
6. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson Edu.

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ELECTRONIC MEASURING INSTRUMENTS
OPEN ELECTIVE-I

Note: No detailed mathematical treatment is required.

Prerequisite : Nil
Course Objectives:
- It provides an understanding of various measuring systems functioning and metrics for performance analysis.
- Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
- Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes:
On completion of this course student can be able to
- Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
- Measure various physical parameters by appropriately selecting the transducers.
- Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.

Unit-I:
Block Schematics of Measuring Systems and Performance Metrics: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag.

Unit-II:
Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications.

Unit-III:
Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments. CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes.

Unit-IV:
Recorders: X-Y Plotter, Curve tracer, Galvanometric Recorders, Servo transducers, pen driving mechanisms, Magnetic Recording, Magnetic recording techniques.

Unit-V:
Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

TEXT BOOKS:
1. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.
2. Electronic Instrumentation: H.S.Kalsi – TMH, 2nd Edition 2004.

REFERENCES:

1. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI 5th Edition 2003.
3. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA
OPEN ELECTIVE-I

Prerequisites
   1. A course on "Computer Programming & Data Structures"

Objectives
   1. Introduces object oriented programming concepts using the Java language.
   2. Introduces the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes
   3. Introduces the implementation of packages and interfaces
   4. Introduces exception handling, event handling and multithreading
   5. Introduces the design of Graphical User Interface using applets and swings

Outcomes
   1. Develop applications for a range of problems using object-oriented programming techniques
   2. Design simple Graphical User Interface applications

UNIT I:
Object oriented thinking and Java Basics- Need for OOP paradigm, summary of OOP concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II:
Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class.
Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces, Exploring java.io.

UNIT III:
Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.
String handling,Exploring java.util.Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, daemon threads, Enumerations, auto boxing, annotations, generics.

UNIT IV:
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, dialogs, menu bar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V:
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS:
1. Java the complete reference, 7th editon, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

REFERENCES:
1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch,   John Wiley & Sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

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IDP (B.Tech. CSE & M.Tech. /MBA) III Year I-Sem   **L T P C**
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COMPUTER GRAPHICS
OPEN ELECTIVE-I

Prerequisites
1. Familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.
2. A course on "Computer Programming and Data Structures"

Objectives
1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Outcomes
1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT-I:
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid-point circle and ellipse algorithms
Filled area primitives: Scan-line polygon fills algorithm, boundary-fill and flood-fill algorithms

UNIT-II:
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm, Polygon Filling

UNIT-III:
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT-IV:
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT-V:
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.
Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Text Books:
1. "Computer Graphics *C version*", Donald Hearn and M.Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

References:
1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

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ENGINEERING MATERIALS
OPEN ELECTIVE-I

Pre requisites: Nil

Course Objectives:
1. To gain an knowledge about the uses and application of various ferrous metals and alloys.
2. To gain an knowledge about the uses and application of various non ferrous alloys.
3. To gain an knowledge about the uses and application of various ceramics, polymers and composites for different engineering applications.

Course Outcomes:
At the end of the course, student would be able to recommend
1. Ferrous metals and alloys for a given engineering applications and service condition.
2. Non ferrous alloys for a given engineering applications and service condition.
3. Ceramics, Polymers and composites for a given engineering applications and service condition.

UNIT-I
FERROUS ALLOYS: Introduction, Designations and classifications for steels, Simple Heat Treatments, Effect of Alloying Elements.

UNIT-II
NONFERROUS ALLOYS: Introduction, properties and applications, Aluminum Alloys, Magnesium Alloys, Copper Alloys and Titanium Alloys.

UNIT-III
CERAMIC MATERIALS: Introduction, Properties and Applications of Ceramics, Glasses and Refractories.

UNIT-IV
POLYMERS: Introduction, Classification of Polymers, Polymerization, Degree of Polymerization, Typical Thermoplastics and Thermosets.

UNIT-V
COMPOSITES: Introduction, Classification, Properties and Applications of Polymer matrix, Metal Matrix Ceramic Matrix and Laminar composites.

TEXT / REFERENCE BOOKS:
1. Donald R. Askland, Pradeep P. Phule, The Science and Engineering of Materials (4th Edition), Thomson Publishers, 2003.
2. William D. Callister Introduction to Material Science and Engineering, John Wiley and Sons, 2007.
3. W.F.Smith, Principles of Materials Science and Engineering, Mc Graw Hill, New York, 1994.

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IDP (B.Tech. CSE & M.Tech. /MBA) III Year I-Sem   **L T P C**
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METALLURGY FOR NON METALLURGISTS
OPEN ELECTIVE-I

Pre requisites: Nil

Course Objectives:
1. To describe the basic principles of metallurgy and the importance of metallurgy in various discipline of engineering.
2. Gain a thorough knowledge about heat treatment of steels.
3. Gain a knowledge about properties and uses of cast irons and non ferrous metals.
4. Gain a working knowledge of basic testing methods for metals.

Course Outcomes:
At the end of the course Student would be able
1. To use and apply metallurgy in his own branch of engineering.
2. The student will be able to justify the various testing methods adopted for metals.

UNIT-I
Introduction: Crystal structure and defects, Crystal structure of metals, Classification of steels, Carbon steels

UNIT-II
Heat Treatment of Steels: The Iron carbon systems, Common phases in steels, Annealing, Normalizing, Hardening and tempering

UNIT-III
Cast irons: Properties and applications of Ductile irons, Malleable irons, Compacted graphite iron.

UNIT-IV
Non Ferrous Metals: Properties and applications of Light Metals (Al , Be, Mg, Ti), Super alloys

UNIT-V
Testing of Metals: Hardness testing, Tensile Testing, Impact Testing, Fatigue Testing.

TEXT BOOKS
1. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007
2. Introduction to Physical Metallurgy – SH Avner, TATA Mc GRAW HILL ,1997
3. Metallurgy for Engineers- Clark and Varney
4. Mechanical Metallurgy – G. E. Dieter

REFERENCE BOOKS
1. Engineering Physical Metallurgy and Heat treatment – Y Lakhtin
2. C. Suryanarayana, Experimental Techniques in Mechanics and Materials, John Wiley, John Wiley, NJ, USA,2006
   Foundations of Materials Science and Engineering – WF Smith

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INDUSTRIAL POLLUTION CONTROL ENGINEERING
OPEN ELECTIVE-I

Objective:
To expose the students to various types of industrial pollutions and controlling techniques.

OUTCOME:
The student will be able learn the sources of air, water pollution and also their treatment methods

UNIT-I
Introduction to industrial pollution and types of pollution from chemical industries, Effects of pollution as environment and ecosystems-global warming-green house effect; Environmental legislatures-standards and guidelines.

UNIT –II
Air pollution- Meteorological aspects of pollution dispersion-adiabatic lapse rate-Environmental lapse rate-Turbulence and stability of atmosphere, Richardson number-Plume raise-plume behavior and characteristics, effective stack height. Major air pollutants and their sources, measurement of air pollutants

UNIT -III
General methods of control air pollutants removal of sulphur dioxide, oxides of nitrogen and organic vapors from gaseous effluents; Removal of particulate matter – principle and working of setting chambers, cyclone separators, fabric and fibre filters – electro static precipitators, Treatment of gaseous effluents.

UNIT -IV
Introduction to water pollution – water pollutants classification – characteristics of liquid effluents from fertilizer, pulp & paper and petroleum industries, estimation of oxygen demands – DO, BOD, COD, TOC – BOD curves, oxygen sag curve – modeling of BOD curves
Biological treatment of waste waters – aerobic and anaerobic methods – suspended and attached growth processes – bacteria – Reproduction in bacterial – Bacterial growth crushes, conventional activated sludge process – Trickling filters, Aerated lagoons – stabilization ponds – fluidized bed contractors.

UNIT -V
Physical Treatment methods : Principle and working of screening – sedimentation – flotation – filtration – flocculation, Tertiary Treatment methods – carbon adsorption – Ion exchange – Reverse Osmosis, Boralin Chlorinating – Ultra filtration, Sludge treatment and disposal , removal of chromium and phenol from liquid effluents.
.
Text books:
1. Pollution control in process industries by S.P. Mahajan TMH.,1985
2. Waste water treatment by M.Narayana Rao and A.K.Datta,Oxford and IHB publ. New Delhi

References:
1. Environmental pollution and control engineering by Rao C. S. – Wiley Eastern   Limited, India, 1993.
2. Air pollution control by P.Prathap mouli and N.Venkata subbayya. Divya Jyothi Prakashan, Jodhpur.

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ESTIMATION, QUANTITY SURVEY & VALUATION
OPEN ELECTIVE -II

Pre Requisites:
Concrete Technology, RC Design, Desgin of Steel Structure

Course Objectives:
The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works .

Course Outcomes:
Able to provide control steps for disaster mitigation steps

UNIT – I
General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

UNIT – II
Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT – III
Earthwork for roads and canals.

UNIT – IV
Rate Analysis – Working out data for various items of work over head and contigent charges.

UNIT-V
Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation -Standard specifications for different items of building construction.

NOTE : NUMBER OF EXERCISES PROPOSED :
1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

Text Books:
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie

Reference books:
1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications   by M. Chakraborthi; Laxmi publications.

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DESIGN ESTIMATION AND COSTING OF ELECTRICAL SYSTEMS
OPEN ELECTIVE-II

Pre-requisite: Power systems-I and Power Systems-II

Objectives:
Objectives of this course are
- To emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability.
- To design and estimation of wiring,
- To design overhead and underground distribution lines, substations and illumination design.

OUTCOMES:
Students are in a position to Understand the design considerations of electrical installations.
- To design electrical installation for buildings and small industries.
- To identify and design the various types of light sources for different applications.

UNIT - I
DESIGN CONSIDERATIONS OF ELECTRICAL INSTALLATIONS: Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections , Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT - II
ELECTRICAL INSTALLATION FOR DIFFERENT TYPES OF BUILDINGS AND SMALL INDUSTRIES: Electrical installations for residential buildings – estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

UNIT - III
OVERHEAD AND UNDERGROUND TRANSMISSION AND DISTRIBUTION LINES: Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT - IV
SUBSTATIONS: Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type.

UNIT – V
DESIGN OF ILLUMINATION SCHEMES: Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes LED, CFL and OCFL differences.

TEXT BOOKS
1. Electrical Design Estimating and Costing, K. B. Raina, S. K. BhattAcharya, New Age International Publisher.
2. Design of Electrical Installations, Er. V. K. Jain, Er. Amitabh Bajaj, University Science Press.

REFERENCE BOOKS

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout   in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650V), Indian Standard Institution, IS: 3106-1966.
5. Code of Practice for earthling, Indian Standard Institution, IS:3043-1966.
6. Code of Practice for Installation and Maintenance of induction motors, Indian Standard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650 Volts), Indian Standard Institution, IS: 2274-1963.
8. Electrical Installation, estimating and costing, Gupta J. B., Katson, Ludhiana.

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ENERGY STORAGE SYSTEMS
OPEN ELECTIVE-II

Pre-requisite: None

Objectives:
Objectives of this course are
   • To enable the student to understand the need for energy storage, devices and technologies available and their applications.

OUTCOMES: After this course, the student
• Can analyze the characteristics of energy from various sources and need for storage
• Can classify various types of energy storage and various devices used for the purpose
• Can apply the same concepts to real time problems.

UNIT - I
Electrical Energy Storage Technologies: Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

UNIT - II
Needs for Electrical Energy Storage: Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

UNIT - III
Features of Energy Storage Systems: Classification of EES systems , Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES), Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

UNIT - IV
Types of Electrical Energy Storage systems: Electrical storage systems, Double-layer capacitors (DLC) ,Superconducting magnetic energy storage (SMES),Thermal storage systems ,Standards for EES, Technical comparison of EES technologies.

UNIT - V
Applications: Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

TEXT BOOKS
1. Energy Storage Benefits and Market Analysis' by James M. Eyer, Joseph J. Iannucci and Garth P. Corey.
2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOKS:
1. Jim Eyer, Garth Corey: Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.

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MECHATRONICS
OPEN ELECTIVE-II

UNIT – I
INTRODUCTION: Definition – Trends - Control Methods: Standalone , PC Based (Real Time Operating Systems, Graphical User Interface , Simulation) - Applications: identification of sensors and actuators in Washing machine, Automatic Camera, Engine Management, SPM, Robot, CNC, FMS, CIM.
SIGNAL CONDITIONING : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution, Filtering Noise using passive components – Registors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass , high pass , notch filtering

UNIT – II
PRECISION MECHANICAL SYSTEMS: Modern CNC Machines – Design aspects in machine structures, guideways, feed drives, spindle and spindle bearings, measuring systems, control software and operator interface, gauging and tool monitoring.
ELECTRONIC INTERFACE SUBSYSTEMS: TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers, over current sensing, resetable fuses, thermal dissipation - Power Supply - Bipolar transistors / MOSFETs

UNIT – III
ELECTROMECHANICAL DRIVES: Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.
MICROCONTROLLERS OVERVIEW: 8051 Microcontroller , micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming – Assembly, C (LED Blinking , Voltage measurement using ADC).

UNIT – IV
PROGRAMMABLE LOGIC CONTROLLERS: Basic Structure - Programming : Ladder diagram - Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling - Analog input/output - PLC Selection - Application.

UNIT – V
PROGRAMMABLE MOTION CONTROLLERS: Introduction - System Transfer Function – Laplace transform and its application in analyzing differential equation of a control system - Feedback Devices: Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive, Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers - P , PI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles – Trapezoidal- S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear , Circular - Core functionalities – Home , Record position , GOTO Position - Applications : SPM, Robotics.

TEXT BOOKS
1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics by M.D.Singh, J.G.Joshi PHI.
3. Mechatronics HMT

REFERENCE BOOKS
1. "Designing Intelligent Machines". open University, London.
2. Michel B. Histand and David G. Alciatore,"
3. Introduction to Mechatronics and Measurement systems, "Tata MC Graw Hill
4. I. C.W. Desi ha, "Control sensors and actuators," Prentice Hall.
5. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
6. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
7. Mechatronics System Design / Devdas shetty /Richard / Thomson.

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JET PROPULSION AND ROCKET ENGINEERING
OPEN ELECTIVE-II

Prerequites: None

Course outcomes:
After doing this course, student should be in position to
1.　Understand Turbo Jet Propulsion System
2.　Analyze the flight performance
3.　Understand Principles of Jet Propulsion and Rocketry & Nozzle Theory and Characteristics
4.　Learn the Aero thermo chemistry of the combustion products
5.　Understand the physics of Solid propellant rocket engine, Liquid Rocket Propulsion System & Ramjet and Integral Rocket Ramjet Propulsion System**:**

Unit - I:
Turbo Jet Propulsion System:
Gas turbine cycle analysis – layout of turbo jet engine. Turbo machinery- compressors and turbines, combustor, blade aerodynamics, engine off design performance analysis.
Flight Performance:
Forces acting on vehicle – Basic relations of motion – multi stage vehicles.

Unit - II:
Principles of Jet Propulsion and Rocketry:
Fundamentals of jet propulsion, Rockets and air breathing jet engines – Classification – turbo jet , turbo fan, turbo prop, rocket (Solid and Liquid propellant rockets) and Ramjet engines.
Nozzle Theory and Characteristics Parameters:
Theory of one dimensional convergent – divergent nozzles – aerodynamic choking of nozzles and mass flow through a nozzle – nozzle exhaust velocity – thrust, thrust coefficient, A_c / A_t of a nozzle, Supersonic nozzle shape, non-adapted nozzles, summer field criteria, departure from simple analysis – characteristic parameters – 1) characteristic velocity, 2) specific impulse 3) total impulse 4) relationship between the characteristic parameters 5) nozzle efficiency, combustion efficiency and overall efficiency.

Unit - III: Aero Thermo Chemistry of The Combustion Products:
Review of properties of mixture of gases – Gibbs – Dalton laws – Equivalent ratio, enthalpy changes in reactions, heat of reaction and heat of formation – calculation of adiabatic flame temperature and specific impulse – frozen and equilibrium flows.
Solid Propulsion System:
Solid propellants – classification, homogeneous and heterogeneous propellants, double base propellant compositions and manufacturing methods. Composite propellant oxidizers and binders. Effect of binder on propellant properties. Burning rate and burning rate laws, factors influencing the burning rate, methods of determining burning rates.

Unit - IV:
Solid propellant rocket engine – internal ballistics, equilibrium motor operation and equilibrium pressure to various parameters. Transient and pseudo equilibrium operation, end burning and burning grains, grain design. Rocket motor hard ware design. Heat transfer considerations in solid rocket motor design. Ignition system, simple pyro devices.
Liquid Rocket Propulsion System:
Liquid propellants – classification, Mono and Bi propellants, Cryogenic and storage propellants, ignition delay of hypergolic propellants, physical and chemical characteristics of liquid propellant. Liquid propellant rocket engine – system layout, pump and pressure feed systems, feed system components. Design of combustion chamber, characteristic length, constructional features, and chamber wall stresses. Heat transfer and cooling aspects. Uncooled engines, injectors – various types, injection patterns, injector characteristics, and atomization and drop size distribution, propellant tank design.

Unit - V: Ramjet and Integral Rocket Ramjet Propulsion System:
Fuel rich solid propellants, gross thrust, gross thrust coefficient, combustion efficiency of ramjet engine, air intakes and their classification – critical, super critical and sub-critical operation of air intakes, engine intake matching, classification and comparison of IIRR propulsion systems.

TEXT BOOKS:
1. Gas Turbines and propulsive systems-P.Khajuria& S.P.Dubey/Dhanpatrai pub.
2. Gas Dynamics & Space Propulsion M.C.Ramaswamy / Jaico Publishing House.

REFERENCE   BOOKS:
1. Rocket propulsion –Sutton
2. Gas Turbines /Cohen, Rogers & Sarvana Muttoo/Addision Wesley & Longman.
3. Gas Turbines-V.Ganesan /TMH.

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ERGONOMICS
OPEN ELECTIVE-II

Prerequists: None

Objectives:
Provide a broad based introduction to ergonomic principles and their application in the design of work, equipment and the workplace. Consideration is given to musculo-skeletal disorders, manual handling, ergonomic aspects of the environment as well as to the social and legal aspects.

Course Outcomes:
On completing this course successfully the student will be able to:
- understand and apply ergonomic principles to the creation of safer, healthier and more efficient and effective activities in the workplace;
- understand ergonomic risk assessments and appropriate control measures;
- understand the causes of upper limb disorders and how to reduce them;
- appreciate workplace layout and equipment design;
- appreciate environmental aspects of good ergonomic design.

UNIT I
Introduction to Ergonomics, Human, Machine Systems, Basic Work Systems, Human Relations and Occupational Psychology, Hawthrone Experiments, Participation, Occupational Medicine, Human Performance Psychology, FMJ versus FJM, Human Factors and Ergonomics. Modern Work Systems and Neo, Taylorism, Attempts to Humanize Work, Generic Tools in Ergonomics, Effectiveness and Cost Effectiveness of Ergonomics in General.

UNIT II
Design and Evaluation of Manual Handing Tasks, Anatomy and Biomechanics of Manual Handling, Prevention of Manual Handling Injuries in the Workplace, Design of Manual Handling Tasks.
Body Mechanics at Work: Risk Assessment and Design, Low Back Pain, Biomechanics of Spinal Loading, Ergonomics and Musculoskeletal System in General, Effectiveness and Cost Effectiveness.

UNIT III
Physically Demanding Work: Stress and Fatigue, Physically and Psychologically Demanding Work, Muscles, Structure and Function, and Capacity, Physical work capacity.
User, Cantered Workspace Design Anthropometric Data, Statistical Essentials, Types of Anthropometric Data, Applications Of Anthropometry in Design, Multiple Workspace Configurations, Status of Anthropometry in Ergonomics.

UNIT IV
Human Error, Accidents, and Safety, Micro ergonomics, Human Error, and Accidents, Prevention of Error in Human, Machine Interaction, Macroergonomices: Performance Shaping Factors.

UNIT V
Visual Environment: Measurements and Design, Vision and the Eye, Measurement of Light, Lighting Design Considerations, Visual figure, Eyestrain, and Near Work, Status of Methods in Risk Assessment and Task design.
Hearing, Sound, Noise and Vibration, Measurement of Sound, Hearing Protection, Design of Acoustic Environment.

Text books
1. Introduction to Ergonomics(Third Edition)/ R.S.Bridger/CRC Press , Taylor & Francis Group
References
1. Human factors in Engineering and Design/E.J.McCormick/ TMH Edison
2. Motion and Time Design and Measurement of work/ Barnes Ralph., / John Wiley & sons Newyork, 2002

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MECHATRONICS
OPEN ELECTIVE-II

Pre-requisites: None.

Course objectives:
• They should be able to link up mechanical and electronics.

Outcomes:
• Develop a relationship between mechanical elements and electronics elements for proper functioning of mechanical systems.

UNIT – I
INTRODUCTION: Definition – Trends - Control Methods: Standalone , PC Based (Real Time Operating Systems, Graphical User Interface , Simulation) - Applications: identification of sensors and actuators in Washing machine, Automatic Camera, Engine Management, SPM, Robot, CNC, FMS, CIM.

SIGNAL CONDITIONING : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution, Filtering Noise using passive components – Registors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass , high pass , notch filtering

UNIT – II
PRECISION MECHANICAL SYSTEMS :
Modern CNC Machines – Design aspects in machine structures, guideways, feed drives, spindle and spindle bearings, measuring systems, control software and operator interface, gauging and tool monitoring.
Note: (text book: Mechatronics HMT – chapter 5)

ELECTRONIC INTERFACE SUBSYSTEMS : TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – III
ELECTROMECHANICAL DRIVES : Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.
MICROCONTROLLERS OVERVIEW : 8051 Microcontroller , micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming –Assembly, C (LED Blinking , Voltage measurement using ADC).

UNIT – IV
PROGRAMMABLE LOGIC CONTROLLERS : Basic Structure - Programming : Ladder diagram - Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling - Analog input / output - PLC Selection - Application.

UNIT – V
PROGRAMMABLE MOTION CONTROLLERS : Introduction - System Transfer Function – Laplace transform and its application in analysing differential equation of a control system - Feedback Devices : Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive , Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers - P , PI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles – Trapezoidal- S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear , Circular - Core functionalities – Home , Record position , GOTO Position - Applications : SPM, Robotics.

TEXT BOOKS :
1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCE:
1. "Designing Intelligent Machines". open University, London.
2. Michel B. Histand and David G. Alciatore,"
3. Introduction to Mechatronics and Measurement systems, "Tata MC Graw hill
4. I. C.W. Desi ha, "Control sensors and actuators," Prentice Hall.
5. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
6. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
   Mechatronics System Design / Devdas shetty/Richard/Thomson.

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PRINCIPLES OF ELECTRONIC COMMUNICATIONS
OPEN ELECTIVE-II

Prerequsite : Nil

Course Objectives:
The objective of this subject is to:
• Introduce the students to modulation and various analog and digital modulation schemes.
• They can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecom concepts.

Course Outcomes:
By completing this subject, the student can
• Work on various types of modulations.
• Should be able to use these communication modules in implementation.
• Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

Unit 1:
Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

Unit 2:
Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

Unit 3:
Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

Unit 4:
Satellite Communication: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.
Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

Unit 5:
Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.
Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:
1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Kennady, Davis, Electronic Communications systems, 4e, TMH, 1999

Reference Books:
1. Tarmo Anttalainen, Introduction to Telecommunications Network Engineering, Artech House Telecommunications Library.
2. Theodore Rappaport, Wireless Communications-Principles and practice, Printice Hall, 2002.
3. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
4. Wayne Tomasi, Introduction to data communications and networking, Pearson Education, 2005.

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CYBER SECURITY
OPEN ELECTIVE -II

Prerequisites
1. A Course on "Network Security and Cryptography"

Objectives
1. The purpose of the course is to educate on cyber security and the legal perspectives of cyber crimes and cyber offenses.
2. Introduce tools and methods for enhancing cyber security.
3. Topics include- cyber crimes, cyber offenses, cyber crimes on mobile and wireless devices, tools and methods to prevent cyber crimes, legal perspectives of cyber crimes and cyber security, computer forensics, Intellectual Property Rights and cyber terrorism

Outcomes
1. Demonstrate the knowledge of cyber security and understand the Indian and Global Act concerning cyber crimes
2. Employ security and privacy methods in the development of modern applications such that personal data is protected; and provide safe Internet usage.

UNIT-I
Introduction to Cybercrime:
Introduction, Cybercrime and Information security, who are cyber criminals, Classification of Cyber crimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cyber crimes.
Cyber offenses : How Criminals Plan Them
Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT-II
Cybercrime: Mobile and Wireless Devices
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.
Tools and Methods Used in Cyber Crime:
Introduction, Proxy services and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

UNIT III
Cyber crimes and Cyber Security: the Legal Perspectives Introduction
Cyber Crime and Legal Landscape around the world, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario In India, Digital signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment Cyber law, Technology and Students: Indian Scenario.

Understanding Computer Forensics
Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody concept, Network Forensics, Approaching a computer, Forensics Investigation, Challenges in Computer Forensics, Special Tools and Techniques Forensics Auditing

UNIT IV
Cyber Security: Organizational Implications
Introduction, cost of cyber crimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cyber crimes the psychology, mindset and skills of hackers and other cyber criminals

UNIT V
Cybercrime: Illustrations, Examples and Mini-Cases
Examples:
Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.
Mini-Cases:
The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Illustrations of Financial Frauds in Cyber Domain, Digital Signature-Related Crime Scenarios.

Text book:
1. **Cyber Security**: *Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Nina Godbole and Sunil Belapure, Wiley INDIA.

Reference book:
1.   **Cyber Security Essentials**, James Graham, Richard Howard and Ryan Otson, CRC Press.

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DATABASE MANAGEMENT SYSTEMS
OPEN ELECTIVE-II

Prerequisites
1. A course on "Advanced Data Structures"

Objectives
1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Outcomes
1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques

UNIT I:
Database System Applications: database system Vs. file system, view of data, data abstraction, instances and schemas, data models, the ER model, relational model, other models, database languages, DDL, DML, database access for application programs, database users and administrator, transaction management, database system structure, storage manager, the query processor, history of data base systems, data base design and ER diagrams, beyond ER design entities, attributes and entity sets, relationships and relationship sets, additional features of ER model, concept design with the ER Model, conceptual design for large enterprises.

UNIT II:
Introduction to the Relational Model: integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views, form of basic SQL query, examples of basic SQL queries, introduction to nested queries, correlated nested queries, set comparison operators, aggregation operators, NULL values, comparison using null values, logical connectivity's, AND, OR and NOT, impact on SQL constructs, outer joins, disallowing NULL values, complex integrity constraints in SQL, triggers and active data bases, Oracle, SQL Server, DB2.

UNIT III:
Relational Algebra: Selection and projection, set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.
Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, dependency preserving decomposition, schema refinement in database design, multi valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT IV:
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity. Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with loss of nonvolatile storage, Advance Recovery systems, Remote Backup systems.

UNIT V:
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

References:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J. Date Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

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CORROSION ENGINEERING
OPEN ELECTIVE-II

Pre-requisites: NIL

Course Objectives:
1. To demonstrate electrometallurgy principles in deposition winning and the efficiency of the bath.
2. To determine corrosion rate/ resistance of metals and alloys.
3. To explain corrosion protection methods and tests.

Course Outcomes:
At the end of the course the student will be able:
1. To gain knowledge in various types of electrolytic cells and the processes taking place in them.
2. To obtain knowledge about the importance of controlling corrosion and its prevention measures.
3. The course is useful for higher studies, R&D, and also for getting into jobs in industries.

UNIT - I
Introduction, Electro Chemistry principles, electrochemical reactions, Polarization, passivity, environmental effects (oxygen, oxidizers, velocity, temperature, corrosive concentration, Galvanic coupling).

UNIT - II
Corrosion, Introduction, Definition, classification, Forms of corrosion, uniform corrosion,
Two metal corrosion: Sacrificial anode, EMF and Galvanic Series, Environmental effects,
Pitting corrosion: Pit shape and growth, Autocatalytic Nature of pitting, Crevice corrosion.

UNIT - III
Intergranular corrosion: Sensitization, weld decay, Knife-Line attack, Stress corrosion cracking: crack morphology, stress effects, environmental factors, metallurgical factors, Erosion corrosion: cavitation damage, fretting corrosion, Corrosion fatigue.

UNIT - IV
Corrosion prevention methods: Alteration of Environment (Inhibitors), Design, Coatings, cathodic and anodic protection. Material selection, Metallurgical aspects, Hydrogen damage (hydrogen blistering, Hydrogen embrittlement, Prevention).

UNIT - V
Modern theory and applications of corrosion: Introduction, free energy, cell potentials, emf series, applications of thermodynamics to corrosion, Corrosion rate expressions and measurements, corrosion testing.

Text / Reference Books:
1. Theory of Corrosion and Protection of Metals, N. D. Tomashov, Macmillan, 1967.
2. Corrosion Engineering, M. G. Fontana, 3rd edition, McGraw-Hill, 1985.
3. Corrosion and Corrosion Control, H. H. Uhlig, Wiley, 1985.

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TESTING OF MATERIALS
OPEN ELECTIVE-II

Pre-requisites: NIL

Course Objectives:
1. To gain and understanding of the response of various metals under the application of stress and/or temperature.
2. To build necessary theoretical back ground of the role of lattice defects in governing bot;h elastic and plastic properties of metals will be discussed.
3. Obtain a working knowledge of various hardness testing machines BHN, VHN, RHN
4. Obtain a working knowledge of creep and fatigue and analysis of data.

Course Outcomes:
At the end of the course the student will be able to:
1. Classify mechanical testing of ferrous and non-ferrous metals and alloys.
2. Recognize the importance of crystal defects including dislocations in plastic deformation.
3. Identify the testing methods for obtaining strength and hardness.
4. Examine the mechanisms of materials failure through fatigue and creep

UNIT – I
Introduction, Importance of testing
Hardness Test: Methods of hardness testing – Brinell, Vickers, Rockwell hardness tests.
The Impact Test: Notched bar impact test and its significance, Charpy and Izod Tests, fracture toughness testing - COD and CTOD tests, significance of transition temperature curve.

UNIT - II
The Tension Test: Engineering stress-strain and True stress-strain curves. Tensile properties, conditions for necking. Stress-Strain diagrams for steel, Aluminum and cast iron.

UNIT - III
Fatigue Test: Introduction, Stress cycles, S-N Curve, Effect of mean stress, Mechanism of fatigue failure, Effect of stress concentration, size, surface condition and environments on fatigue.

UNIT – IV
Creep and Stress Rupture: Introduction, The creep curve, Stress-rupture test, Structural changes during creep, Mechanism of creep deformation, theories of creep. Fracture at elevated temperature.

UNIT – V
NDT: Principle, Operation, Advantages and Limitations of Liquid Penetrant, Magnetic Particle, Radio graphy and Ultrasonic tests.

TEXT / REFERENCE BOOKS:
1. Mechanical Metallurgy – G. E. Dieter
2. Mechanical behavior - Ed. Wulf.
3. Mechanical Metallurgy – White & Lemay.
4. Testing of Materials - A.V.K. Suryanarayana

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SOLID WASTE MANAGEMENT
OPEN ELECTIVE-II

Objectives:
- To know the Classification of solid waste and characterization of the same
- Understand the sense of onsite handling storage and collection systems including transportation
- Understand the different processing technologies of solid waste.

Outcomes:
The student will be able to
- Apply the knowledge of characterization of waste and develop a suitable management plan
- Assess the cost of transportation and laboratory processing of solid waste
- Identify hazardous nature of waste if any and can suggest suitable dumping methods.
- Suggest processing waste for material for energy recovery.

Unit I
Introduction: Definition, characteristics and perspectives of solid waste. Types of solid waste. Physical and chemical characteristics. Variation of composition and characteristics. Municipal, industrial, special and hazardous wastes.

General aspects: Overview of material flow in society. Reduction in raw material usage. Reduction in solid waste generation. Reuse and material recovery. General effects on health and environment. Legislations.

Unit II
Engineered systems: Typical generation rates.Estimation and factors effecting generation rates. On site handling.Storage and processing. Collection systems and devices. Transfer and transport.

Unit III
Processing Techniques: Mechanical volume reduction. Thermal volume reduction. Component separation. Land filling and land forming. Deep well injection.

Unit IV
Material recovery: Mechanical size alteration. Electromagnetic separation. Drying and dewatering. Other material recovery systems. Recovery of biological conversion products. Recovery of thermal conversion products.
Energy recovery: Energy recovery systems and efficiency factors. Determination of output and efficiency. Details of energy recovery systems. Combustion incineration and heat recovery. Gasification and pyrolysis. Refuse derived fuels (RDF).

Unit V
Case studies: Major industries and management methods used in typical industries – Coal fired power stations, textile industry, oil refinery, distillery, sugar industry, and radioactive waste generation units.

Text Books:
1. Howard S. Peavy, Environmental Engineering, McGraw Hill International Edition, 1986.
2. Dutta, Industrial Solid Water Management and Land Filling Practice, Narose Publishing House, 1999.

Reference Books:
1. Sastry C.A., Waste Treatment Plants, Narose Publishing House, 1995.
2. Lagrega, Hazardous Waste Management, McGraw Hill, 1994.

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MARKETING MANAGEMENT
PG CORE-I

(Students must read textbook. Faculty are free to choose any other cases)
Course Aim: The aim of the Marketing Management Course is to provide students the marketing skills and enable them .
- ➤ T o understand the basic marketing trends through case studies.
- ➤ To familiarise with basic concepts of marketing mix and strategies
- ➤ To get oriented to the tools required to help develop and implement marketing strategies.

Learning outcome:
The students would be able to describe key marketing concepts, theories and techniques for analyzing a variety of marketing situations
By reading text and relating the concepts through cases the student would be able to understand the importance and role of marketing in a global environment
They will be able to analyze markets and design customer driven strategies and will be able to communicate the decisions towards business development with superior customer value.

1.   Introduction to World of Marketing: Importance, scope of Marketing, Core Marketing Concepts, Marketing Philosophies, Marketing Environment, Marketing Strategies & Plans, Developed Vs Developing Marketing. Market Research-Definition of MR, MIS, Commissioning MR, MR Process, MR Online, MR & Ethics, International MR.
      Case 1: Bata (Rajendra.P Maheshwari page no: 03)
      Case 2: Mahindra Scooters (Arun Kumar page no: 89).
      Case 3: Ready Meal Manufactures (Adrian palmer, page no: 70).
      Case 4: Santoor –(lamb Hair– page no : 238).
      Case 5: Drawing on data, searching for insight (Adrian palmer – Page no: 175).

2.   Analyzing Marketing Opportunities, Customer Value and Marketing Mix : Consumer Decision Making, Creating Customer Value, Analyzing Consumer Markets – Consumer Behavior – cultural, Social & Personal Factors, developing products & brands – product levels; classifying products, product range, line & mix, PLC, new product development.
       Case 1: Small New Phones (Adrian palmer- page no: 296).

3.   Designing a Customer Driven Strategy: Market segmentation- segmentation of consumer market, business market, requirement for effective segmentation, market targeting – evaluating market segmentation, selecting target market segmentation, positioning – positioning maps, positioning strategy.
      Case 1: (Segmentation) Zee TV (lamb, Hair   page no 212).
      Case 2: (Targeting) Kellogg's (lamb, Hair page no 300)
      Case 3: (Positioning) Nimbooz (S. Neelamegham page no 225).
      Case 4 :(Positioning) Dalda (Arun Kumar page no:195).

4.   Distribution Decisions, Promotion & Communication Strategies : Marketing Channels, Channel intermediates and functions, channel structure, channel for consumer products, business and industrial products, alternative channel, channel strategy decisions. The promotional mix, advertising, public relations, sales promotion, personal selling, marketing communication- communication process, communication promotion mix, factors effecting the promotion mix
      Case 1: Barista (Arun Kumar – page no:33).
      Case 2: Nano Car (lamb, Hair – page no:52)
      Case 3: Indigo (lamb, Hair – page no:356).
      Case 4: TESCO (Adrian palmer page no : 388)
      Case 5: Hero Motor Corp (lamb, Hair Page no:446)
      Case 6: Avon Cosmetics (lamb, Hair Page no:497).
      Case 7: Eureka (Arun – Page no: 711).
      Case 8: Home Shop (Arun – page no: 639).

5.   Pricing Decisions & Personal Communication   - Importance of price, cost determinant of price, markup pricing, profit maximization pricing, break even pricing, pricing strategy, ethics of pricing strategy, product line pricing, WOM, Rural marketing, BOP, relationship Marketing, Digital marketing, Social marketing, post modern marketing, market sustainability and ethics, Global marketing.
   Case 1: Coca Cola(lamb, Hair – page no: 112).
   Case 2: I phone (lamb, Hair – page no: 534).
   Case 3: Akash Tablet (lamb, Hair – page no: 557).
   Case 4: Compact car (Arun Kumar page no :369)
   Case 5: Chick (lamb,Hair Page no:650)
   Case 6: Nokia (Neelamegham page no– 645).
   Case 7: Shakti (Rajendra .P Maheswari – Page no:408).
   Case 8: Airtel (Arun – page no: 901)
   Case 9: Beer Marketing (Adrian palmer page no:529)

Textbook:
1. Lamb, Hair, Sharma, Mc Daniel: MKTG, A South Asian Perspective, Cengage Learning, 2012.
   Journal : MICA Communications Review – A Marketing Communications Journal, Mudra Institute of Communications, Ahmedabad.
   Business Game
   Music2Go Marketing: (Marketing Management Simulation Game), TMH, 2013. You can play on any computer with   internet (Rs.150/- per year-better buy and play).

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HUMAN RESOURCE MANAGEMENT
PG CORE-II

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
To understand various terms in HRM and be able to manage the human resources of an organization effectively and efficiently.

Learning Outcome:
Students should be able to understand the basic HR concepts. They will be able to understand the process of recruitment, selection, performance appraisal, training & development, compensation and employee retention approaches and strategies.

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Unit-I:
Introduction of HRM: Introduction to HRM –Line Managers –HR Duties –New Approaches to Organizing HR –Globalization & Competition Trends Technological Trends –Trends in Nature of Work –Workforce and Demographic Trends –Economic Challenges –HRM in India –High Performance Work System's–Labor Legislation in India –Equal Employment Opportunity 1990-1991 –HR Score Card developed by TVRLS India.

Case: Social Surveyors in Flood-hit Areas (Gary Dessler page no 160)
Case: Finding people who are passionate about what they do (Gary Desslerpage no 195)
Case: HR, CULTURE and Business Results Success at Google, Scripps and UPS (Robert L Mathis P.No. 35)
Case: Religious Accommodation (Robert L Mathis P. No. 118)
Case: Mitsubishi Believes in EEO-Now (Robert L Mathis P. No. 119)

Unit-II: Recruitment and Placement: Basics of Job Analysis –Methods for Collecting Job Analysis Information –Job Descriptions –Job Satisfaction –Job Enlargement, Job Enrichment, Job Rotation, HRP –Recruitment & Selection Process –Planning & Forecasting –Sources of Recruitment – Recruitment of Diverse Work Force –Employee Testing & Selection –Basic types of Interviews – Errors in Interviews –Translating Strategy into HR-Policies & Practices.

Case:Reinventing the wheel at apex door Company (Gary Dessler page no 309)
Case: Xerox Focuses on HR (Robert L Mathis P. No. 79)
Case: where do you find the Bodies? (Robert L Mathis P. No. 79)
Case: The Reluctant Receptionist (Robert L Mathis P. No. 159)
Case: Accenture –Retaining for Itself (Robert L Mathis P. No.193)
Case: Recruiting at Kia (Robert L Mathis P. No. 231)
Case: Strategic Selection: A Review of Two Companies (Robert L Mathis P. No.267)

Unit-III:
Performance Appraisal and Training & Development of Employees –Concept of Performance, Management Appraisal –Techniques for Performance Appraisal –Career Management –Employer Life Cycle –Career Management & Talent Management, Analyzing Training needs & Designing the program –Implementing different training program –Implementing Management Development Programs –Evaluating the Training Programs .

Case: Training Crucial for Hotels (Robert L Mathis P. No. 307)
Case: performance management improvements for Bristol-Myers Squibb (Robert L Mathis P. No. 393)
Case: Just Another Job (Robert L Mathis P. No. 647)
Case: The Dilemma Within (Robert L Mathis P. No. 667)
Case: Performance Appraisal at Cola Magic Drinks (Robert L Mathis P. No. 671)
Case: Appraising the secretaries at Sweet water U? (Gary Dessler page no 349)

Unit-IV: Compensation–Basic Factors in Determining pay structure –Establishing pay rates –Pricing Managerial and Professional Jobs –Special Topics in Compensation –Benefits –Insurance – Retirement Benefits –Personal Services & Family friendly benefits –Salient features of Workmen Compensation Act & Minimum Wages Act.

Case: Salary inequities at ACME Manufacturing (Gary Dessler page no 429)
Case: HR Contributes at CSSCO (Robert L Mathis P. No. 36)
Case: Compensation changes at JC Penny (Robert L Mathis P. No. 435)
Case: Benefiting Connie (Robert L Mathis P. No. 507)

Unit-V: Employee Relation–Labour Movement –Collective Bargaining Process –Grievances – Managing Dismissals –Employee Safety and Health –Occupational Safety Law –Work Place Health Hazards Problems & Remedies –Salient features of Industrial Disputes Acts 1947 –Factories Act, Mines Act.

Case : The New Safety and Health Program (Gary Dessler page no 623)
Case : Full Disclosure on Sex Offenders? (Robert L Mathis P. No. 231)
Case : Wal-Mart and Watching Its "Union Prevention" (Robert L Mathis P. No. 629)

REFERENCES:
- Gary Dessler, "Human Resource Management", 12thEdition, Pearson-2012.
- Robert L Mathis, John H Jackson, Manas Ranjan Tripathy "Human Resource Management-A South Asian Perspective ", Cengage Learning2012.
- C.B.Mamoria & V.S.P.Rao, Personnel Management, HPH, 2012.
- K. Aswathappa, "Human Resource Management, Text and Cases", TMH, 2011.
- Dipak Kumar Bhattacharyya "Human Resource Management", Excel Books, 2012.
- R.Wayne Mondy, "Human Resource Management" Pearson, 2009

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SALES AND DISTRIBUTION

PG Elective-I (Marketing)

(Students must read textbook. Faculty are free to choose any other cases)

Aim: The aim of this course is to enable students to the sales and distribution processes with particular focus on Sales Management and Sales Personnel, the role of Distribution Channels and enabling them to manage Channel partners.

To expose students to the tools and strategies necessary for designing, motivating and evaluating sales & distribution management systems.

.
Learning outcomes:
- ➢ The student should be able to manage the sales force and distribution processes through sales planning and Budgeting .

- ➢ The Students should be able to understand & appreciate the diverse variables affecting the sales & distribution function and analyse their impact on the sales and distribution processes.

1. **Introduction to Sales Management:** Evolution of Sales Management, importance of Sales Management, types of Selling, difference between Selling and Marketing, Modern Day Sales Activities, Selling Skills, Selling Strategies, Selling Process.
   Case: Plastic Industries, Inc., The role of Personal Selling in creating Market. (Richard R.Still page no 104,105)
   Case: United air flow manufacturer of households appliances sales persons job. (Richard R.Still page no 115 to 118)

2. **Sales Planning and Budgeting:** Sales planning process, sales forecasting methods, sales budgeting process, methods used for deciding sales budget, types of quotas and quota setting procedure, reasons for establishing or revising sales territories, routing and scheduling sales persons, market cost analysis.
   Case: Augsberg Wiesel Ltd, manufacturer of table ware, establishment of sales territories (Richard R Still, Page no 603 to 605)
   Case: Midland office engineering, establishment of sales budgeting program, (Richard R Still, page no 588 to 589)

3. **Sales Force Management:** Recruitment and selection of the sales force, training the sales force, sales force motivation, sales force compensation, sales force control and evaluation.
   Case: 1 Adjusting Compensation Plan to Motivate Sales Representatives (K.Sridhara Batt, page no 576 to 577)
   Case: 2 Sales Force Strategy at Life Insurance Corporation (K.Sridhara Batt, page no 579)

4. **Introduction to Distribution Management**
   Definition of Distribution Management, need for Distribution Channels, Distribution Channels for Rural Markets, designing the Marketing Channels, Motivating and Evaluating Channel Members, Capturing the Customer requirements
   Case: 1 Fed Ex's Value Chain Solutions, (K.Sridhara Batt page no 618 to 620)
   Case: 2 The National Handloom Development Corporation. (Tapan K. Panda, Sunil Sahadev page no. 504)

5.   Managing Channel Institutions
        Managing Channel Information Systems, Managing Retailers, Wholesalers, Franchisers,
        Designing Channel Systems, reasons for Channel Conflicts, Managing Conflict, Managing
        International Channel of Distribution, Ethical issues in Sales and Distribution Management
        Case: 1 Kinetic Engineering Company, Handling Channel Conflict, (Krishna K Havaldar,
        Vasant   page no 461)
        Case: 2 Indian Ayurveda Pharmacy Limited, (Tapan K. Panda,Sunil Sahad page no 719)

Textbook

Krishna K Havaldar, Vasnt M Cavale, Sales and Distribution Management, 2nd edition, TMH, 2011.
Journal : MICA Communications Review – A Marketing Communications Journal, Mudra Institute of Communications, Ahmedabad.

Business Game : Music2Go Marketing: (Marketing Management Simulation Game), TMH, 2013.
You can play on any computer with   internet (Rs.150/- per year-better buy and play)**.**
Music2Go is a **Principles of Marketing/Marketing Management** simulation game, where the
students are required to formulate and implement their own Sales and Marketing Campaign. This
helps the students to have a hands – on business experience in the classroom – experiential learning
at its best.

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IDP (B.Tech. CSE & M.Tech. / MBA) IV Year I-Sem   **L   T   P   C**
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TRAINING & DEVELOPMENT
PG Elective – I (HR)

(Students must read textbook. Faculty are free to choose any other cases)

Course Objectives:
1. To provide the students information on the Career opportunities in training, important concepts and meanings, Integrating strategy and training.
2. To enable the students to understand the design of training, implementation
3. To introduce the knowledge of evaluation of training programs in the organization.

Learning Outcome:
1. The student will be familiar with how to do training need analysis
2. Students will be able to learn various training methods, design training programs, implement training programs.
3. They also gain the knowledge to evaluate the effectiveness of training programs.

1. **Training in organizations:** Trends in training, Career opportunities in training, important concepts and meanings, Integrating OD, strategy and training, understand motivation and performance, aligning training design with learning process.
   Case : Taking Charge at Domtar : What it takes for a turnaround? (Nick Blanchard)
   Case :LG Electronics ((Nick Blanchard)
   Case : The wilderness training lab((Nick Blanchard)

2. **Need Analysis and Training design:** The Training Need Analysis (TNA) Model, TNA and Design, organizational constraints, developing objectives, Facilitation of learning and training transfer to the job, design theory.
   Case : Developing a training package at westcan (Nick Blanchard)
   Case : The Training program (Fabrics Inc.) (Nick Blanchard)

3. **Training methods:** Matching methods with outcomes, lectures and demonstrations , games and simulations, OJT, computer based training.(CBT).
   Case : Training & Development at Godrej. (Nick Blanchard)

4. **Implementation & Evaluation of Training:** Development of training, implementation, transfer of training, major players in training & development, rational for evaluation, resistance to training evaluation, types of evaluation.
   Case : Jack goes to training. (Nick Blanchard)
   Case 3 : Training designed to change behavior and attitude. (Nick Blanchard)

5. **Areas of organizational Training:** Orientation training, diversity training, sexual harassment training, team training, cross functional teams, cross cultural training, training for talent management and competency mapping.
   Case 4: The competent employee. (Nick Blanchard)

Textbook:
   - **P.Nick Blanchard, James W. Thacker, A.Anand Ram, " Effective Training" 4e, Pearson, 2012.**

References:
1. Anjali Ghansekar "Training & Development" Everest, 2013.
2. Raymond A Noe, Amitabh Deo Kodwani, "Employee Training and Development" McGraw Hill, 2012.
3. B,Rathan Reddy " Effective Human Resource Training & Developing Strategy " Himalaya,2012 .
4. Rolf Lynton, Uday Pareek "Training for Development" Sage, 2012.
5. G Pandu Naik "Training & Development "Excel Books, 2012.
6. R K Sahu "Training for Development" Excel Books, 2012.
7. P L Rao : HRD Trainer's Handbook of Management Games, Excel, 2013

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FINANCIAL MANAGEMENT
PG Elective-I (Finance)

(Students must read textbook. Faculty are free to choose any other cases)
*The students need Discounting Table and Annuity tables for the examination

Course Aim: To give an overview of the functions of a financial manager in the commercial world with a particular focus on the concepts and theories of corporate finance.

Learning Outcome:
The students will gain skills to understand, evaluate and resolve the problems confronted by the financial managers. They will gain in insight into the decision making process of a financial manager based on timely, relevant and reliable financial and non-financial information. This course will further help the students to understand the deligent use of resources efficiently, effectively and economically.

1   **The Finance Function**: Nature and Scope; Evolution of finance function – Its new role in the contemporary scenario –Goals of finance function – maximizing vs. satisfying; Profit vs. Wealth vs. Welfare; the Agency relationship and costs; Risk-Return trade off; Concept of Time Value of Money – Future Value and Present value and the basic valuation model.

2. **The Investment Decision**: Investment decision process- Project generation, project evaluation, project selection and project Implementation. Developing Cash Flow; Data for New Projects; Capital Budgeting Techniques –Traditional and DCF methods. The NPV vs. IRR Debate; Approaches for reconciliation. Capital budgeting decision under conditions of risk and uncertainty. Cost of capital: Concept and measurement of cost of capital, Debt vs. Equity, cost of equity, preference shares, equity capital and retained earnings, weighted average cost of capital and marginal cost of capital. Importance of cost of capital in capital budgeting decisions.

3. **Capital Structure Decisions**: Capital structure vs. financial structure - Capitalization, financial leverage, operating leverage and composite leverage. EBIT-EPS Analysis, Indifference Point/Break even analysis of financial leverage, Capital structure Theories –The Modigliani Miller Theory, NI, NOI Theory and Traditional Theory –A critical appraisal.

4. **Dividend Decisions**: Dividends and value of the firm - Relevance of dividends, the MM hypothesis, Factors determining Dividend Policy-dividends and valuation of the firm-the basic models. Declaration and payment of dividends. Bonus shares. Rights issue, share-splits, Major forms of dividends – Cash and Bonus shares. The theoretical backdrop – Dividends and valuation; Major theories centered on the works of GORDON, WALTER and LITNER. A brief discussion on dividend policies of Indian companies. Working Capital Management: Components of working capital, gross vs. net working capital, determinants of working capital needs, the operating cycle approach. Planning of working capital, Financing of working capital through Bank finance and Trade Credit – Recommendations of Tandon and Daheja Committee on Working Capital. Cases.

5. **Management of Current Assets**: Management of cash, – Basic strategies for cash management, cash budget, cash management techniques/processes. Marketable securities: characteristics, selection criterion, Marketable security alternatives; Management of receivables and Management of inventory- The importance of current assets management in working capital planning. Corporate Restructuring: Corporate Mergers, Acquisitions and Takeovers: Types of Mergers, Economic rationale of Mergers, motives for Mergers; Financial evaluation of Mergers.

Textbook
1. IM Pandey, Financial Management, 10th Edition, Vikas , 2013.

References:
1. M.Y Khan, P K Jain: "Financial Management-Text and Problems", 6th Edition, TMH, 2012.
2. P.C.Tulsian,C.A. Bharat Tulsian , "Financial Management" S.Chand Publications,2012
3. Prasanna Chandra, "Financial Management Theory and Practice", 8th Edition. TMH ,2012
4. Shashi K.Gupta, R.K.Sharma , "Financial Management" Kalyani Publishers ,2012
5. Rajiv Srivastava, Anil Mishra , Financial Management" Oxford University Press, New Delhi, 2012
6. James C Van Horne, Sanjay Dhamija, "Financial Management and Policy" Pearson Education, 2012 .
7. IM Pandey, Cases in Financial Management, TMH 2/e 2012

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MANAGEMENT INFORMATION SYSTEM (MIS)
PG Elective – I (SYSTEMS)

Course Objectives
1. To provide students basic concepts of MIS and IS models
2. To explain integration process of MIS with Enterprise Resource Planning (ERP)
3. To provide a practical framework for Information System operations and management

Learning Outcomes
1. Students learn different models of MIS and their applicability in various business resource requirement plans
2. Students learn user training, operations, control, troubleshooting and maintenance aspects of MIS
3. Students will appreciate what is the successful design and implementation of MIS in business departments and operations

1. UNIT- I Introduction to IS Models – Nolan Stage Hypothesis, IS Strategic Grid, Wards Model, Earl's Multiple Methodology, Critical Success Factors, Soft Systems Methodology, Socio-Technical Systems Approach (Mumford), System Develop Life Cycle, Prototype and End User Computing, Application Packages, Outsourcing, Deciding Combination of Methods.

2. UNIT-II Types of Information Systems– Transactions Processing System, Knowledge Work Systems, Office Automation System, Management Information System, Decision Support System, Expert System, Strategic Information System. IS Security, Control and Audit - System Vulnerability and Abuse, business value of security and control, Need for Security, Methods of minimizing risks, IS Audit, ensuring system quality.

3. UNIT- III Induction to ERP**:** Overview of ERP, MRP, MRPII and Evolution of ERP, Integrated Management Systems, Reasons for the growth of ERP, Business Modeling, Integrated Data Model, Foundations of IS in Business, Obstacles of applying IT. Advantages and limitations of ERP.

4. UNIT –IV ERP Modules: Finance, Accounting Systems, Manufacturing and Production Systems, Sales and Distribution Systems, , Human Resource Systems, Plant Maintenance System, Materials Management System, Quality Management System, ERP System Options and Selection, ERP proposal Evaluation.

5. UNIT –V ERP Implementation and Maintenance: Implementation Strategy Options, Features of Successful ERP Implementation, Strategies to Attain Success, User Training, Maintaining ERP & IS**.** Case Studies.

References
1. ***C Laudon and Jane P.Laudon, et al: Management Information Systems, Pearson Education, 2009.***
2. Alexis Leon, ERP (Demystified), 5/E, Tata McGraw-Hill, 2009.
3. David L Olson, Managerial Issues of Enterprise Resource Planning Systems, McGraw Hill, International Edition-2009.
4. Vaman, ERP in Practice, Tata McGraw-Hill , 2009
5. Gordon B. Davis & Margrethe H.Olson: Management Information Systems, Tata McGraw-Hill , 2009.
6. W S Jawadekar: Management Information Systems, Tata McGraw-Hill , New Delhi, 2009
7. James A. Obrein: Management Information Systems, Tata McGraw-Hill , 2008
8. Gerald V.Post, David L Anderson: Management Information Systems, Irvin McGraw Hill, 2009.
9. C.S.V.Murthy: Management Information System, Himalaya publishing House ,2009

10. Rainer, Turban, Potter, Introduction to Information Systems, WILEY-India, 2009.
11. Dharminder and Sangeetha, Management Information Systems, Excel books, 2009
12. Monk, Concepts in ERP, Cengage, 2009.
13. Ashim Raj Singla, Enterprise Resource Planning, Cengage, 2008.
14. Vinod Kumar Garg, et al., Enterprise Resource Planning, PHI, 2007.

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SOFT SKILLS LAB
(Activity-based)

- To improve the fluency of students in English
- To facilitate learning through interaction
- To illustrate the role of skills in real-life situations with case studies, role plays etc.
- To train students in group dynamics, body language and various other activities which boost their confidence levels and help in their overall personality development
- To encourage students develop behavioral skills and personal management skills
- To impart training for empowerment, thereby preparing students to become successful professionals

INTRODUCTION
Definition and Introduction to Soft Skills – Hard Skills vs Soft Skills – Significance of Soft/Life/Self Skills – Self and SWOT Analysis *and*

1. **Exercises on Productivity Development**
   - Effective/ Assertive Communication Skills (Activity based)
   - Time Management (Case Study)
   - Creativity & Critical Thinking (Case Study)
   - Decision Making and Problem Solving (Case Study)
   - Stress Management (Case Study)

2. **Exercises on Personality Development Skills**
   - Self-esteem (Case Study)
   - Positive Thinking (Case Study)
   - Emotional Intelligence (Case Study)
   - Team building and Leadership Skills (Case Study)
   - Conflict Management (Case Study)

3. **Exercises on Presentation Skills**
   - Netiquette
   - Importance of Oral Presentation – Defining Purpose- Analyzing the audience- Planning outline and preparing the Presentation- Individual & Group Presentation- Graphical Organizers- Tools and Multi-media Visuals
   - One Minute Presentations (Warming up)
   - PPT on Project work- Understanding the Nuances of Delivery- Body Language – Closing and Handling Questions – Rubrics for Individual Evaluation (Practice Sessions)

4. **Exercises on Professional Etiquette and Communication**
   - Role-Play and Simulation- Introducing oneself and others, Greetings, Apologies, Requests, Agreement & Disagreement….etc.
   - Telephone Etiquette
   - Active Listening
   - Group Discussions (Case study)- Group Discussion as a part of Selection Procedure- Checklist of GDs
   - Analysis of Selected Interviews (Objectives of Interview)
   - Mock-Interviews (Practice Sessions)
   - Job Application and Preparing Resume
   - Process Writing (Technical Vocabulary) – Writing a Project Report- Assignments

5. Exercises on Ethics and Values

Introduction — Types of Values - Personal, Social and Cultural Values - Importance of Values in Various Contexts

- Significance of Modern and Professional Etiquette – Etiquette (Formal and Informal Situations with Examples)
- Attitude, Good Manners and Work Culture (Live Examples)
- Social Skills - Dealing with the Challenged (Live Examples)
- Professional Responsibility – Adaptability (Live Examples)
- Corporate Expectations

Note:

- Hand-outs are to be prepared and given to students.
- Training plan will be integrated in the syllabus.
- Topics mentioned in the syllabus are activity-based.

SUGGESTED SOFTWARE:

The following software from **'train2success.com'**

- Preparing for being Interviewed,
- Positive Thinking,
- Interviewing Skills,
- Telephone Skills,
- Time Management
- Team Building,
- Decision making

SUGGESTED READING

1. Alex, K. 2012. *Soft Skills.* S. Chand Publishers
2. *Management Shapers.* 2011. Collection of 28 Books by different Authors. Universities Press.
3. Sherfield, Robert M. *2005. et al Cornerstone: Developing Soft Skills.* Pearson
4. Suresh Kumar,E; Sreehari, P. & Savithri, J. 2011. *Communication Skills and Soft Skills- An Integrated Approach.* New Delhi: Pearson
5. The ACE of Soft Skills by Gopalaswamy Ramesh & Mahadevan Ramesh. 2013. Pearson Publishers. New Delhi.
6. Patnaik, P. 2011. *Group Discussion and Interview Skills.* New Delhi: Foundation
7. Sudhir Andrews. 2009. *How to Succeed at Interviews.* New Delhi: Tata McGraw Hill
8. Sasikumar, V & Dhamija, P.V. 1993. *Spoken English - A Self-Learning Guide to Conversation Practice.* New Delhi: Tata McGraw-Hill
9. *Dixson, Richard J. Everyday Dialogues in English. Prentice Hall India Pvt Ltd*
10. Mukhopadhyay. L *et al. 2012. Polyskills. New Delhi: CUP India Pvt Ltd*
11. Rizvi, M. A. 2005. *Effective Technical Communication.* New Delhi: Tata McGraw Hill
12. *The Hindu Speaks on Education* by the Hindu Newspaper
13. Naterop, B. Jean and Revell, Rod. 2004. *Telephoning in English.* Cambridge: CUP

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RESEARCH METHODOLOGY & STATISTICAL ANALYSIS
PG CORE-III

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim: To understand the basic statistical tools for interpretation of quantitative and qualitative data.

Learning Outcome: Students will be able to apply the principles of research methodology for the research design for the various mini and major projects of the MBA programme. They will be able to analyse the data statistically.

1. **Research Methodology**: Introduction-Topic-Review of Literature-Research Gaps-Research Questions-Objectives-Hypotheses-Scope of the study-Period of the study-Sampling Techniques-Data Collection-Primary data –Questionnaire design-Secondary data-Data Analysis-Limitations of the study-Appendix-References.

2. **Tabulation, Graphical presentation of data**: Histogram, Diagrammatic representation of data: Bar diagram, Multiple Bar diagram, Sub-divided Bar Diagram, Pie Diagram, Measures of Central Tendency: Mean, Median and Mode. Measures of Dispersion: Range, Standard deviation and Variance, Coefficient of variation, Measure of Skewness.

3. **Linear Correlation and Regression Analysis**: Covariance, Pearson's Correlation Coefficient, Scatter plot, Spearman's rank Correlation Coefficient, Regression lines.

4. **Parametric and Non- Parametric Hypothesis Testing**: Procedure for Testing of Hypothesis, One Sample t-test for the Population Mean, Two Sample t-test for independent Samples, Paired Sample t-test. F-test for two population Variances (Variance ratio test), ANOVA One Way Classification, ANOVA two way Classification, Chi Square test of association, Chi Square test of independence.

5. **Time Series and Data Analysis**: Fitting a trend line to a time series, Method of least Squares and Method of Moving Averages, Measure of Seasonal Variation.

Textbook
1. Glyn Davis & Branko Pecar "Business Statistics Using Excel" Oxford University Press, 2012.

References:
1. P N Arora" Comprehensives Statistics Methods" S. Chand, 2012.
2. Sharma" Business Statistics" Pearson, 2012.
3. David Cooper, Business Research Methods, TMH, 9/e 2013.
4. Zikmund, Business Research Methods, Cengage, 2012.
5. S C Gupta, "Fundamentals of Statistics", HPH, 2012
6. C B Gupta " An introduction to Statistical Methods" Vikas, 2012
7. S L Gupta 'Business Research Methods" TMH, 2012.
8. Pannerselvam" Research Methodology" PHI, 2012.
9. Ranjit Kumar "Research Methodology" Sage, 2012.
10. R P Hooda "Statistics" Vikas, 2012
11. Newbold" Statistics for Business and Economics" Pearson, 2012.
12. Levin, Rubin, Rastogi & Siddiqui, "Statistics for Management" Pearson, 2013
13. Mukul Gupta & Deepa Gupta "Research Methodology" PHI, 2013.
14. Bhardwaj : Mathematics and Statistics for Business, Excel, 2013.

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BUSINESS LAW AND REGULATION
PG CORE-IV

(Students must read textbook along with cases. Faculty are free to choose any other cases)

Course Aim: The aim of this course is to enable students understand legal and regulatory framework for doing business in India.

Learning Outcome: After going through the text and case lets in terms of various court judgements, the students should be able to understand the formalities involved in incorporating a company and the nuances related to the Law of Contract. The student will also be able to know the implications of direct and indirect taxes, negotiable instruments Act and also about the cyber laws.

1. Companies Act, 1956: Steps and procedure for incorporation of the company, Appointment of Directors, Powers, duties, & liabilities of Directors, Company Meetings, Resolutions, Winding-up of a Company.

2. Law of Contract: Nature of contract and essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and free consent, Legality of object. Unlawful and illegal agreements, Contingent contracts, Performance and discharge of contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: General Principles, Conditions & Warranties, Performance of Contract of Sale.

3. Direct and Indirect Tax: Income Tax Act -1961 - Important Provisions of Income Tax Act: Assessment year –Assesee, Gross Total Income, Procedure for advance payment of tax and tax deducted at source. Assessment procedure. Central Excise Act -1944: .Basic concepts related to excisable goods, classification of goods, and Basic concept of VAT.

4. Negotiable Instruments Act - 1881: Negotiable Instruments- Promissory Note, Bills of Exchange, & Cheque, and their definitions and characteristics, Types of endorsements, Holder- Holder in due course, Discharge of Parties.

5. Cyber Crime and the Legal Landscape-the world-Why do we need cyber laws in tha indian context-The indina IT act-challenges to indian Law and cyber crime scenarion in india. (Refer Nina Godbole & Sunit Belapure)

Textbook:
1. **RSN Pillai, Bagavathi, Business Law, S.Chand, 2013.**

References
1. Akhileshwar Pathak: Legal Aspects of Business, TMH, 4/e, 2013.
2. Nina Godbole & Sunit Belapure " Cyber Security" Wiley India 2012.
3. K.R. Bulchandani: Business Law for Management, 5/e, Himalaya Publishing House (HPH), 2012
4. Ravinder Kumar "Legal Aspects of Business", 2nd Edition Cengage Learning, 2012.
5. Kuchal: Business Law, Vikas, 2011
6. Tulsian:Business Law, TMH, 2012.
7. S S Gulshan, Business Law, 4th edition, Excel Books, 2012
8. S.N. Maheshwari, S K Maheshwari, A Manual of Business Laws, Himalaya Publishing House (HPH), 2013.
9. C L Bansal, Business and Corporate Laws, Excel Books, 2011.
10. Tejpal Sheth, Business Law, Pearson, 2012
11. P.K.Padhi, Legal Aspects of Business, PHI, 2013

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INTEGRATED MARKETING COMMUCATION
PG Elective-II (Marketing)

(Students must read textbook. Faculty are free to choose any other cases)

Aim: The aim of this course is to a) enable students to understand management of marketing communication, marketing mix and ethical aspects of marketing communication b) choose a marketing communications mix to achieve the communications and behavioral objectives of the IMC campaign plan.

Learning outcome
➢ The student should be able to design innovative integrated marketing communication strategies for a given product or service using social media

➢ Students will able to create an integrated marketing communications plan to promote IMC strategies and to measure their effectiveness.

1. **Understanding Integrated Marketing Communication**: Understanding Marketing Communication, Integrated Marketing Communication, Integrated Marketing Communication as an Integral part of Marketing, Understanding Consumer Behaviour, Understanding the Communication process, Communication Mix.
   Case : Cadbury Manages a Crisis with Integrated Marketing Communications (Kruti Shah page no 59)

2. **Budgeting, Objectives and Evaluation of IMC**: Setting Communication Objectives, DAGMAR Approach to setting objectives and measuring advertising effectiveness, allocating the Marketing Communication Budget, Conducting research to measure communication effectiveness, Post-Testing tools and techniques, Evaluating other promotional tools and IMC.
   Case : The Premium Milk Food Private Ltd. (Kruti Shah page no 820)
   Case : Archias, Advertizing (Jaishri Jethwaney, Shruthi Jain, Oxford, page no 195)

3. **Marketing Communication Mix I:**
   Creative Execution in Advertising, Decision in Print, Execution on Radio, Execution on online and television, getting that 'Big Idea' of creativity.
   Case : Tata Salt (Part I,II,III) (Kruti Shah page no 282,284,310-311,367-372)

4. **Marketing Communication Mix II**:
   Sales Promotion, Direct Marketing, Personal Public Relations, Publicity and Corporate Advertising, Unconventional Promotional Media: Sponsorships, Mobile Advertising, Word Of Mouth, Village Farmers, Out of Home Media, World Wide Web Communications.
   Case : Amul taste of India (Kruti Shah page no 793)
   Case : Rasha Prankees promotion (Kruti Shah page no 600)

5. **Regulation, Social and Ethical Aspects of Advertising and Promotion**:-
   Federal Regulation of Advertising, regulations of Advertising and Promotion in India, regulation of other Promotional Areas, Social and Ethical Criticisms of Advertising, ethical aspects of Advertising – Truth in Advertising, Advertising to children, Advertising controversial products, Social Aspects of Advertising.
   Case : Surrogate advertising(Jai shri Jethwaney page no 475-480)
   Case : The Unilever experience (Jai shri Jethwaney page no 606)

Textbook:
- **Krutishah, Alan D'Souza, Advertising and promotions on IMC Perspective, TMH, 2012**.
  Journal : MICA Communications Review – A Marketing Communications Journal, Mudra Institute of Communications, Ahmedabad.

  Businesss Game : AdSim Advertising: (Advertising & Promotion Simulation Game), TMH, 2013. You can play on any computer with   internet (Rs.150/- per year-better buy and play)**.**
  AdSim is a simulation game for the **Advertising & Promotion** course, where the students are required to formulate and implement their own Advertising and Promotion campaign. This helps the students to have an hands – on business experience in the classroom – experiential learning at its best.

References:
1. Jaishri Jethwaney, Shruthi Jain, Advertising Management, Oxford, Second edition, 2012.
2. George E Belch, Michael A Belch , Keyoor puravi , Advertising and Promotions – An Integrated Marketing Communications perspective , TMH, 2013.
3. Semenile , Allen, O Guinn , Kaufmann, Advetising and Promotions, An Integrated brand approach, Cengage, 6th edition , 2012.

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MANAGEMENT OF INDUSTRIAL RELATIONS
PG Elective – II (HR)

(Students must read textbook. Faculty are free to choose any other cases)

Course objectives:
1. The aim of the course is to enable HR elective students develop awareness towards labour laws.
2. The students will be introduced, how to deal with legal problems emanating from employer and employee relations in organizations.
3. To introduce the students with the concept of collective bargaining, employee welfare, wage policy act.

Learning Outcomes:
1. The student understands the industrial relations, its importance in HR
2. Various Labour Laws like Factories Act, Wage and Bonus Act and Dispute Preventive and Corrective Mechanisms are learnt.
3. They will also understand the role of Trade Unions, Settlement of disputes, Collective Bargaining, Wage Policy.

1. Industrial Relations: Introduction, Dunlop's Industrial Relations Systems, Characteristics of Indian IR System; Trade Unions: Union Purpose. Trade Union , Functions, Methods, Politics, Types of Unions, Trade Unions in India: Union Structure and characteristics. Recognition of Unions: States provisions for Recognition. Rights of recognized Unions, Unfair Labour Practices:
   Case 1. Let us get back to work (p.no. 720, C.B.Mamoria)
   Case 2. A case of complicated multi-union manoeuvres (J.A. Kulkarni)

2. Settlement of Disputes: Role of state Dispute Settlement Machinery and its instruments, Legislation: Causes of disputes, Right to Strike, Major Strikers, Tripartite and Bipartite Bodies, Standing orders and Grievance Procedure.
   Case 1. Stop the shouting game please (p.no. 760, C.B.Mamoria)
   Case 2. The dish ends ltd. (p.no.07, J.A. Kulkarni)

3. Collective Bargaining, Conciliation, Arbitration, Adjudication, The Industrial Dispute Act 1947, Labour Welfare work, Labour Welfare officer, Worker's Participation.
   Case 1.who is to be blammed (p.no. 685, C.B.Mamoria)

4. Wage Policy and Wage Regulation Machinery, Wage Legislation, Payment of Wages Act 1936, The Payment of Bonus Act,1965
   Case 1. Rules and regulations still guide actions at UPS (p.no. 37, C.B.Mamoria)

5. The Factories Act 1948, Mines Act 1952, Industrial Relations and Technological Change.
   Case 1. Organizations and unions working as partners (p.no. 738, C.B.Mamoria)

Textbook:
- **Mamoria, Mamoria, Gankar "Dynamics of Industrial Relations" Himalaya Publishing House.2012.**

Cases:
1. **C.B.Mamoria, VSP Rao "personnel management- text & cases", Himalaya Publishers 13ᵗʰ edition, 2012.**
2. **J.A.Kulkarni, Asha Pachpande, Sandeep Pachpande, "case studies in amangement", pearson, 2011.**

References:
1. Dr K S Anandram "Cases in Personnel Management Industrial Relations and Trade Relations" Everest, 2012.
2. Arun Monappa,Ranjeet Nambudiri,Selvaraj " Industrial Relations and Labour Laws" , TMH,2012
3. A.M.Sharma "Industrial Relations and Labour Laws", Himalaya Publishing House,2013.
4. Ratna Sen "Industrial Relations-Text and cases "Macmillan Publishers,2011.
5. Kubendran.V,Kodeeswari.K "Industrial Relations and Labour Laws "Himalaya Publishing House,2011.
6. Punekar S.D,Deodhar S.B, Saras wathi Sankaren"Labour Welfare,Trade Unionism and Industrial Relations, "Himalaya Publishing House,2012.
7. B.D.Singh "Industrial Relations"Excel Books 2008.
8. S C Srivastava "Industrial Relations and Labor Laws" Vikas, 2012.
9. Padhi " Labour and Industrial Relations" PHI, 2012.
10. Venkata Ratnam "Industrial Relations" Oxford, 2012.

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SECURITY ANALYSIS PORTFOLIO MANAGEMENT
PG Elective-II (Finance)
(Students must read textbook. Faculty are free to choose any other cases)

Course Aim: To Understand the investment alternatives, process and portfolio management
Learning Outcome: The objective of this course is to provide the conceptual and Practical understanding of Stock markets Equity & Bond Valuation , Cash market and also Mutual funds.

1. a) Investment Environment in India, overview of Indian financial system securities trading in stock markets, investment alternatives, the investment management process.
    b) Security Analysis: Fundamental Analysis, Technical Analysis, EMH (Efficient Market Hypothesis)

2. Portfolio Analysis: The returns and risks from investing- Markowitz portfolio Theory, Mean-variance approach, portfolio selection-efficient portfolios, The single index model-capital asset pricing model, arbitrage pricing theory.

3. Bond Analysis & Valuation & management: Types of bonds, Interest rates, Term Structure of interest rates, measuring bond yields, Yield to Maturity, Yield to Call, Yield to Maturity, Holding Period Return, Bond pricing theorems, bond duration, Active and Passive bond management Strategies, bond immunization, bond volatility, bond convexity.

4. (a) Equity Valuation : Equity Analysis & Valuation, Balance sheet Analysis equity valuation models, intrinsic value & market price, The P/E Ratio & Earnings multiplier Approach, CAGR, Price/Book value, Price/ Sales ratio, Economic Value Added (EVA) and MVA.
    (b) Derivatives: Overview of derivatives Markets, Option Markets, Option Strategies and option valuation forward & future markets, Strategies. Stock index futures, interest rate futures, Swaps contracts.

5. Mutual Funds: Types of Mutual Funds Schemes, Structure, NAV(Net Asset Value),Risk and Return, Performance Evaluation Models- Sharpe Model, Trey nor Model, Jensen Model, Fama's Decomposition. Trends in Indian Mutual Funds.

Textbooks:
1. **William. F.Sharpe, Gordon j Alexander & Jeffery V Bailey: Fundamentals of Investments, Prentice Hall,2012.**

    Journals : Vikalpa, IIMA, IIMB Review, Decision, IIMC, Vision, MDI.

    Business Game : Stock-Trak: (Finance Simulation Game), TMH, 2013- You can play on any computer with   internet (Rs.150/- per year-better buy and play)**.**
    Stock-Trak is the most comprehensive, Online investment simulation game for **Finance** students to trade on Stocks, bonds, mutual funds, options, futures, spots, future options and international stocks with virtual money. This game is created specifically for classroom use and students can play this game 24*7 to give them hands-on experience on Investments.

References:
1. Reilly, Brown: Analysis of Investment and Management of Portfolios, 10th Edition, Cengage, 2012.
2. ZVI Bodie, AlexKane, Alan J Marcus : Investments, TMH, 2012.
3. Donald E Fischer, Ronald J Jordan: Security Analysis and Portfolio Management, 6th Edition, Pearson, 2012.
4. Prasanna Chandra: Investment analysis and Portfolio Management" 4th Edition, TMH, 2012.
5. Punithavathi Pandian : Security Analysis and Portfolio Management, Vikas. 2012.
6. Jones: Invest Analysis and Management, Wiley.
7. M. Ranganatham, R. Madhumathi: Security Analysis and Portfolio Management, 2nd Edition , Pearson, 2012.
8. Edwin J Elton, Martin J Gruber, Stephen J Brown, William N.Goef Z Mann : Modern Portfolio
9. Theory and Investment Analysis. 2013.

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ENTERPRISE RESOURCE PLANNING
PG Elective – II (SYSTEMS)
(Students must read textbook. Faculty are free to choose any other cases)

Course Objectives
1. To provide students the foundations of ERP planning and system options
2. To provide framework of general and specialized modules of ERP
3. To provide students a risk-benefit analysis of ERP system

Learning Outcomes
1. Students understand a) integration of various ERP modules with each other and with Business Environment b) the issues in operation and implementation of a successful ERP system and c) how to face the challenges associated with the present and future ERP systems..

1. Introduciton to ERP- Foundation for Understanding ERP systems-Buisiness benefits of ERP-The challenges of impelmenting ERP system-ERP modules and Historical Developement.
   Case: Response top RFP for ban ERP system (Mary Sumner).

2. ERP system options & Selection methods-Measurement of project Inpact- information Technology Selection-ERP proposal evaluvation-Project Evaluvation Technique.(David L.olson).
   Case: Atlantic Manufacturing (Mary Sumner).

3. ERP system Installation Options- IS/IT Management results-Risk Identificatioon analysis-System Projects- Demonstation of the system-Failure method-system Architecture & ERP (David L.Olson)
   Case: DataSolutiions & Technology Knowledge (Mary Sumner).

4. ERP - sales and Marketing- Managment control process in sales and markring-ERP custoemr relatonship managment-ERP systems- Accounting & Fiance control processes. Fiancial modules in ERP systems.
   Case: atalantic manufacturing (Mary Sumner).

5. ERP – Produciton and Material Managment-Control process on produciton and manuifacturing-Produciton module in ERP- supply chain Managmeent & e-market place-e-businesss & ERP-e supply chian & ERP- Future directions for ERP.
   Case: HR in atalntic manufacturing. (Mary Sumner).

Textbook:
1. **Mary Sumner " Enterprice Resource Planning" Pearson, 2012**.

Referencs:
1. David L.Olson " Managerial Issues in ERP systems" TMH 2012.
2. Ellen Monk "Enterprice Resource Planning" Cengage, 2012.
3. Alexis Leon "Enterprice Resource Planning" 2e, TMH ,2012
4. Goyal "Enterprice Resource Planning" TMH, 2012
5. Jagan Nathan Vaman "ERP Srategies for Steering Orgnizationsal competence and competetive Advantage" TMH, 2012.

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STATISTICAL ANALYSIS LAB USING SPSS / EXCEL

Course aim: The course aims is to understand MS Excel for applying statistical tools learnt in RMSA.

Learning Outcome: The learning outcome is that the students should be able to:
➢ Analyse the data to draw inference for decision making.
➢ Understand application of statistical measures of central tendency.
➢ Understand application of ANOVA.
➢ Analyse trends.
➢ Test hypotheses.

Syllabus - PART A

About EXCEL
1. Introduction, Uses of Excel, New functions and features of excel 2007.
2. Getting started with excel: Opening a blank or new workbook, general organization.
3. Highlights and main functions: Home, Insert, page layout, formulas.
4. Highlights and main functions: Data, review, view, add-inns.
5. Using the Excel help function.

General EXCEL Lessons
6. Customizing the Quick Access Toolbar.
7. Creating and Using Templates.
8. Working with Data: Entering, Editing, Copy, Cut, Paste, Paste Special.
9. Formatting Data and Using the Right Mouse Click.
10. Saving, Page Setup, and Printing.
11. Using Headers and Footers.
12. Manipulating Data, using Data Names and Ranges, Filters and Sort and Validation Lists.
13. Data from External Sources.
14. Using and Formatting Tables.
15. Basic Formulas and Use of Functions.
16. Data Analysis Using Charts and Graphs.
17. Managing, Inserting, and Copying Worksheets.
18. Securing the Excel Document (Protect Cells and Workbook).

ADVANCED EXCEL LESSONS
19. Advanced Formulas and Functions.
20. Advanced Worksheet Features.
21. Advanced Data Analysis using PivotTables and Pivot Charts.

PART B – STATISTICAL TOOLS FOR EXECUTION USING EXCEL

I. Tabulation, bar diagram, Multiple Bar diagram, Pie diagram, Measure of central tendency: mean, median, mode, Measure of dispersion: variance, standard deviation, Coefficient of variation.
II. Correlation, regression lines.
III. t- test, F-test, ANOVA one way classification, chi square test, independence of attributes.
IV. Time series: forecasting Method of least squares, moving average method.
V. Inference and discussion of results.

Text
1. Glyn Davis & Branko Pecar "Business Statistics Using Excel" Oxford University Press, 2012.

References:
1. David Whigham "Business Data Analysis Using Excel'' Oxford University Press, 2012.
2. Winstion "Excel 2010 Data Analysis and Business Modelling" PHI Learning Private Limited.
3. Bajpai "Business Statistics" Pearson, 2013.
4. D P Apte : Statistical Tools for Managers USING MS EXCEL, Excel, 2012.
5. Bruce Bowerman, Business Statistics in Practice, TMH, 5/e 2012.
6. Shelly, MS Office, 2007, Cengage, 2009.
7. Robert H Carver, Doing Data Analysis with SPSS, Cengage, 2013

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STRATEGIC MANAGEMENT
PG CORE-V
(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
The aim of this subject is to enable the students develop a holistic perspective about Strategic management of an organization

Learning Outcome:
By reading the text and discussing the cases students should be able to understand how to scan internal and external environment of an organization, understand different types of strategies and structures, strategies of the competitors, turnaround strategies, global strategies and strategic control. With that knowledge they would be able to formulate strategies, change strategies if necessary and implement strategies. They will also be able to evaluate strategies and take corrective steps.

Unit-I:
Strategic Inputs: Introduction to Strategic Management-Strategic Management and Competitiveness-Technology and Technology change-Vision, Mission and Objectives-Strategic Leaders-Strategic Management process-The External Environment: Opportunities, Threats, Competition and Competitor Analysis. External Environmental Analysis, Segments of the External Environment, Porters 5 Force Model, The internal Environment: Resource, Capabilities, Competencies and Competitive advantages. Analyzing internal organization - Building Core Competencies - Value Chain Analysis, Outsourcing.
Case:Bharti Airtel (Hitt & Irelandpage no 4).
Case: ITC Limited (Hitt & Irelandpage no 30).

Unit-II: Formulation of Strategic Actions: Business level strategy-Effectively managing relationships with Customers-the purpose of Business strategy. Competitive Rivalry and Dynamics - A Model of Competitive Rivalry-Competitor Analysis-Drivers of Competitive actions and responses-Competitive rivalry and dynamics.
Case:Bajaj Auto limited (Hitt & IrelandPage no 80).
Case: Coca cola Vs Pepsi in India (Hitt & Irelandpage. no108)

Unit-III: Corporate level Strategy-Levels of Diversifications and reasons-Value creating diversifications. Strategic Acquisitions & Restructuring - Popularity of Mergers & Acquisitions strategies, problems in achieving Acquisition Success-Restructuring.
Case: Foster's Group Diversification into the Wine Business (Hitt & IrelandPage 150)
Case: Merger and Acquisition Activity during a Global Crisis: Global and in India (Hitt & Ireland page 154) Focus : Troubles in the Godrej –P & G Alliance(Hitt & Irelandpage. no 223)

Unit-IV: Global Strategy-Identifying International Opportunities and international Strategies-Strategic competitive Outcomes and risk in an international Environment. Corporate Implications for strategy-Strategic Alliances-corporate level cooperative strategy, Competitive risk with Cooperative strategies.
Case: Entry into India & China by Foreign Firms and Indian/Chinese Firms Reaching for Global markets (Hitt & Irelandpage. no 176).
Case: Using Cooperative Strategies at IBM (Hitt & Ireland page 206)

Unit-V: Structure and Controls with Organizations-Organizational Structure and controls, Evolutionary Patterns of strategy and organizational structure. Leadership Implications for Strategy - Entrepreneurial Implications for Strategy. Fundamental principles of Ethics, Professional Ethics, Ethics of Finance & Accounting professionals, Cyber crimes, Ethics & Human rights
Case 1 CISCO's Evolution of Strategy and Structure. (Hitt & Irelandpage. no 256)
Case 2 selecting a new CEO (Hitt & Irelandpage no 282)
Case 3 The Continuing innovation revolution at Amazon: The kindle and E-books(Hitt & Ireland page 304)

REFERENCES:
- Hitt & Ireland and Manikutty," Strategic Management: A South Asian Perspective": Cengage Learning, 9e, 2012
- Mital; Cases in Strategic Management; 3rdEdition, TMH, 2015.
- Mason A Carpenter et al."Strategic Management: A dynamic Perspective"Pearson,2e, 2012.
- A Nag" Strategic Management:Analysis, Implementation & Control "Vikas Publishing house, 2012.
- Adrian & Alison" Strategic Management: Theory & Application" Oxford UniversityPress, 2010.
- C.L.Bansal, Business and Corporate Laws, 1/e, Excel Books, 2006

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RETAILING MANGEMENT
PG Elective-III (Marketing)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim: The main aim of this course is a) to enable students to gain an insight into retailing industry and shopping environment. b) to familiarize them with concepts of Retailing through cases and motivate them to go for a career in retailing industry.

Learning outcome:
a.　To enable the students to link Modern Retailing Concepts to cases and understand the present Retailing Trends.
b.　To facilitate the students to be able to managing retail operations efficiently and effectively.

1. **Introduction to Retail Management** - Meaning of Retail & Retailing, History, types, functions, utilities, theories of retailing, e-tailing, structure of Indian retail industry, retailing in Asia, global retailing, retailing in Europe, service retailing, FDI retailing, Rural marketing, ethics in retailing.
   Case: The Classic story.(Aditya page no 283)
   Case: The Panwallah. (Aditya Prakash page no 287)

2. **Understanding Shoppers & Shopping** - Shopping Environment, shopping in a Socio Cultural Contest, shopping process shopping behaviour, demographics of Indian shoppers, psychographic profile of Indian shoppers, lifestyle of Indian shoppers, shopping patterns in India.
   Case: Multinational Fast Food Chains in India. Retail Management (Suja Nair page no 474)
   Case: Changing Indian Consumers. (Aditya page no 258)
   Case: Tanishq. (Suja Nair page no 440)

3. **Delivering Value though Retail Functions** - Classification of formats, ownership-based, store based, non-store based, other retail formats, Value Based Model of store format choice, attribute based model of store format choice, the competitive market place, Marketing Structure, the demand side of retailing, non price decisions, types of competition, evolution of retail competition, future changes in retail competition.
   Case: Nirula's. (Suja Nair Page no 448)
   Case: Hot Breads. (Suja Nair page no 452)
   Case: McDonalds India. (Suja Nair page no 459)
   Case: Automobile and Niche Marketing (Dr. Harjit   Singh page no 417)

4. **Pricing & Supply Chain Management -** Pricing Objectives & Policies, Interactive Pricing Decisions, different Pricing Strategies, Price Adjustment Strategies. SCM- introduction, derivers of SCM, SCM & competitive advantages, types of supply chain-supply chain length, width, control of supply chain, framework of Supply Chain Management-SCM network structure, Supply Chain Business Process, SCM components, Retail Inventory Management, Retail Logistics Management, EDI in SCM.
   Case: Café Coffee Day. (Suja Nair page no 434)
   Case: Shoppers stop. (Suja Nair page no 470)

5. **Retail Buying & Managing Retail Operations**-objectives of buying, organization buying, retailing buying behaviour, models of buying behaviour, buyer-responsibilities, merchandising & assortment plans-merchandise plan, merchandise plan for basic stocks retail buying groups, negotiations in retail, contract in retail, store layout & design, merchandise display-fixtures, positioning of merchandise, materials & finishes – floors, interior walls, ceilings, lightings, music, graphics-exterior signage, interior signage, layouts for e-tailers.
   Case: Godrej and Boyee's. (Suja Nair page no 466)

Textbook
- Piyush Kumar Sinha, Dwarika Prasad Uniyal, Managing Retailing, 2nd Edition, Oxford, 2012.

   Journals : Vikalpa, IIMA, IIMB Review, Decision, IIMC, Vision, MDI, MICA Communications Review – A Marketing Communications Journal, Mudra Institute of Communications, Ahmedabad.

References:
1. Lusch, Dunne, Carver, Introduction to Retailing, 7th Edition, Cengage Learning, 2013.
2. **Suja Nair**, Retail Management, Himalaya Publication House, 2012.
3. **Aditya Prakash** Tripathi, Noopur Agrawal, Fundamentals of Retailing (text and cases), Himalaya Publication House, First Edition, 2009.
4. Swapna Pradhan, Retail Management-Text & Cases, TMH, 2013.
5. Dr. Harjit Singh, Retail Management a global perspective text and cases, S.Chand, 2011.
6. Michael levy, Barton Weits, Ajay Pundit, Retailing Management, McGraw-Hill, 2011.
7. Arif sheikh, Kaneez Fatima, Retail Management, Himalaya Publication House-2012.
8. Chetan Bajaj, Rajnish tuli, Nidhi Varma ,Srivastava, Retail Management, 2nd edition, oxford, 2012.
9. David Gilbert, Retail Marketing Management, 2nd edtion, Pearson, 2013

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SERVICES MARKETING
PG Elective-IV (Marketing)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
To facilitate the students about the concepts of Services Marketing through cases.

Learning Objective: The objective of the course is to provide a deeper insight into the Marketing Management of companies offering Services as product. The students will be able to understand the characteristics of services, understand consumer behaviour in services, align service design and standards, delivering service, managing services promises.

1. **Foundations of Service Marketing:** What are Services? Why Services Marketing? Role of Services in Modern Economy, Service and Technology, characteristics of services compared to goods, Services Marketing Mix, staying focusing on customer, Gaps model of Service Quality-Customer Gap, Provider Gap, Closing Gap.
   Case 1: The United Indian Bank (Govind Apte Page no 55-56)
   Case 2: Online air travel: Expedia, Orbitz and Travelocity lead the pack (John E.G.Bateson Page no 82-83)

2. **Focus on the Consumer:** Consumer behaviour in services, Consumer expectations in service, consumer perceptions of service, Understanding Consumer Requirements-listening to customers through research, building customer relationships, service recovery.
   Case1: The Crestwood Inn, (John E.G.Bateson Page no 320-321)
   Case 2: Population growth and the urban poor (Vinnie Jauhari, Kirti Dutta Page no 106-108)

3. **Aligning Service Design and Standards:** Service innovation and design-challenges, types of service innovations, stages in service innovation and development, service blueprinting, high performance service innovations, new Service Development Processes, Customer defined service standards-factors, types, and development, Physical Evidence and the Services cape.
   Case 1: Physical evidence a case of KF. (Vinnie Jauhari Page 236-238).
   Case 2: IT Trainers Limited. (Govind Apte Page no 186).

4. **Delivering and Performing Service:** Employee's roles in service delivery, customer's roles in service delivery, delivering service through intermediaries and electronic channels, managing demand and capacity.
   Case 1: Relationship between Employee satisfaction, Customer satisfaction and market share: The case of Hewlett-Packard, (Vinnie Jauhari Page 336).
   Case 2: Total Assurance Ltd. (Govind Apte Page 207-208).

5. **Managing Service Promises:** Integrated services marketing communications-need for coordination, five categories of strategies to match service promises with delivery, Pricing of Services-three key ways that service prices are different for customers, approaches to pricing services, pricing strategies that link to the four value definitions.
   Case 1: Why Differential Pricing helps the poor? (Vinnie Jauhari et al Page 336).

Textbook
1. **Valarie A.Zeithaml & Mary Jo-Bitner: Services Marketing – Integrating customer focus across the firm, TMH, Fifth edition, 2011.**

   Journal : MICA Communications Review – A Marketing Communications Journal, Mudra Institute of Communications, Ahmedabad.

References

1. John E.G.Bateson, K.Douglas Hoffman : Services Marketing, Cengage Learning, Fourth Edition, 2012.
2. Harsh V.Varma: Services Marketing text and cases, Pearson, Second edition, 2012.
3. Ravi Shanker : Services Marketing - The Indian Prespective, Excel Books, 2011.
4. Vinnie Jauhari, Kirti Dutta: Services- Marketing, Operations and Management, Oxford University Press,2012.
5. Govind Apte : Services Marketing, Oxford Press, 2011.
6. Christoper lovelock,Jochen wirtz, Jayanta Chatterjee, Services Marketing, 7th edition Pearson 2013.
7. K.Rama Mohan Rao, Services Marketing, 2nd edition Pearson, 2011.
8. Dr. S. Shajahan, Services Marketing, 2nd edition, HPH, 2012.
9. Ramneek Kapoor, Justin Paul, Biplab Halder, Services Marketing Concepts and Practices, TMH, 2011.
10. Rajendra Nargundkar, Services Marketing, , 3rd edition, TMH,2012.
11. R. Srinivasan, Services Marketing the Indian context, 3rd edition, PHI,2012.
12. Dr. B. Balaji, Services Marketing and Management, S.Chand, 2012.
13. Steve Baron, Kim Harris and Toni Hilton, Services Marketing text and cases, Macmillan, 2009.
14. Nimit Chowdhary, Monika Chowdhary, textbook of Marketing of Service the Indian Experience, Macmillian, 2013.

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INTERNATIONAL MARKETING
PG Elective-V (Marketing)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim: To enable the student understand the Global Markets, formulate of Global Marketing Strategies and Implement.

Learning Objective: The objective of the course is to provide a deeper insight into the global marketing management, environment of global markets, assessing global market opportunities, developing and implementing global marketing strategies.

1. **Introduction to International Marketing:** Definition,   Scope, Features, Difference between Domestic and International Marketing, Why International? International Marketing Theories, Types of Economics & Markets.
    Case: 1 Starbucks –going Global fast. (Philip, John, Prashant Text)

2. **Environment of Global Markets:** Types: Political, Economical, Social, Legal and Technological Environments, EXIM Policy, International Trade and its barriers trade in Goods & Services.
    Case: 1 IKEA Catalogue. (Svend & Madhurima -Pearson page no 242)
    Case: 2 Mc. Donalds and obesity. (Philip John Prashant Text)

3. **Assessing Global Market Opportunities:** Global vision through Market Research: Market Selection, Role of Culture, Government Policies of Target Markets, SWOT Analysis of Target Markets, International Trade Agreements, World Market Stages.
    Case:1 Reliance Entertainment(Svend & Madhurima, Pearson page no 312)
    Case:2 Mahindra & Mahindra (Svend & Madhurima,Pearson page no 356)
    Case:3. IMAX corporation (Svend & Madhurima, Pearson page no 412)

4. **Developing Global Market strategies:** Segmentation product & services decisions for consumers and Business: Marketing channels and Distribution, Promotion Strategies, Pricing strategies.
    Case:1 Harley-Davidson:-Price level (Svend & Madhurima,pearson page no 510)
    Case:2 Mc Donalds Great Britain –the Turnaround (Text page no 793)

5. **Implementing Global marketing strategies:** Negotiation with customers and selection method, E-Marketing channels organization & controlling of the global marketing programme.
    Case: 1 NTT DOCOMO (Svend & Madhurima,Pearson page no 709)

Textbook

- **Philip R. Cateora, John L graham, Prashant Salwan, International Marketing -13th edition – TMH-2011.**

References
1. Svend Hollensen, Madhumita Benerjee-Global Marketing-4th Edition- Pearson-2010.
2. *Rajagopal –International Marketing*-2nd Edition –Vikas -2011
3. *P.K.Vasudeva, International Marketing-4th edition-Excel Books-2012*
4. Dr.Gajender Sharma- International Marketing-1st edition-Excel Books-2010
5. Justin Paul, International Marketing – Text and Cases, TMH, 2013.
6. Kiefer Lee, Steve Carter-Global Marketing Management-3rd edition-Oxford-2011.
7. Warner J.Keogan, Naval K.Bghargava-Global Management-7th Edition-Person-2011
8. Francis Cherunilam- International Marketing-12th Edition-HPH-2012.
9. Rathor, Jani,Rathor- International Marketing-4th edition- HPH-2011

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COMPENSATION & REWARD MANAGEMENT
PG Elective – III (HR)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
It enables the student understand the concepts issues and challenges of compensation and reward management.

Learning Outcome:
The student understands how to design the compensation for various levels of jobs in the organization, designing the compensation for special groups. Government and legal issues in compensation design.

1. The Pay Model Strategy: The Totality of Decisions, Defining Internal Alignment, Job Analysis, Evaluating Work, Job Evaluation, person-based Structures.
   Case: So you want to lead an orchestra (George T Milkovich page no 72)
   Case: Job Evaluation at whole foods (George T Milkovich page no 125)

2. Defining Competitiveness, Designing pay levels, Mix and pay structures, pay for performance. The Evidence pay for performance plans.
   Case: Burger Boy(George T Milkovich page no 249)
   Case: Incentives in the club House(George T Milkovich page no 279)

3. Performance Appraisals, Benefits Determination Process, statutory Benefits including Health care, Employee welfare and Retirement Benefits.
   Case: Merit pay: Making policies and practices that work (George T Milkovich page no 319)

4. Compensation of Special Groups, Union role in wage and Salary administration. International pay systems.
   Case: Compensation of special groups (George T Milkovich page no 443)
   Case: Coke and IBM(George T Milkovich page no 491)

5. Government and legal issues in compensation Public sector pay Management: Making it work.
   Case: Communicating by copier(George T Milkovich page no 575)

Textbook:
- **George T Milkovich, Jerry M Newman, C S Venkata Ratnam" TMH,2013.**

References:
1. B D Singh "Compensation and Reward Management" Excel books,2012
2. Joseph J.Martocchio "Strategic Compensation" Pearson, 2012.
3. Kanchan Bhatia "Compensation Management" Himalaya, 2012.
4. Henderson "Compensation Management in a Knowledge Based World" 3e, Pearson, 2012.
5. Luis R.FGomez- Mejia "Compensation and Organizational Performance" Yesdee Publishing, 2012.
6. Michale Armstrong" Employee Reward" University Press, 2012.
7. Barry Gerhart, "Compensation" Sage, 20

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MANAGEMENT OF CHANGE
PG Elective – IV (HR)
(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
The course enables the student to understand the concept change management. This will help them to emerge as leaders in the organizations.

Learning Outcome:
The student understands the need to bring change, how to design change in the organizations, role of leadership in change management, change communication and resistance to change and the role of HR in change management.

1. Managing Change Conundrums, Organizational change classifications, History and organizational change. The role of paradigms and perspectives. External and Internal change contexts.
    Case: Changing times at Factory Bank (Mark Hughes page no 70)

2. Organizational design and change, strategic level change, Group and team level change, and Individual level change. Organizational Structure. Organizational Culture and Management of Change.
    Case: Restructuring at Flexco (Adrian page no 57)
    Case: Cultural change at Dupont Nylone (Adrian page no 65)

3. The leadership of Change, Change communication, resistance to change, Organizational learning, power, politics and Organizational change. Ethics and Managing Change, Change Agents and Agency.
    Case: Funding crisis at Musicians in the community (Mark Hughes page no 221)

4. HR and Managing Change: Recruitment & Selection & The Management of Change, Performance Management &Management of Change, Reward Managements & The Management of Change, Technological Change.
    Case: Recruitment and Selection at Unicol (Adrian page no 117)
    Case: Reward Management at Midland Main Line - Strategic Reward Management (Adrian page no 191).

5. Employee Relations, Involvement Strategies, Management of Change, Downsizing and the Management of Change, Evaluating and Promoting change.
    Case: Downsizing at Energy Co **(**Adrian page no 268)
    Case: Evaluating a possible change to training methods at telesales Incorporated (Adrian page no 300)

Textbook:
- **Mark Hughes, " Managing Change – a critical perspective", Universities Press, 2011.**

References:
1. Adrian Thornhill,Phil Lewis,Mike Millmore. Mark N K Saunders "Managing change", Pearson,2011.
2. John Hayes " The Theory and Practice of Change Management", Palgrave,2012.
3. Robert A Paton "Change Management" 3e , Sage Publications ,2012.
4. Palmer Dunford 'Managing Organizational Change" TMH,2012.
5. Radha R Sharma "Change Management and Organizational Transformation" Mc Grawhill, 2012.
6. Dipak Kumar " Organizational Change and Development" Oxford,2012.
7. Niloanjan Sengupta " Managing Change in Organizations" PHI ,2012.
8. Nic Beech " Managing Change" Cambridge Press" 2012

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PERFORMANCE MANAGEMENT
PG Elective - V (HR)
(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
To give an understanding about performance management and reward system linked with performance.

Learning Outcome:
The students can understand the importance of performance Management, Performance Appraisals, Reward System, and other performance related concepts.

1. Performance Management and reward systems in context, Performance Management process, Performance Management strategic planning.
   Case: Performance Management at Network Solutions,Inc (Herman Aguinis page no 26)
   Case: Performance Management at the University of Ghana (Herman Aguinis page no 48)

2. Defining performance and choosing a Measurement Approach, Measuring Results and Behaviours. Gathering performance Information, Implementing a performance Management System.
   Case: Accountabilities, Objectives and Standards (Herman Aguinis page no 113)
   Case: Evaluating the appraisal form used by a Grocery Retailer ((Herman Aguinis page no 145)

3. Performance Management and employee development, Performance Management skills.
   Case: Implementation of 360 degree feed back system at Ridge intellectual (Herman Aguinis page no 204)
   Case: Was Robert Eaton A Good Coach (Herman Aguinis page no 233)

4. Reward Systems and legal issues, Managing Team performance.
   Case: Possible Illegal Discrimination at Tractors,Inc. (Herman Aguinis page no 265)
   Case: Team Performance Management at Duke University Health systems. (Herman Aguinis page no 283)

5. Relevant Performance related concepts: Bench marking, Six Sigma, Competency Mapping, Balance Score card, Coaching and Mentoring Pygmalion effect, Job Analysis.
   Case: BHEL,EVA Incentive Schemes: (B D Singh page no 589)
   Case: The TCS Approach and experience(B D Singh page no 601)
   Case: NTPC Performance Management System(B D Singh page no 632)
   Case: Performance Management system(PMS) at Bharti Telecom(B D Singh page no 663)

Textbook.
1. **Ram Kumar Balyan, Vikramender Singh & Suman "Performance management text and cases", Himalaya Publications, 2011**.

Reference
1. Herman Aguinis, " Performance Management" Pearson, 2012.
2. Anjali Ghanekar' Essentials of Performance Management' Everest Publishing House, 2010
3. Lance A Berger & Dorothy R Berger " The Talent Management Hand Book" 2nd edition TMH, 2013.
4. B D Singh, " Performance Management System- a holistic approach" excel Books,2010
5. Prem Chadha "Performance management" Macmillan, 2012.
6. Srinivas K Kandula "Performance Management" PHI, 2010.
7. R K Sahu : Performance Management System, Excel, 2013

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IDP (B.Tech. CSE & M.Tech. / MBA) V Year I-Sem   **L T P C**
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STRATEGIC INVESTMENT AND FINANCING DECISIONS
PG Elective – III (Finance)

(Students must read textbook. Faculty are free to choose any other cases)

Aim:
To develop an understanding of the role of financial strategy, in the investing, financing and resource allocation decisions with in an organization. To develop an understanding of the various strategies that are in use to trade off risk and return

Learning Outcome:
To explain the role and nature of investment and financial strategies and its relationship to maximization of wealth/shareholders value. To examine various risk models in capital budgeting. To evaluate the motives for financial implications of mergers and acquisitions and lease financing. To discuss the impact of general and specific inflation on financial and investment strategy decisions.

1. Investment decisions under conditions of Risk and uncertainty: Concepts of risk and uncertainty. Risk Analysis in Investment Decisions. Risk adjusted rate of return, certainty equivalents, probability distribution of cash flows, decision trees, sensitivity analysis and Monte Carlo Approach to Simulation. Investment Decisions under capital constraints: Capital Rationing Vs. Portfolio. Portfolio Risk and diversified projects.

2. Types of Investments and disinvestments: Project abandonment decisions, Evidence of IRR. Multiple IRR, Modified IRR, Pure, simple and mixed investments. Lorie Savage Paradox. Adjusted NPV and impact of inflation on capital budgeting decisions.

3. Critical analysis of appraisal techniques: Discounted pay back, post pay back, surplus life and surplus pay back, Bail-out pay back, Return on Investment, Equivalent Annual Cost, Terminal Value, single period constraints, multi-period capital constraint and an unresolved problem, NPV mean variance analysis, Hertz Simulation and Hillier approaches. Significance of information and data bank in project selections.

4. Strategic Analysis of selected investment decisions: Lease Financing, Leasing Vs. Operating Risk, borrowing vs. procuring. Hire purchase and Instalment decisions. Lease Risk Management, Leasing as a Financing Decision, Advantages of Leasing, and Leasing Decision in practice.

5. Financing Decisions: Mergers and Acquisitions Basic Issues, Strategy , Diversification and Mergers and Acquisitions , Theories of Mergers, Types of Mergers ,Cost of Mergers , Government guidelines for Takeover, Problems on Mergers & Acquisitions and cases

Textbooks:

▪ **Ravi M Kishore " Strategic Financial Management, Taxman 2012.**

References:
1. Prasanna Chandra: Financial Management, 8/e, TMH, 2012
2. Prasanna Chandra: Projects: Planning, Analysis, Financing Implementation and Review, 6/e, TMH, 2012
3. I.M. Pandey: Financial Management, Vikas 2012.
4. Brigham & Ehrhardt: Financial Management, Text and Cases, Cengage, 2012.
5. G.V.Satya Sekhar, Strategic Financial Management , Himalaya Publishing House 2012
6. MY Khan and PK Jain: Financial Management: Text, Problems & Cases, TMH, 2012.

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INTERNATIONAL FINANCIAL MANAGEMENT
PG Elective – IV (Finance)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
To give an understanding about MNC Financial Management.

Learning Outcome:
The objective of the course is to provide students with a broad view of International Monetary Systems and its understanding to enable a global manager to do business in a global setting. The prerequisite for the course is Financial Accounting and Analysis and Financial Management.

1. International Financial Management: An overview, Importance, nature and scope, International Business Methods, Recent changes and challenges in IFM

2. International Flow of Funds: Balance of Payments (BoP), Fundamentals of BoP, Accounting components of BOP, Factors affecting International Trade flows, Agencies that facilitate International flows. Indian BoP Trends. International Monetary System: Evolution, Gold Standard, Bretton Woods's system, the flexible exchange rate regime, evaluation of floating rates, the current exchange rate arrangements, the Economic and Monetary Union (EMU).

3. Foreign Exchange Market: Function and Structure of the Forex markets, major participants, types of transactions and settlements dates, Foreign exchange quotations. Process of arbitrage, speculation in the forward market - Currency Futures and Options Markets, Overview of the other markets – Euro currency market, Euro credit market, Euro bond market, International Stock market.

4. (a) Exchange Rates: Measuring exchange rate movements, Factors influencing exchange rates. Government influence on exchange rates – exchange rate systems. Managing Foreign exchange Risk. International arbitrage and interest rate parity.
(b) Relationship between inflation, interest rates and exchange rates – Purchasing Power Parity – International Fisher Effect – Fisher Effect.

5. Asset–liability Management: Foreign Direct Investment, International Capital Budgeting, International Capital structure and cost of capital. International Portfolio Management. International Financing: Equity, Bond financing, parallel loans - International Cash management, accounts receivable management, inventory management. Payment methods of international trade, trade finance methods, Export – Import bank of India, recent amendments in EXIM policy, regulations and guidelines.

Textbooks:

1. **Jeff Madura: International Corporate Management, Cengage, 2012.**

References:
1. Alan C.Shapiro: Multinational Financial Management, John Wiley, 2012
2. Sharan.V: International Financial Management 5Th Ed**.**PHI2012
3. Madhu Vij: International Financial Management, Excel, 2012.
4. Ephraim Clark: International Finance, , Second Edition, Thomson.
5. P.G.Apte: International Financial Management, TMH 2012.
6. S.Eun Choel and Risnick Bruce: International Financial Management, TMH, 2012
7. Reid. W.Click& Joshua D.Coval, PHI 2012

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DERIVATIVES
PG Elective – V (Finance)
(Students must read textbook. Faculty are free to choose any other cases)

Aim:
To give an understanding about the derivatives in stock, commodity and Forex markets.

Learning Outcome:
The objective of this course is to make students efficient in the area of Derivatives, giving them the knowledge of basics in Derivatives, Future Markets, Option Strategies, etc

1. **Introduction to Derivatives** – Development and Growth of Derivative Markets, Types of Derivatives, Uses of Derivatives, Fundamental linkages between spot & Derivative Markets, The Role of Derivatives Market, Uses & Misuses of derivatives.

2. **Future and Forward Market** structure of forward and Future Markets, Mechanics of future markets, Hedging Strategies, Using futures, Determination of forward and future prices, Interest rate futures, Currency futures and Forwards.

3. **(a) Options** – Distinguish between Options and Futures, Structure of Options Market, Principles of Option Pricing, Option Pricing Models: The Binomial Model, The Black – Scholes Merton Model.
   (b) Basic Option Strategies, Advanced Option Strategies, Trading with Options, Hedging with Options, Currency Options.

4. **Commodity Market Derivatives-** Introduction, Types, Commodity Futures and Options, Swaps. Commodity Exchanges- MCX, NCDEX- Role, Functions & Trading. (Refer : M.Ranganatham & R.Madhumathi)

5. **Swaps** – Concept and Nature, Evolution of Swap Market, Features of Swaps, Major types of Swaps, Interest Rate Swaps, Currency Swaps, Commodity Swaps, Equity Index Swaps, Credit Risk in Swaps, Credit Swaps, using Swaps to Manage Risk, Pricing and Valuing Swaps.

Textbooks:
1. **John C Hull: Options, Futures and other derivatives, , Pearson , 2012.**

References:
1. M.Ranganatham & R.Madhumathi : Derivatives and Risk Management, Pearson, 2012
2. Robert A Strong: Derivatives – An Introduction, ThomsonT 2012
3. Gupta: Financial Derivatives, PHI 2012
4. Dubofsky, Miller: Derivatives Valuations and Risk Management, Oxford. 2012.
5. Don M. Chance, Robert Brooks: Derivatives and Risk Management Basic, Cengage. 2012.

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E-BUSINESS
PG Elective – III (SYSTEMS)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
It enables the student understand the concepts of Electronic Business.

Learning Outcome:
The student understands E-Business, its Models, E-Business plans, E-Business Application and Securing E- Business

1. Electronic Business- Understanding new Internet Economy and Business-E-business an e-commerce-Features of E-Business- Advantages of E-Business- Busines Environment- Establishing E-Business.
    Case : Barnes & Noble nad Amazon. Com (Ref 1- Kulkarni).

2. E-Business Models- E-Business Strucutre- E-Business models- E-Business model Design-IT infrastructure requirement of E-business models.
    Case: B2C model at Aradhana Tours. (Ref 1 Kulkarni)

3. Creating E-Business plans- softwareprograms to create a business- Phases /Aspects of E-Business- e-Marketinmg and sales Strategies-website and portal managmenet.
    Case" FLOP (ref 1 :Kulkarni)

4. E-Business Appliications- Charactersttics o E-Business applications-Project palning approach for E-Business applications- Application Integration- application in various domains.
    Case Nokia (Ref 1 Kulkarni)

5. Securing your e-business- risk Managment- business continuity planning-Network and web site security-web sire Defacement-Secuiryt audit and Pentration Testing.
    Case: Asmi Agencies-e-market (Ref 1 Kulkarni)

Textbook:
*   **Kulkarni et al. "E-Business" Oxford, 2012.**

Reference
1. Dave chaffey, e-business & e- commerece management- strategy, implementation and practice, 5th edition, pearson, 2013.
2. Napier et al " Creating A Winning E-Business" Cengage, 2012.
3. Parad Diwan : e-commerce A Manager's Guide to e-business, Excel, 2013.

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CYBER SECURITY
PG Elective – IV (SYSTEMS)

(Students must read textbook. Faculty are free to choose any cases)

Course Aim:
It enables the student to understand Cyber crime, Tools and methods used in cyber crime and Cyber Security.

Learning Outcome:
The student understands the cyber crimes. Computer forensic system, and Cyber Security.

1. Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era.

2. Tools and methods used in cyber crime-Proxy servers and Anonymizers-Phishing-Password cracking-Key loggers and Spywares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network.

3. Understanding computer forensic-Historical background of cyber forensic-Forensic analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory-Relevance of the OSI 7 Layer model to computer Forensic-Computer forensic from compliance perspectives.

4. Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices.

5. Cyber Security –Organizational implications-cost of cybercrimes and IPR issues-Web threats for organizations: the evils and Perils-Social media marketing-Security and privacy Implications-Protecting people privacy in the organizations-Forensic best practices for organizations.

Textbook:
- **Nina Godbole & Sunit Belapure "Cyber Security", Wiley india, 2012.**

Reference:
1. Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012.
2. Dhiren R Patel, "Information security theory & practice",PHI learning pvt ltd,2010.
3. MS.M.K.Geetha & Ms.Swapne Raman"Cyber Crimes and Fraud Management, "MACMILLAN, 2012.
4. Pankaj Agarwal : Information Security & Cyber Laws (Acme Learning), Excel, 2013.
5. Vivek Sood, Cyber Law Simplified, TMH, 2012.

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INFORAMTION SYSTEM CONTROL AND AUDIT
PG Elective – V (SYSTEMS)

(Students must read textbook. Faculty are free to choose any other cases)

Course Aim:
It enables the student understand the concepts of Information System and Control.

Learning Outcome:
The student understands the audit standards, Audit Process, Computer assistance Audit tools, Managing Audit tools and Strategy and Standards for Auditing.

1. Audit and review the role of Inforamtion Technology-Audit standards-Importance of audit standard independence- AICPA proannouncmenet- The need for IT audit function- role of the IT auditor-Legal implications.
   Cases.

2. Auidit proces in a inforamtion Technology Envionment-Risk Assesmant-Audit budget- Objectives and context-prelimenary review-Feildwork and implermentating audit Methodology-Docukenting results.
   Cases.

3. Computer Assistance Audit tools- Auditor productivity tools-Flowcharting Techniques-Flowcharting an nalytical tool- Defininf critical data-Flowcharting technique-Generalizing audit software-Computer forensic.
   Cases.

4. Managing IT audits- Estabish a career develpement and planning-Evaluvating IT audit quality-criteria for IT audit quality-IT auditing in new millinieum-code of ethics and professional standards-Private industry- Managmeent consultancy.
   Cases.

5. Strategy and standards for Auditing- Strategic palnning- communication- demand managmeent-Architecture and standards- Busines architecture- application and inforamtion architecture-Architecture fuanctions.
   Cases.

Textbook:
- **Sandra Senft & fredrick " Inforamtion Technology Control and Audit " CRC Press, 2012.**

Reference:
- D P   Dube, V P Gulati, Information System Audit and Assurance – Includes case studies and chelists from the banking industry, TMH, 2008.