

# **ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS**

## **COMPUTER SCIENCE & ENGINEERING**

*For*

**M. Tech. (Cyber Forensics & Information Security)**  
(Two Year Full Time Programme)



**JNTU COLLEGE OF ENGINEERING HYDERABAD  
(Autonomous)**

Kukatpally, Hyderabad – 500 085, Telangana, India.

**2017**



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD  
COLLEGE OF ENGINEERING HYDERABAD  
(AUTONOMOUS)  
Kukatpally, Hyderabad – 500 085**

ACADEMIC REGULATIONS 2017  
for CBCS Based M.Tech. (Regular/Full Time) Programmes  
(Effective for the students admitted into 1 year from the  
Academic Year **2017-18** and onwards)

**1.0 Post-Graduate Degree Programmes in Engineering & Technology (PGP in E & T):**

JNTUH offers 2 Year (4 Semesters) full-time **Master of Technology** (M.Tech.) Degree Programmes, 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 different branches of Engineering & Technology with different specializations.

**2.0 Eligibility for Admission:**

- 2.1 Admissions to the PGPs shall be made subject to the eligibility, qualifications and specializations prescribed by JNTUH College of Engineering Hyderabad, JNT University Hyderabad, for each Specialization under each M.Tech. Programme, from time to time.
- 2.2 Admission to the PGP shall be made either on the basis of - the Rank/Percentile earned by the candidate in the relevant qualifying GATE Examination / the Merit Rank obtained by the qualifying candidate at an Entrance Test conducted by the Telangana State Government (PGECET) for M.Tech. Programmes / an Entrance Test conducted by the Jawaharlal Nehru Technological University Hyderabad / 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.
- 2.3 The medium of instructions for all PG Programmes will be ENGLISH only.

**3.0 M.Tech. Programme (PGP in E & T) Structure:**

- 3.1 The M.Tech. Programmes in E & T of JNTUH-CEH are of Semester Pattern, with 4 Semesters constituting 2 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 PGP - Academic Regulations.

**3.2.1 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 are taken as 'references' for the present set of Regulations. The terms 'SUBJECT' or 'COURSE' imply the same meaning here, and refer to 'Theory Subject', or 'Lab Course', or 'Design/ Drawing Subject', or 'Seminar', or 'Comprehensive Viva', or 'Project', as the case may be.

### 3.2.2 Credit Courses:

All Subjects (or 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 hour/ Week/ Semester for Theory/ Lecture (L) Courses; and,
- Two hours/ Week/ Semester for Laboratory/ Practical (P) Courses or Tutorials (T).

Other student activities like Study Tour, Guest Lecture, Conference/ Workshop Participations, Technical Paper Presentations etc., and identified Mandatory Courses if any, will not carry Credits.

### 3.2.3 Subject/ Course Classification:

All Subjects/ Courses offered for the PGP are broadly classified as : (a) Core Courses (CoC), and (b) Elective Courses (E!C).

- Core Courses (CoC) and Elective Courses (E!C) are categorized as PS (Professional Subjects), which are further subdivided as – (i) PC (Professional/ Departmental Core) Subjects, (ii) PE (Professional/ Departmental Electives) , (iii) Seminar, (iv) Comprehensive Viva, and (v) Project Work (PW).

### 3.2.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping for the M.Tech. Degree Programmes is as listed below ...

<b>S. No</b>	<b>Broad Course Classification</b>	<b>Course Group/ Category</b>	<b>Courses Description</b>	<b>Credits</b>
1)	Core Courses (CoC)	PC- Professional Core	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	20
2)	Elective Courses (E!C)	PE– Professional Electives	Includes Elective subjects related to the Parent Discipline/ Department/ Branch of Engg.	32
3)	Core Courses	Project Work	M.Tech. Project or PG Project or PG Major Project	30
		Seminar	Seminar/ Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	2
		Comprehensive Viva-voce	Viva-voce covering all the PG Subjects and related aspects	4
		Communication Skills/ Soft Skills	Lab oriented	2
<b>Total Credits for PGP</b>				<b>90</b>

**4.0 Course Work:**

- 4.1 A Student, after securing admission, shall pursue and complete the M.Tech. PGP in a minimum period of 2 Academic Years (4 Semesters), and within a maximum period of 4 Academic Years (starting from the Date of Commencement of I Year).
- 4.2 Each student shall Register for and Secure the specified number of Credits required for the completion of the PGP and Award of the M.Tech. Degree in respective Branch of Engineering with the chosen Specialization.
- 4.3 I Year is structured to provide typically 28 Credits (28 C) in each of the I and II Semesters, and II Year comprises of 34 Credits (34 C), totaling to 90 Credits (90 C) for the entire M.Tech. Programme.

**5.0 Course Registration:**

- 5.1 A 'Faculty Advisor' shall be assigned to each M.Tech. Programme with respective Specialization, who will advise the Students about the M.Tech. Programme Specialization, its Course Structure and Curriculum, Choice/ Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.
- 5.2 A Student may be permitted to Register for Subjects/ Courses of 'his CHOICE' with a typical total of 28 Credits per Semester in I Year (Minimum being 24 C and Maximum being 32 C, permitted deviation being  $\pm 15\%$ ), and 16 Credits (inclusive of Project) per III Semester in II Year (Minimum being 16 C and Maximum being 32 C), 18 credits (inclusive of Project) per IV Semester in II Year (minimum being 18 C and maximum 32 C), based on his interest, competence, progress, and 'PRE-REQUISITES' as indicated for various Subjects/ Courses, in the Department Course Structure (for the relevant Specialization) and Syllabus contents for various Subjects/ Courses.
- 5.3 Choice for 'additional Subjects/ Courses' in any Semester (above the typical 28/16/18 Credit norm, and within the Maximum Permissible Limit of 32/32 Credits, during I/ II Years as applicable) must be clearly indicated in the Registration, which needs the specific approval and signature of the Faculty Advisor/ Counselor on hard-copy.
- 5.4 Dropping of Subjects/ Courses in any Semester of I Year may be permitted, ONLY AFTER obtaining prior approval and signature from the Faculty Advisor (subject to retaining a minimum of 24 Credits), 'within 15 Days of Time' from the beginning of the current Semester.

**6.0 Attendance Requirements:**

- 6.1 A Student shall be eligible to appear for the End Semester Examination (SEE) of any Subject, if he acquires a minimum of 75% of attendance in that Subject for that Semester.
- 6.2 A Student's Seminar Report and Seminar Presentation shall be eligible for evaluation, only if he ensures a minimum of 75% of his attendance in Seminar Presentation Classes during that Semester.

- 6.3 Condoning of shortage of attendance up to 10% (65% and above, and below 75%) in each Subject or Seminar of a Semester may be granted by the College Academic Council on genuine and valid grounds, based on the Student's representation with supporting evidence.
- 6.4 A stipulated fee per Subject/Seminar shall be payable towards condoning of shortage of attendance.
- 6.5 Shortage of Attendance below 65% in any Subject/Seminar shall in NO case be condoned.
- 6.6 A Student, whose shortage of attendance is not condoned in any Subject(s) or Seminar in any Semester, is considered as 'Detained in that Subject(s)/Seminar', and is not eligible to take End Examination(s) of such Subject(s) (and in case of Seminars, his Seminar Report or Presentation are not eligible for evaluation) in that Semester; and he has to seek Re-registration for those Subject(s)/Seminar in subsequent Semesters, and attend the same as and when offered.

#### **7.0 Academic Requirements:**

The following Academic Requirements have to be satisfied, in addition to the Attendance Requirements mentioned in Item No. 6.

- 7.1 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.
- 7.2 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.
- 7.3 A Student shall - register for all Subjects covering 90 Credits as specified and listed in the Course Structure for the chosen PGP Specialization, put up all the Attendance and Academic requirements for securing 90 Credits obtaining a minimum of B Grade or above in each Subject, and 'earn all 90 Credits securing SGPA  $\geq$  5.0 ( in each Semester) and final CGPA (ie., CGPA at the end of PGP)  $\geq$  5.0, to successfully complete the PGP.
- 7.4 Marks and Letter Grades obtained in all those Subjects covering the above specified 90 Credits alone shall be considered for the calculation of final CGPA, which shall be indicated in the Grade Card of II Year II Semester.

- 7.5 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 90 Credits as specified in the Course Structure, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required 90 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 6 and 7.1 – 7.4 above.
- 7.6 Students who fail to earn 90 Credits as per the specified Course Structure, and as indicated above, within 4 Academic Years from the Date of Commencement of their I Year, shall forfeit their seats in M.Tech. Programme and their admissions shall stand cancelled.
- 7.7 When a Student is detained due to shortage of attendance in any Subject(s)/Seminar in any Semester, no Grade Allotment will be done for such Subject(s)/Seminar, and SGPA/ CGPA calculations of that Semester will not include the performance evaluations of such Subject(s)/Seminar in which he got detained. However, he becomes eligible for re-registration of such Subject(s)/Seminar (in which he got detained) in the subsequent Semester(s), as and when next offered, with the Academic Regulations of the Batch into which he gets readmitted, by paying the stipulated fees per Subject. In all these re-registration cases, the Student shall have to secure a fresh set of Internal Marks (CIE) and End Semester Examination Marks (SEE) for performance evaluation in such Subject(s), and subsequent SGPA/ CGPA calculations.
- 7.8 A Student eligible to appear in the End Semester Examination in any Subject, but absent at it or failed (failing to secure B Grade or above), may reappear for that Subject at the supplementary examination (SEE) as and when conducted. In such cases, his Internal Marks (CIE) 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.

## **8.0 Evaluation - Distribution and Weightage of Marks:**

- 8.1 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 Comprehensive Viva-voce etc; however, the M.Tech. Project Work (Major Project) will be evaluated for 200 Marks.
- 8.2 a) For Theory Subjects, CIE Marks shall comprise of - Mid-Term Examination Marks (for 25 Marks), and Assignment Marks (for 5 Marks).  
b) During the Semester, there shall be 2 Mid-Term examinations. Each Mid-Term examination shall be for 25 Marks (with 120 minutes duration). The better performance out of these two Mid-Term Examinations shall be considered for the award of 25 Marks.
- 8.3 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./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 Lab. Teacher and another faculty member of the same Department as assigned by the Head of the Department.

- 8.4 There shall be a Seminar Presentation in I Year I Semester or II 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.
- 8.5 Each Student shall appear for a Comprehensive Viva-Voce at the end of the III Semester (II Year I 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.
- 8.6 a) Every PGP Student shall be required to execute his M.Tech. 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 I Year II Semester, and shall continue through II Year I and 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 I 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'. Every Student must compulsorily register for his M.Tech. 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 II Year I Semester, and one before the submission of M.Tech. Project Work Report/ Dissertation.
- b) 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.
- c) 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 performance 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.

d) 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).

8.7 a) 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 adjudicated 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).

b) 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.

c) 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 4 years from the date of commencement of his I Year I Semester).

## **9.0 Re-Admission / Re-Registration:**

### **9.1 Re-Admission for Discontinued Students:**

Students, who have discontinued the M.Tech. Degree Programme due to any reasons what so ever, may be considered for 'Readmission' into the same Degree Programme (with same specialization) with the Academic Regulations of the Batch into which he gets readmitted, with prior permission from the concerned authorities, subject to Item 4.1.



**9.2 Re-Registration for Detained Students:**

When any Student is detained in a Subject (s)/ Seminar due to shortage of attendance in any Semester, he may be permitted to re-register for the same Subject in the 'same category' (Core or Elective Group) or equivalent Subject if the same Subject is not available, as suggested by the Board of Studies of that Department, as when offered in the sub-sequent Semester(s), with the Academic Regulations of the Batch into which he seeks re-registration, with prior permission from the concerned authorities, subject to Item 4.1.

**10.0 Grading Procedure:**

- 10.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals, or Seminar, or Project, etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 6 above, and a corresponding Letter Grade shall be given.
- 10.2 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:

<i>% of Marks Secured (Class Intervals)</i>	<i>Letter Grade (UGC Guidelines)</i>	<i>Grade Points</i>
80% and above ( $\geq 80\%$ , $\leq 100\%$ )	O (Outstanding)	10
Below 80% but not less than 70% ( $\geq 70\%$ , $< 80\%$ )	A <sup>+</sup> (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 <sup>+</sup> (Good)	7
Below 55% but not less than 50% ( $\geq 50\%$ , $< 55\%$ )	B (above Average)	6
Below 50% ( $< 50\%$ )	F (FAIL)	0
<b>Absent</b>	<b>Ab</b>	<b>0</b>

- 10.3 A student obtaining F Grade in any Subject shall be considered 'failed' and is be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subjects will remain the same as those he obtained earlier.
- 10.4 A Letter Grade does not imply any specific % of Marks.
- 10.5 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**

- 10.6 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points ( $\Sigma CP$ ) 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

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

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),  $C_i$  is the no. of Credits allotted to the  $i^{\text{th}}$  Subject, and  $G_i$  represents the Grade Points (GP) corresponding to the Letter Grade awarded for that  $i^{\text{th}}$  Subject.

- 10.7 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

$$\text{CGPA} = \{ \sum_{j=1}^M C_j G_j \} / \{ \sum_{j=1}^M C_j \} \dots \text{for all S Semesters registered}$$

(ie., upto and inclusive of S Semesters,  $S \geq 1$ ),

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 1<sup>st</sup> 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),  $C_j$  is the no. of Credits allotted to the  $j^{\text{th}}$  Subject, and  $G_j$  represents the Grade Points (GP) corresponding to the Letter Grade awarded for that  $j^{\text{th}}$  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.

- 10.8 For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.
- 10.9 For Calculations listed in Item 10.5 – 10.8, 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.
- 10.10 A student shall be declared successful or 'passed' in a Semester, only when he gets a  $SGPA \geq 5.00$  (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire PGP, only when gets a  $CGPA \geq 5.00$ ; subject to the condition that he secures a  $GP \geq 6$  (B Grade or above) in every registered Subject/ Course in each Semester (during the entire PGP) for the Degree Award, as required.
- 10.11 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.

**10.12 Passing Standards :**

- 10.12.1 A Student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA  $\geq 5.00$  (at the end of that particular Semester); and a Student shall be declared successful or 'passed' in the entire PGP, only when gets a CGPA  $\geq 5.00$ ; subject to the condition that he secures a GP  $\geq 6$  (B Grade or above) in every registered Subject/ Course in each Semester (during the entire PGP), for the Award of the Degree, as required.
- 10.12.2 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), Credits earned, SGPA, and CGPA etc.

**11.0 Declaration of Results:**

- 11.1 Computation of SGPA and CGPA are done using the procedure listed in 10.5 – 10.8.
- 11.2 For Final % of Marks equivalent to the computed CGPA, the following formula may be used ..
- $$\% \text{ of Marks} = (\text{CGPA} - 0.5) \times 10$$

**12.0 Award of Degree and Class:**

- 12.1 A Student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire PG Programme (PGP), and secures the required number of **90** Credits (with GP  $\geq 6.0$ ), shall be declared to have 'QUALIFIED' for the award of the M.Tech. Degree in the chosen Branch of Engineering and Technology with specialization as he admitted.

**12.2 Award of Class**

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree, he shall be placed in one of the following four classes based on the % CGPA:

<b>Class Awarded</b>	<b>CGPA</b>
First Class with Distinction	$\geq 7.75$
First Class	$6.75 \leq \text{CGPA} < 7.75$
Second Class	$6.0 \leq \text{CGPA} < 6.75$

- 12.3 A student with final CGPA (at the end of the PGP)  $< 6.00$  will not be eligible for the Award of Degree.

**13.0 Withholding of Results:**

- 13.1 If a 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.

#### 14.0 Transitory Regulations:

14.1 A Student - who has discontinued for any reason, or who has been detained for want of attendance as specified, or who has failed after having undergone PGP, may be considered eligible for readmission to the same PGP with same set of Subjects/ Courses (or equivalent Subjects/ Courses as the case may be), and same Professional Electives (or from same set/category of Electives or equivalents as suggested), as and when they are offered (within the time-frame of 4 years from the Date of Commencement of his I Year I Semester).

#### 15.0 Student Transfers:

15.1 There shall be no Branch/ Specialization transfers after the completion of Admission Process.

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

#### 16.0 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 regulations, the decision of the Vice-Chancellor/ Principal is final.
- v) The College may change or amend the Academic Regulations, and/ or Course Structure, and/ or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates as notified by the University/ College.

#### 17. MALPRACTICES RULES:

	Nature of Malpractices	Punishment
	<b>If the candidate:</b>	
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.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners	Cancellation of the performance in that subject.

	or writes to the examiner requesting him to award pass marks.	
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.	

**18. GENERAL:**

- **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
- **Credit Point:** It is the product of grade point and number of credits for a course.
- The Academic Regulations should be read as a whole for the purpose of any interpretation.
- The University/College reserves the right of altering the Academic Regulations and/or Syllabus/Course Structure, as and when necessary. The modifications or amendments may be applicable to all the candidates on rolls, as specified by the University/College.
- Wherever the words 'he' or 'him' or 'his' occur in the above regulations, they will also include 'she' or 'her' or 'hers'.
- Wherever the word 'Subject' occurs in the above regulations, it implies the 'Theory Subject', 'Practical Subject' or 'Lab.' and 'Seminar'.
- In case of any ambiguity or doubt in the interpretations of the above regulations, the decision of the Vice-Chancellor will be final.

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**JNTUH COLLEGE OF ENGINEERING HYDERABAD**  
**M.Tech. (Cyber Forensics & Information Security)-Full Time w.e.f. 2017-18**

**I – SEMESTER**

S.No.	Subject	L	T	P	Credits
1	Fundamentals of Cyber Security	4	0	0	4
2	Mathematical Foundations of Cryptography	4	0	0	4
3	Elective – 1	4	0	0	4
4	Elective – 2	4	0	0	4
5	Elective – 3	4	0	0	4
6	Elective – 4	4	0	0	4
7	Information Security Lab	0	0	4	2
8	Seminar	0	0	4	2
<b>Total Credits</b>					<b>28</b>

**II – SEMESTER**

S.No.	Subject	L	T	P	Credits
1	Cyber Crime Investigation & Digital Forensics	4	0	0	4
2	Network Security	4	0	0	4
3	Elective – 5	4	0	0	4
4	Elective – 6	4	0	0	4
5	Elective – 7	4	0	0	4
6	Elective – 8	4	0	0	4
7	Digital Forensics Lab	0	0	4	2
8	Soft Skills Lab	0	0	4	2
<b>Total Credits</b>					<b>28</b>

**III – SEMESTER**

S.No.	Subject	L	T	P	Credits
1	Comprehensive Viva Voce				4
2	Project Phase -I				12
<b>Total Credits</b>					<b>16</b>

**IV – SEMESTER**

S.No.	Subject	L	T	P	Credits
1.	Project Phase-II & Dissertation				18
<b>Total credits</b>					<b>18</b>



**JNTUH COLLEGE OF ENGINEERING HYDERABAD**  
**M.Tech. (Cyber Forensics & Information Security)-Full Time w.e.f. 2017-18**

**Elective - I**

1. Algorithms and Computational Complexity
2. Android Application Development
3. Scripting Languages

**Elective – II**

1. IoT Security
2. Malware Analysis
3. Information Systems Control and Audit

**Elective – III**

1. Information Theory & Coding
2. Data Mining
3. Mobile Application Security

**Elective – IV**

1. R Programming
2. Deep Learning
3. Social Media Security

**Elective – V**

1. Software Security Engineering
2. Ethical Hacking
3. Incident Response and Forensics

**Elective - VI**

1. Computer Security Audit and Assurance
2. Cyber laws and Security policies
3. Digital Watermarking and Steganography

**Elective – VII**

1. Intellectual Property Rights
2. Cloud Computing Security
3. IT Security Metrics

**Elective – VIII**

1. Quantum Cryptography
2. Big Data Analytics
3. Biometrics

## JNTUH COLLEGE OF ENGINEERING HYDERABAD

**M.Tech. I Year I-Sem (Cyber Forensics & Information Security)**

**L T P C**  
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### FUNDAMENTALS OF CYBER SECURITY

**Objective:**

This course is aimed to generate interest and awareness in cyber security field, which is important in the world of information security due to the wide variety of computer crimes that take place in cyber space. The course deals with various types of attacks framed by an attacker, and the security which need to be implemented at various levels along with latest trends in cyber security.

**UNIT-I:**

Cyber Security Basics – Sphere, Terminology, Vulnerability in the Cyber Structure and Infrastructure, Cyber threats and Weaponry, Cyber Defense, Cyber Attack Detection and Prevention, Information Security Testing, Cyber Security Investigation/assessment, Cyber-Deterrence.

**UNIT-II:**

Cyber Crimes and Cyber Laws – Introduction, IT laws & Cyber Crimes – Internet, Hacking, Password Cracking, Viruses, Virus Attacks, Pornography, Software Privacy, Intellectual Property, Legal System of Information Technology, Social Engineering, Phishing, Denial of Service attack, Malicious Code, Mail Bombs, Worms, Logic Bombs, Botnet, Trojan, Bug Exploits.

**UNIT-III :**

**End point Security:** Desktop and Laptop Security, Cell Phone and PDA Security, Bluetooth Security, Patch and Vulnerability Management, Password Management, Security for Full Virtualization Technologies, Media Sanitization, Security Radio Frequency Identification (RFID) Systems. **Network Security:** Intrusion Detection & Prevention Systems, Firewalls and Firewall Policy, Computer Security Log Management, Enterprise Tele work and Remote Access Security, Securing WiMAX Wireless Communication. **Web Security:** Server Security, Web authentication, SSL and SET, Securing Public Web Servers, Secure Deployment of IPv6, Secure Domain name System (DNS) Deployment, SSL VPNs, Unified Threat Management (UTM).;

**UNIT-IV :**

**Application Security:** Active Content and Mobile Code, E-commerce Security, Email Security (PGP, S/MIME), Web Security, Web Application Security, OWASP; **Data Security:** Data Management, Database Security, Data Encryption, Data Leakage Prevention (DLP), Data Destruction; **Software Security:** Software Flaws, Malware, Software based Attacks; Insecurity in Software: SRE, Software Tamper Resistance, DRM, Software Development.

**Operating System Security:** Security Functions, Software Updates and Patches, OS Integrity Checks, Account management, Antivirus Software, Security in Ordinary Operating Systems, Design of Secure OS, OS hardening, Configuring the OS for security, Security kernels, Secure Virtual machine Systems, Trusted Operating System, NGSCB.

**UNIT-V:**

Recent Trends in Cyber Security – Zero – day Malware, Trojan Wars, New Ways to Monetize Non-Financial Data, Fraud-as-a-service, Out-of-band Methods forcing Cybercriminals to Innovate, The Rise of Hactivism, Attacks in mobile devices, social media

and cloud computing; Insider threats, Increased regulatory security, Cyber-Terrorism, Cyber –War and Cyber-Peace. Topological Vulnerability Analysis, Cyber Situational Awareness, Secure Composition of Systems, Autonomic Recovery, Secure Data Centers, Cloud Computing Security, Privacy in location-Based Applications.

**Text Books:**

1. Cyber Security ,Edward Amoroso,kindle Edition,2007
2. Cyber Security ,Understanding Cyber crimes,Computer Forensics and Legal Persepectives, Sunita Belapure and Nina Godbole, Wiley India Pvt Ltd.2011

**References:**

1. Computer Security ,Dirter Gollmann ,John Wiley & Sons Publication , 2011
2. Cyber Security Essentials ,James Graham, Richard Howrad ,Ryan Olson, CRC Press , 2011

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**MATHEMATICAL FOUNDATIONS OF CRYPTOGRAPHY****Objectives:**

- Build a solid mathematical basis to understand foundations of cryptography
- Formally understand the notions related to security authentication and privacy.
- Provide a rigorous treatment of the emerging and key subject subarea of CSE - security.

**UNIT I**

Basic functions of cryptology - encryption, signature and identification problems.  
Mathematical basics - basics of computational number theory - elliptic curves - pairing functions.

**UNIT II**

Fundamental constructs -distinguishability - pseudo-random number generator - one way functions with trapdoor - some number theoretic candidates - RSA and discrete log variants.

**UNIT III**

security models for encryption schemes - CPA,CCA1,CCA2 security - secure hash functions - random oracle and standard models of proof techniques under various security models. RSA, El Gamal, Rabin, and Cremar-Shoup encryption schemes.

**UNIT IV**

Digital signatures - provably secure signature schemes - signcryption - ID-based and certificateless cryptology.

**UNIT V :**

Identification schemes - zero knowledge protocols - perfect, statistical, and computational zero knowledge - applications to commitment schemes.

**Text Books:**

- Oded Goldreich, Foundations of Cryptography ( two volumes) Cambridge university Press, 2001, 2004. ( Indian print available).

**Reference Book:**

- J.Katz, Y.Lindell, Introduction to Modern Cryptography, Chapman Hall, USA 2007.
- Wen Bo Mao, Modern cryptography - Theory and practice, Prentice Hall, USA, 2003 (Indian edition available).

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<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**ALGORITHMS AND COMPUTATIONAL COMPLEXITY****Elective - I****UNIT I**

Computational Complexity: Polynomial time and its justification, Nontrivial examples of polynomial-time algorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The P versus NP problem and why it's hard

**UNIT II**

Algorithmic paradigms: Dynamic Programming, Greedy, Branch-and-bound, Divide and Conquer

**UNIT III**

Randomized Algorithms: Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization Advanced Algorithms;

**UNIT IV**

Graph Algorithms: Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes.

**UNIT V**

Advanced Data Structures and applications: Decision Trees and Circuits, B-Trees, AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps, Disjoint sets, Union by Rank and Path Compression

**References:**

1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms , Third Edition, McGraw-Hill, 2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms , Cambridge University Press, 1995.
3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones & Bartlett Publishers, 2001.
4. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition, Addison-Wesley Professional, 1998.
5. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008.

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**ANDROID APPLICATION DEVELOPMENT****Elective - I****Prerequisites:**

- ✎ A Course on JAVA
- ✎ A Course on DBMS

**Objectives:**

- ✎ To demonstrate their understanding of the fundamentals of Android operating systems
- ✎ To improve their skills of using Android software development tools
- ✎ 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 understands the working of Android OS Practically.
- ✎ Student will be able to develop Android user interfaces
- ✎ Student will be able to develop, deploy and maintain the Android Applications.

**Unit I:**

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes

Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

**Unit II:**

Android User Interface: Measurements – Device and pixel density independent measuring units Layouts – Linear, Relative, Grid and Table Layouts

User Interface (UI) Components – Editable and non editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

**Unit III**

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

**Unit IV**

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

**Unit V**

Advanced Topics: Alarms – Creating and using alarms

Using Internet Resources – Connecting to internet resource, using download manager

Location Based Services – Finding Current Location and showing location on the Map, updating location

**Text Books:**

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

**References:**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

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**SCRIPTING LANGUAGES**  
**Elective - I**

**Objectives**

The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Bio-data. The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

**UNIT-I**

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

**UNIT -II**

Advanced perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

PHP Basics : PHP Basics- Features, Embedding PHP Code in you'r Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

**UNIT – III**

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

**UNIT -IV**

TCL : TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCLe val, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

**UNIT-V**

Python: Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. Integrated Web Applications in Python — Building Small, Efficient Python Web Systems, Web Application Framework.

**TEXT BOOKS**

- The World of Scripting Languages, David Barron, Wiley Publications.
- Python Web Programming, Steve Holden and David Beazley, New Riders Publications.



- Beginning PHP and MySQL, 3<sup>rd</sup> Edition, Jason Gilmore, Apress Publications (Dream tech.)

#### **REFERENCE BOOKS**

- Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
- Programming Python,M.Lutz,SPD.
- PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
- PHP 5.1,I.Bayross and S.Shah, The X Team, SPD.
- Core Python Programming, Chun, Pearson Education.
- Guide to Programming with Python, M.Dawson, Cengage Learning.
- Perl by Example, E.Quigley, Pearson Education.
- Programming Perl,Larry Wall, T.Christiansen and J.Orwant,O'Reilly, SPD.
- Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
- PHP and MySQL by Example, E.Quigley, Prentice Hall(Pearson).
- Perl Power, J.RFlynt, Cengage Learning.
- PHP Programming solutions, V.Vaswani, TMH.

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**IoT SECURITY  
Elective – II****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 enabled 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 Madiseti, 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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**MALWARE ANALYSIS**  
**Elective – II**

**Unit I**

Introduction to malware, Basic Static and Dynamic Analysis, Overview of Windows file format, PEView.exe, Patching Binaries , Disassembly(objdump, IDA Pro),

**Unit II**

Introduction to IDA, Introduction to Reverse Engineering, Extended Reverse Engineering using GDB and IDA, Advanced Dynamic Analysis - debugging tools and concepts, Malware Behavior - malicious activities and techniques,

**Unit III**

Analyzing Windows programs – WinAPI, Handles, Networking , COM, Data Encoding, Malware Countermeasures , Covert Launching and Execution,

**Unit IV**

Anti Analysis- Anti Disassembly, VM, Debugging -, Packers – packing and unpacking, Intro to Kernel – Kernel basics, Windows Kernel API, Windows Drivers,

**Unit V**

Kernel Debugging - , Rootkit Techniques- Hooking, Patching, Kernel Object Manipulation , Rootkit Anti-forensics , Covert analysis

**Text books / references:**

1. Michael Sikorski and Andrew Honig, “ Practical Malware Analysis”, No Starch Press,2012
2. Jamie Butler and Greg Hoglund, “Rootkits: Subverting the Windows Kernel”, Addison-Wesley, 2005
3. Dang, Gazet, Bachaalany, “Practical Reverse Engineering”,Wiley,2014
4. Reverend Bill Blunden, “The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System” Second Edition, Jones & Bartlett, 2012.

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**INFORMATION SYSTEMS CONTROL AND AUDIT**  
**Elective – II**

**Objectives:**

To understand the foundations of information systems auditing  
 To understand the management, application control framework  
 To understand about the evidence collection and evidence evaluation process

**Unit- I**

Overview of Information System Auditing, Effect of Computers on Internal Controls, Effects of Computers on Auditing, Foundations of information Systems Auditing, Conducting an Information Systems Audit.

The management Control Framework-I: Introduction, Evaluating the planning Function, Evaluating the Leading Function, Evaluating the Controlling Function, Systems Development Management Controls, Approaches to Auditing Systems Development, Normative Models of the Systems Development Process, Evaluating the Major phases in the Systems Development Process, Programming Management Controls, Data Resource Management Controls.

**Unit- II**

The Management Control Framework-II: Security Management Controls, Operations management Controls Quality assurance Management Controls.

The Application Control Framework-I: Boundary Controls, Input Controls, Communication Controls.

**Unit-III**

The Application Control Framework-II: Processing Controls, Database Controls, output Controls.

**Unit- IV**

Evidence Collection: Audit Software, Code Review, Test Data, and Code Comparison, Concurrent Auditing techniques, Interviews, Questionnaires, and Control Flowcharts. Performance Management tools.

**Unit -V**

Evidence Evaluation: Evaluating Asset Safeguarding and Data Integrity, Evaluating System Effectiveness, Evaluating System Efficiency.

**References**

1. Ron Weber, Information Systems Control and Audit, Pearson Education, 2002.
2. M.Revathy Sriram, Systems Audit, TMH, New Delhi, 2001.
3. Jalote : Software Project Mangement in Practice, Pearson Education
4. Royce : Software Project Management, Pearson Education.

**JNTUH COLLEGE OF ENGINEERING HYDERABAD****M.Tech. I Year I-Sem (Cyber Forensics & Information Security)****L T P C**  
**4 0 0 4****INFORMATION THEORY AND CODING**  
**Elective – III****Unit I**

Overview; Basic Concepts - Entropy and Mutual information;

**Unit II**

Lossless Source Coding - Source entropy rate; Kraft inequality; Huffman code; Asymptotic equipartition property; Universal coding; Noisy Channel Coding - Channel capacity;

**Unit III**

Random channel codes; Noisy channel coding theorem for discrete memoryless channels;

**Unit IV**

Typical sequences; Error exponents; Feedback; Continuous and Gaussian channels; Lossy Source Coding - Rate- Distortion functions;

**Unit V**

Random source codes; Joint source-channel coding and the separation theorem. Compression as a Case Study (LZ &amp; MPEG)

**References:**

1. S. Lin and D. J. Costello, Error Control Coding – Fundamentals and Applications, Second Edition, Pearson Education Inc., NJ., USA, 2004
2. S. Lin and D. J. Costello, Error Control Coding, Second Edition, Prentice Hall, 1983.
3. R. Bose, Information Theory, Coding and Cryptography , Tata McGraw-Hill, 2003.
4. E. R. Berlekamp, Algebraic Coding Theory , McGraw-Hill, New York, 1968.
5. R. E. Blahut, Algebraic Codes for Data Transmission , Cambridge University Press Cambridge, UK, 2003.

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**DATA MINING  
Elective – III****Prerequisites**

- ✎ A Course on “Database Management System”
- ✎ Knowledge of probability and statistics

**Objectives:**

- ✎ This course presents the techniques for mining different types of data.
- ✎ It also presents methods for mining data streams, Time Series data.
- ✎ It then describes methods for web mining, distributed data mining, social networks analysis.

**Outcomes:**

- ✎ Ability to extract knowledge from different sources of data such as streams, web, sequences.
- ✎ Discover frequent patterns, sequence patterns.
- ✎ Ability to perform periodicity analysis
- ✎ Ability to generate and use knowledge from web content, web usage data.
- ✎ Apply data mining techniques to social media data to perform social networks analysis.

**Unit I**

Sequential Pattern Mining concepts, primitives, scalable methods; Transactional Patterns and other temporal based frequent patterns, Mining Time series Data,

**Unit II**

Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis;

**Unit III**

Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem;

**Unit IV**

Graph Mining, Mining frequent subgraphs, finding clusters, hub and outliers in large graphs, Graph Partitioning; Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining;

**Unit V**

Distributed Data Mining, Distributed data mining framework, Distributed data source, Distributed data mining techniques, Distributed classifier learning, distributed clustering, distributed association rule mining and Challenges of distributed data mining; Social Network Analysis, characteristics of social Networks.

**Reading:**

1. Jiawei Han and M Kamber , Data Mining Concepts and Techniques, , Second Edition, Elsevier Publication, 2011.
2. Vipin Kumar, Introduction to Data Mining - Pang-Ning Tan, Michael Steinbach, Addison Wesley, 2006.
3. G Dong and J Pei, Sequence Data Mining, Springer, 2007.

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**MOBILE APPLICATION SECURITY**  
**Elective – III**

**UNIT I: Top Mobile Issues and Development Strategies:** Top Issues Facing Mobile Devices, Physical Security , Secure Data Storage (on Disk), Strong Authentication with Poor Keyboards , Multiple-User Support with Security, Safe Browsing Environment , Secure Operating Systems, Application Isolation, Information Disclosure, Virus, Worms, Trojans, Spyware, and Malware , Difficult Patching/Update Process, Strict Use and Enforcement of SSL, Phishing , Cross-Site Request Forgery (CSRF), Location Privacy/Security, Insecure Device Drivers, Multifactor Authentication, Tips for Secure Mobile Application Development .

**UNIT II: WAP and Mobile HTML Security :**WAP and Mobile HTML Basics , Authentication on WAP/Mobile HTML Sites , Encryption , Application Attacks on Mobile HTML Sites ,Cross-Site Scripting , SQL Injection , Cross-Site Request Forgery , HTTP Redirects , Phishing , Session Fixation , Non-SSL Login , WAP and Mobile Browser Weaknesses , Lack of HTTPOnly Flag Support , Lack of SECURE Flag Support , Handling Browser Cache , WAP Limitations.

**UNIT III: Bluetooth Security:** Overview of the Technology , History and Standards , Common Uses , Alternatives , Future , Bluetooth Technical Architecture , Radio Operation and Frequency, Bluetooth Network Topology , Device Identification , Modes of Operation , Bluetooth Stack ,Bluetooth Profiles , Bluetooth Security Features , Pairing , Traditional Security Services in Bluetooth, Security “Non-Features” , Threats to Bluetooth Devices and Networks, Bluetooth Vulnerabilities , Bluetooth Versions Prior to v1.2, Bluetooth Versions Prior to v2.1.

**UNIT IV: SMS Security:** Overview of Short Message Service, Overview of Multimedia Messaging Service, Wireless Application Protocol (WAP), Protocol Attacks , Abusing Legitimate Functionality, Attacking Protocol Implementations, Application Attacks , iPhone Safari , Windows Mobile MMS, Motorola RAZR JPG Overflow, Walkthroughs ,Sending PDUs ,Converting XML to WBXML .

**UNIT V Enterprise Security on the Mobile OS:** Device Security Options , PIN , Remote , 346 Secure Local Storage , Apple iPhone and Keychain , Security Policy Enforcement ,Encryption ,Full Disk Encryption ,E-mail Encryption , File Encryption , Application Sandboxing, Signing, and Permissions , Application Sandboxing , Application Signing , Permissions , Buffer Overflow Protection ,Windows Mobile , iPhone ,Android ,BlackBerry , Security Feature Summary.

**TEXT BOOK:**

1. “Mobile Application Security”, Himanshu Dwivedi, Chris Clark, David Thiel, TATA McGRAW-Hill.

**REFERENCES:**

1. “Mobile and Wireless Network Security and Privacy”, Kami S.Makki,et al, Springer.
2. “Android Security Attacks Defenses”, Abhishek Dubey, CRC Press.

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**R PROGRAMMING**  
**Elective – IV**

**Objectives:**

- Understanding and being able to use basic programming concepts
- Automate data analysis
- Working collaboratively and openly on code
- Knowing how to generate dynamic documents
- Being able to use a continuous test-driven development approach

**UNIT – I**

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

**UNIT –II**

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes

**VECTORS**

Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices ,Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

**UNIT –III**

LISTS, Creating Lists , General List Operations, List Indexing Adding and Deleting List Elements ,Getting the Size of a List , Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames ,Other Matrix-Like Operations

**UNIT—IV**

FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Subtable, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

**UNIT—V****OBJECT-ORIENTED PROGRAMMING**

S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

**TEXT BOOKS:**

1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage India



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**DEEP LEARNING  
Elective - IV****Prerequisites: Machine Learning****Unit I**

Introduction: Feedforward Neural networks. Gradient descent and the backpropagation algorithm. Unit saturation, aka the vanishing gradient problem, and ways to mitigate it. ReLU Heuristics for avoiding bad local minima. Heuristics for faster training. Nestors accelerated gradient descent. Regularization. Dropout.

**Unit II**

Convolutional Neural Networks Architectures, convolution / pooling layers Recurrent Neural Networks LSTM, GRU, Encoder Decoder architectures.

**Unit III**

Deep Unsupervised Learning Autoencoders (standard, sparse, denoising, contractive, etc), Variational Autoencoders, Adversarial Generative Networks, Autoencoder and DBM Attention and memory models, Dynamic memory networks Applications of Deep Learning to Computer Vision Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, video to text with LSTM models. Attention models for computer vision tasks.

**Unit IV**

Applications of Deep Learning to NLP: Introduction to NLP and Vector Space Model of Semantics Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of Words model (CBOW), Glove, Evaluations and Applications in word similarity, analogy reasoning Named Entity Recognition.

**Unit V**

Opinion Mining using Recurrent Neural Networks Parsing and Sentiment Analysis using Recursive Neural Networks Sentence Classification using Convolutional Neural Networks Dialogue Generation with LSTMs Applications of Dynamic Memory Networks in NLP Recent Research in NLP using Deep Learning: Factoid Question Answering, similar question detection, Dialogue topic tracking, Neural Summarization, Smart Reply.

**Reference Books and Papers:**

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation. (2015).
2. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1 (2009): 1127.
3. Hochreiter, Sepp, and Jergen Schmidhuber. "Long short-term memory." Neural computation 9.8 (1997): 1735-1780.
4. Oquab, Maxime, et al. "Learning and transferring midlevel image representations using convolutional neural networks." Proceedings of the IEEE conference on computer vision and pattern recognition. 2014.

5. Bengio, Yoshua, et al. "A neural probabilistic language model." *Journal of machine learning research* 3.Feb (2003). Collobert,
6. Ronan, et al. "Natural language processing (almost) from scratch." *Journal of Machine Learning Research* 12.Aug (2011): 2493-2537.
7. Mikolov, Tomas, et al. "Efficient estimation of word representations in vector space." *arXiv preprint arXiv:1301.3781* (2013).
8. Pennington, Jeffrey, Richard Socher, and Christopher D. Manning. "Glove: Global Vectors for Word Representation." *EMNLP*. Vol. 14. 2014.
9. Kim, Yoon. "Convolutional neural networks for sentence classification." *EMNLP* (2014). Oquab, Maxime, et al. "Learning and transferring mid-level image representations using convolutional neural networks." *Proceedings of the IEEE conference on computer vision and pattern recognition*. 2014.
10. Kumar, Ankit, et al. "Ask me anything: Dynamic memory networks for natural language processing." *arXiv preprint arXiv:1506.07285* (2015).
11. Sutskever, Ilya, Oriol Vinyals, and Quoc V. Le. "Sequence to sequence learning with neural networks." *Advances in neural information processing systems*. 2014.
12. Kalchbrenner, Nal, Edward Grefenstette, and Phil Blunsom. "A convolutional neural network for modelling sentences." *ACL* (2014).
13. Socher, Richard, et al. "Recursive deep models for semantic compositionality over a sentiment treebank." *Proceedings of the conference on empirical methods in natural language processing (EMNLP)*. Vol. 1631. 2013.
14. Socher, Richard, et al. "Parsing with Compositional Vector Grammars." *ACL*. 2013. Abadi, Martin, et al. "Tensorflow: Large-scale machine learning on heterogeneous distributed systems." *arXiv preprint arXiv:1603.04467* (2016).

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**SOCIAL MEDIA SECURITY  
Elective - IV****Unit I :**

Introduction to Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs;

**Unit II:**

Collecting data from Online Social Media, Trust, credibility

**Unit III**

Reputations in social systems, Online social Media and Policing,

**Unit IV**

Information privacy disclosure, revelation and its effects in OSM and online social networks;

**Unit V**

Phishing in OSM & Identifying fraudulent entities in online social networks

**References:**

“To be adopted by the course instructor”

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**0 0 4 2****INFORMATION SECURITY LAB**

Experiments are to be performed using the following list of Equipments/ Applications/ Devices.

<b>S.No.</b>	<b>IoT Device</b>
1	Digital Storage Oscilloscope: 100MHz bandwidth: 2GS/s sample rate: 2 channel: 2.5K record length: 5 year warranty. Certificate of Calibration Standard, Commercial series.
2	USB real time signal analyzer
3	Vector Signal Analysis Software
4	WLAN 802.11a/b/g/j/p measurement application
5	FLUKE - 17B+ Multimeter
6	WSD 81i SOLDERING STATION 230V IND
7	USB MICROSCOPE `WITH STAND
8	Board Type Breadboard / Solderless Board Material POM Plastic Steel Hole Diameter 0.8mm External Height 210mm External Width 240mm
9	MICROCHIP DV102411 MRF24WB0MA, WI FI, DEMO BOARD
10	MICROCHIP DV102412 WIFI G / 802.11, DEVELOPMENT BOARD
11	WiFi Module - ESP8266 - PCB Antenna
12	GSM Modem - RS232 - SIM900A
13	40x1 Socket Strip , Machine Round pins
14	40x1 header strip, machine round pins.
15	MULTICOMP MCBBJ65 Kit contents:65 pcs of 22AWG Jumper wire
16	WISHER WJW60B JUMPER WIRE KIT
17	Intel galileo gen 2 Development board
18	Arduino IoT starter kit
19	Raspberry pi 3 (WiFi , BLE, and 64Bit)

20	KEIL MCBSTM32F400 STM32F407IG, CORTEX M4, EVAL BOARD
21	STM32VLDISCOVERY
22	ARM7 LPC2148 Development board
23	STM32F0DISCOVERY
24	NU-LB-NUC140-ND
25	PIC based dev boards(16,24,32 bit)
26	Gas sensor
27	THERMOCOUPLE KIT(temperature)
28	Temperature sensor module- NTC
29	Flexible flexi force pressure sensor 1lb
30	Vibration detecting module
31	Microwave doppler radar sensor for motion and speed sensing
32	Heartbeat sensor- digital pulse out
33	Heartbeat pulse sensor- analog out
34	Blood pressure sensor- analog out
35	gyro+Accelerator sensor, 3 Axis based on MPU-6050
36	RC brushless motor 2212 1000KV with propeller adaptor
37	NEMA34 stepper motor 45 kgcm torque with RMCS-1101 drive
38	Stepper motors MINI STEPPING MOTOR BOARD
39	High torque encoder DC servo motor 60RPM with UART/I2C/PPM drive and power supply
40	OLIMEX ARM-USB-OCD-H debugger, ARM JTAG, OPEN SOURCE
41	Debug adapter for ARM/Cortex
42	Step down DC-DC Adjustable voltage regulator 3A output
43	Triple channel DC power supply
44	Resistor kit contents 100-pcs of each 85 values 10 ohm to 1Mohm carbon film axial leaded resistors

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**CYBER CRIME INVESTIGATION & DIGITAL FORENSICS****Unit I**

Framework for Digital Forensic Evidence Collection and Processing, Fundamentals of Host Forensics for Microsoft Windows - Kernel and Device driver architecture, registry, auditing and security architecture

**Unit II**

File system handling - Reconstruction of files and directory structures on the FAT and NTFS Fundamentals of Host Forensics for UNIX derivatives - Linux operating system, Kernel and Device drives architecture

**Unit III**

Security and audit mechanisms, file system and pseudo file systems, the reconstruction of file and directory structures using UFS and Ext2/3fs as exemplars.

**Unit IV**

Forensic Analysis of Database Systems, Database Tampering, Forensic analysis of Database Components, table storage, transaction log, indexes, Forensic recovery for table storage. Network Forensics, investigating logs, network traffic and web attacks, Mobile Device and Wireless Forensics, Anti-Forensics

**Unit V**

Steganography and Image file Forensics, Email investigation, Investigating Copiers, IVR, Video Surveillance, RFID and Vehicular tracking (GPS) devices, Case studies and Tools.

**Text books/references:**

1. E. P. Dorothy, Real Digital Forensics for Handheld Devices , Auerback Publications, 2013.
2. J. Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, Syngress Publishing, 2012.
3. E. Casey, Handbook of Digital Forensics and Investigation, Academic Press, 2010
4. C. H. Malin, E. Casey and J. M. Aquilina, Malware Forensics Field Guide for Windows Systems: Digital Forensics Field Guides, Syngress, 2012
5. J. Wiles and A.Reyes, The Best Damn Cybercrime and Digital Forensics Book Period, Syngress, 2007.

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**4 0 0 4****NETWORK SECURITY****Unit I**

Review and Fundamentals: Overview of networking security; Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms; Security Attacks (Interruption, Interception, Modification and Fabrication)

**Unit II**

Principle of least privilege, access control, and operating systems security Authentication overview; Authentication protocols, Authentication and key establishment, key exchange, mediated key exchange, User Authentication, password-based authentication, password security, Certificate Authority and key management, digital signatures, digital Certificates.

**Unit III**

Conventional encryption Principles, algorithms and tools Basics of cryptography: cryptographic hash functions, symmetric and public-key encryption, public key cryptography principles & algorithms, cipher block modes of operation, Secure Hash Functions and HMAC.

**Unit IV**

Security Attacks Buffer overflow attacks & format string vulnerabilities, Denial-of-Service Attacks Hijacking attacks: exploits and defenses Internet worms, viruses, spyware, phishing, botnets, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**Unit V**

IP Security Overview & Architecture, Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters Email privacy: Pretty Good Privacy (PGP) and S/MIME. Network security protocols in practice. Introduction to Wireshark. SSL, IPsec, and IKE. DNS security Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**References:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, Wiley Dreamtech
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. A look back at Security Problems in the TCP/IP Protocol Suite, S. Bellovin, ACSAC 2004.

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**SOFTWARE SECURITY ENGINEERING**  
**Elective – V**

**UNIT – I**

**Security a software Issue:** introduction, the problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of Detecting Software Security

**What Makes Software Secure:** Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties?

**UNIT – II**

**Requirements Engineering for secure software:** Introduction, the SQUARE process Model, Requirements elicitation and prioritization.

**UNIT – III**

**Secure Software Architecture and Design:** Introduction, software security practices for architecture and design: architectural risk analysis, software security knowledge for architecture and design: security principles, security guidelines and attack patterns

**Secure coding and Testing:** Code analysis, Software Security testing, Security testing considerations throughout the SDLC.

**UNIT – IV**

**Security and Complexity:** System Assembly Challenges: introduction, security failures, functional and attacker perspectives for security analysis, system complexity drivers and security.

**UNIT – V**

**Governance and Managing for More Secure Software:** Governance and security, Adopting an enterprise software security framework, How much security is enough?, Security and project management, Maturity of Practice.

**TEXT BOOK:**

1. Software Security Engineering: Julia H. Allen, Pearson Education

**REFERENCE BOOKS:**

1. Developing Secure Software: Jason Grembi, Cengage Learning
2. Software Security : Richard Sinn, Cengage Learning



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**ETHICAL HACKING**  
**Elective – V**

**UNIT I**

Introduction: Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

**UNIT II**

The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, Timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement

**UNIT III**

Preparing for a Hack: Technical Preparation, Managing the Engagement Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance

**UNIT IV**

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits, applications, Wardialing, Network, Services and Areas of Concern

**UNIT V**

Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion  
Draft copy w.e.f. academic year 2015-16

**TEXT BOOK**

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press

**REFERENCE BOOKS**

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning.

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**INCIDENT RESPONSE AND FORENSICS**  
**Elective – V**

**Objectives:**

- To know the real world incidents
- To make a pre incident preparation
- To understand about incident detection and characterization

**UNIT I:**

**Real-World Incidents:** What Constitutes an Incident? What Is Incident Response? Where We Are Now, Why Should You Care About Incident Response? Concept of the Attack Lifecycle, IR Management Handbook: What Is a Computer Security Incident? What Are the Goals of Incident Response? Who Is Involved in the IR Process? The Incident Response Process: Initial Response, Investigation, Remediation, Tracking of Significant Investigative Information, Reporting.

**UNIT II:**

**Pre-Incident Preparation:** Preparing the Organization for Incident Response, Identifying Risk, Policies That Promote a Successful IR, Working with Outsourced IT, Thoughts on Global Infrastructure Issues, Educating Users on Host-Based Security, Preparing the IR Team, Preparing the Infrastructure for Incident Response, Computing Device Configuration, Network Configuration.

**UNIT III:**

**Incident Detection and Characterization:** Collecting Initial Facts, Checklists, Maintenance of Case Notes, Building an Attack Timeline, Understanding Investigative Priorities, What Are Elements of Proof?, Setting Expectations with Management, Initial Development of Leads, Defining Leads of Value, Acting on Leads, Turning Leads into Indicators, The Lifecycle of Indicator Generation, Resolving Internal Leads, Resolving External Leads.

**UNIT IV:**

**Data Collection:** Live Data Collection, When to Perform a Live Response, Selecting a Live Response Tool, What to Collect, Live Data Collection on Microsoft Windows Systems, Prebuilt Toolkits, Do It Yourself, Memory Collection, Live Data Collection on Unix-Based Systems, Live Response Toolkits, Memory Collection.

**UNIT V:**

**Forensic Duplication:** Forensic Image Formats, Complete Disk Image, Partition Image, Logical Image, Image Integrity, Traditional Duplication, Hardware Write Blockers, Image Creation Tools, Live System Duplication, Duplication of Enterprise Assets, Duplication of Virtual Machines.

**TEXT BOOK:**

1. "Incident Response and Computer Forensics", Kevin Mandia, Mathew Pepe, Jason Luttgens, 3rd Edition, McGraw-Hill Osborne Media, 2014.

**REFERENCES:**

1. "Handbook Computer Crime Investigation's Forensic Tools and Technology", Eoghan Casey, Academic Press.
2. "A Step-by-Step Guide to Computer Attacks and Effective Defenses", Skoudis. E., Perlman. R. Counter Hack, Prentice Hall Professional Technical Reference.
3. "Disk Detective: Secret You Must Know to Recover Information From a Computer", Norbert Zaenglein, Paladin Press.
4. "Guide to computer forensics and investigations", Bill Nelson, Amelia Philips and Christopher Steuart, Cengage Learning.

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**4 0 0 4****COMPUTER SECURITY AUDIT AND ASSURANCE**  
**Elective – VI****Unit I**

Security Policy frameworks: practices, and procedures, business practice disclosures,

**Unit II**

Policy authority and practices, information security practices, personal and physical security practices,

**Unit III**

Operation management practices, PKIs and key management schemes,

**Unit IV**

Key generation, key storage, backup, recovery and distribution,

**Unit V**

XML frameworks for security policy specification, certificate management life cycle.

**References:**

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw-Hill Education, 01-Jan2005
2. Auditing IT Infrastructures for Compliance; Martin Weiss, Michael G. Solomon; Jones & Bartlett Publishers, 10Jul-2015

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**CYBER LAWS AND SECURITY POLICIES****Elective - VI****UNIT-I**

Introduction to Computer Security: Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

**UNIT-II**

Secure System Planning and administration, Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

**UNIT-III**

Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies – process management-planning and preparation-developing policies-asset classification policy-developing standards.

**UNIT-IV**

Information security: fundamentals-Employee responsibilities- information classification - Information handling- Tools of information security- Information processing-secure program administration.

**UNIT-V**

Organizational and Human Security: Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

**REFERENCES**

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media, 2006.
2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2<sup>nd</sup> Edition, Prentice Hall, 1996
5. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997
6. James Graham, " Cyber Security Essentials" Averbach Publication T & F Group.

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**4 0 0 4****DIGITAL WATERMARKING AND STEGANOGRAPHY**  
**Elective - VI****Objectives:**

- To learn about the watermarking models and message coding
- To learn about watermark security and authentication.
- To learn about steganography. Perceptual models

**UNIT I**

**INTRODUCTION:** Information Hiding, Steganography and Watermarking – History of watermarking – Importance of digital watermarking – Applications – Properties – Evaluating watermarking systems.

**WATERMARKING MODELS & MESSAGE CODING:** Notation – Communications – Communication based models – Geometric models – Mapping messages into message vectors – Error correction coding – Detecting multi-symbol watermarks.

**UNIT II**

**WATERMARKING WITH SIDE INFORMATION & ANALYZING ERRORS:** Informed Embedding – Informed Coding – Structured dirty-paper codes - Message errors – False positive errors – False negative errors – ROC curves – Effect of whitening on error rates.

**UNIT III**

**PERCEPTUAL MODELS:** Evaluating perceptual impact – General form of a perceptual model – Examples of perceptual models – Robust watermarking approaches - Redundant Embedding, Spread Spectrum Coding, Embedding in Perceptually significant coefficients

**UNIT IV**

**WATERMARK SECURITY & AUTHENTICATION:** Security requirements – Watermark security and cryptography – Attacks – Exact authentication – Selective authentication – Localization – Restoration.

**UNIT V**

**STEGANOGRAPHY:** Steganography communication – Notation and terminology – Information-theoretic foundations of steganography – Practical steganographic methods – Minimizing the embedding impact – Steganalysis

**REFERENCES:**

1. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, "Digital Watermarking and Steganography", Morgan Kaufmann Publishers, New York, 2008.
2. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, "Digital Watermarking", Morgan Kaufmann Publishers, New York, 2003.
3. Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, "Techniques and Applications of Digital Watermarking and Content Protection", Artech House, London, 2003.
4. Juergen Seits, "Digital Watermarking for Digital Media", IDEA Group Publisher, New York, 2005.
5. Peter Wayner, "Disappearing Cryptography – Information Hiding: Steganography & Watermarking", Morgan Kaufmann Publishers, New York, 2002.

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**INTELLECTUAL PROPERTY RIGHTS**  
**Elective – VII**

**UNIT - I:**

**Introduction to Intellectual property:** Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT - II:**

**Trade Marks:** Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT - III:**

**Law of copy rights:** Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

**Law of patents:** Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT - IV:**

**Trade Secrets:** Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

**Unfair competiitiion:** Misappropriation right of publicity, False advertising.

**UNIT - V:**

**New development of intellectual property:** new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

**TEXT BOOKS & REFERENCES:**

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

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**CLOUD COMPUTING SECURITY**  
**Elective – VII**

**Unit I**

Introduction to cloud – Basic Concepts and Terminology – Concepts and Models of cloud computing – Cloud delivery and deployment models.

**Unit II**

Cloud enablers and security – Internet, Broadband, Data centre and virtualization technologies,

**Unit III**

Web and Multitenant services – Cloud security,

**Unit IV**

Agent threats: Cloud infrastructure mechanisms, Specialized cloud mechanisms,

**Unit V**

Cloud Management and Cloud Security. AWS, Azure and Google case study

**References:**

1. T. Mather, S. Kumaraswamy, S. Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'Reilly Series, 2009.
2. T. Erl, R. Puttini, Z. Mahmood, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.
3. The Google file system. In Proceedings of the nineteenth ACM symposium on Operating systems principles (SOSP '03). ACM, New York, NY, USA, 29-43.
4. MapReduce: simplified data processing on large clusters. Commun. ACM 51, 1, 107-113, 2008.
5. Controlling data in the cloud: outsourcing computation without outsourcing control. In Proceedings of the 2009 ACM workshop on Cloud computing security (CCSW '09). ACM, New York, NY, USA, 85-90, 2009.



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**IT SECURITY METRICS**  
**Elective – VII**

**UNIT-I:**

**What Is a Security Metric?** Metric and Measurement, Security Metrics Today, The Dissatisfying State of Security Metrics, Reassessing Our Ideas About Security Metrics.

**Designing Effective Security Metrics:**

Choosing Good Metrics, GQM for Better Security Metrics, More Security Uses for GQM, Summary.

**UNIT-II:**

**Understanding Data:** What are Data? Data Sources for Security Metrics; We Have Metrics and Data - Now what, Summary, Case Study 1. **The Security Process Management Framework:** Managing Security as a Business Process, the SPM Framework, Before You Begin SPM, Summary. **The Analyzing Security Metrics Data:** The Most Important Step, Analysis Tools and Techniques, Summary. **Designing the Security Measurement Project:** Before the Project Begins, Phase One: Build a Project Plan and Assemble the Team, Phase two: Gather the Metrics Data, phase Three: Analyze the Metrics Data and Build Conclusions, phase Four: Present Results, Phase Five: Reuse the Results, Project Management Tools, Summary.

**UNIT-III:**

Measurements **Security Operations:** Sample Metrics for Security Operations, Sample Measurement Project for Security Operations, Summary. **Measuring Compliance and Conformance:** The Challenges of Measuring Compliance, Sample Measurement Projects for Compliance and Conformance, Summary.

**UNIT-IV:**

**Measuring Security Cost and Value:** Sample Measurement Projects for Compliance and Conformance, The Importance of Data to Measuring Cost and Value, Summary. **Measuring People, Organizations, and Culture:** Sample Measurement Projects for People, Organizations, and Culture, Summary.

**UNIT-V:**

**The Security Improvement Program:** Moving from Projects to Programs, Managing Security Measurement with a Security, Requirements for a SIP, Measuring the SIP. Summary. **Learning Security: Different Contexts for Security Process Management:** Organizational Learning, Three Learning Styles for IT Security Metrics, Final Thoughts, Summary.

**Text Books:**

1. IT SECURITY METRICS, Lance Hayden, TATA McGraw-HILL.
2. SECURITY METRICS, CAROLINE WONG, TATA McGraw-HILL.

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**4 0 0 4****QUANTUM CRYPTOGRAPHY**  
**Elective – VIII****UNIT – I**

Quantum computing models, quantum algorithms, quantum tree search, quantum wavelets, quantum information theory,

**UNIT – II**

Quantum cryptography, breaking RSA system, quantum teleportation, circuit design, quantum error correction

**UNIT – III**

Finite Dimensional Hilbert Spaces – Tensor Products and Operators on Hilbert Space – Hermitian and Trace Operators - Basic Quantum Mechanics necessary for the course.

**UNIT – IV**

Quantum Gates and operators and Measurement: Quantum Computational Model – Quantum Complexity – Schemes for Physical realization (Only peripheral treatment expected)

**UNIT – V**

Shor's Algorithm – Application to Integer Factorization – Grover's Algorithm – Quantum Cryptography: Encryption and decryption schemes

**References:**

1. Applied Quantum Cryptography, Christian Kollmitzer, Mario Pivk, Springer Science & Business Media, 28-Feb2010
2. Quantum Cryptography and Secret-Key Distillation, Gilles van Assche, Cambridge University Press, 29-Jun-2006

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**BIG DATA ANALYTICS**  
**Elective – VIII**

**Unit I**

Big Data Analytics : What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing for Big Data; Big Data Analytics:What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools;

**Unit- II**

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics; Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

**Unit III**

Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFS Files, File system types, commands, org.apache.hadoop.io package, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS;

**Unit IV**

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFS (Hadoop Distributed File System), HDFS Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

**Unit V**

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets; Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools;

**TEXT BOOKS**

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™, DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e, BY Albright |Winston

**REFERENCE BOOKS:**

1. Rajiv Sabherwal, Irma Becerra- Fernandez,” Business Intelligence –Practice, Technologies and Management”, John Wiley 2011.
2. Lariss T. Moss,ShakuAtre, “ Business Intelligence Roadmap”, Addison-Wesley It Service.
3. Yuli Vasiliev, “ Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting”, SPD Shroff, 2012.

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**BIOMETRICS  
Elective – VIII****UNIT – I**

Introduction to Biometrics, Biometrics technology evolution, Biometric system, Biometric Functionalities; Verification and Identification, Biometric characteristics, Different Biometric traits; physiological and behavioral, Comparison of various biometrics, Biometric deformations, Biometric system errors; false match rate, false non-match rate, failure to capture and failure to enroll.

**UNIT – II**

Unibiometric, Multibiometric, Unimodal and Multimodal biometrics, Fusion of different biometrics, Sources of biometric information for fusion, Levels of fusion; Sensor level fusion, Feature level fusion, Match score level fusion and Decision level fusion, score normalization, Fusion methodologies, Issues in designing a multibiometric system, Advantages and disadvantages of multibiometrics.

**Unit – III**

Biometrics Security; Biometric system challenges, Attacks on biometric system, Biometric cryptography, Biometric steganography, Liveness detection in biometrics, Cancelable biometrics, Watermarking techniques; basic framework of watermarking, application of watermarking, attacks on watermarking, general watermarking process, watermarking algorithms.

**Unit – IV**

Biometric sensors; Biometric sensor interoperability, Soft biometrics, Incorporating Ancillary information in biometric systems,

**Unit - V**

Biometric scope and future; biometrics and IT infrastructure, smart card technology and biometrics, DNA biometrics, Biometric standards, API of AADHAAR Schemes. Applications of biometrics; Government sector, Commercial sector and Forensic sector, SFINGE tool.

**Text Books:**

1. Davide Maltoni, Dario Maio, Anil K. Jain, & Salil Prabhakar, "Handbook of Fingerprint Recognition", Springer India.
2. G.R. Sinha and Sandeep B. Patil, "Biometric: Concepts and Applications", Wiley India Pvt. Ltd.
3. Arun A. Ross, K. Nandakumar, and Anil K. Jain, "Handbook of Multibiometrics, (International Series on Biometrics)", Springer India.

**Reference Books:**

1. Anil K.Jain, Patrick Flynn, Arun A. Ross, "Handbook of Biometrics", Springer India.
2. John Chirillo and, Scott Blaul, "Implementing Biometric Security", Wiley India Pvt. Ltd.
3. Julian Ashbourn, "Practical Biometrics: From Aspiration to Implementation", Springer Professional Computing.

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**DIGITAL FORENSICS LAB**

1. Experiment on security of IoT using RaspberryPi Kit (e.g. ref: <http://digitalcommons.kennesaw.edu/cgi/viewcontent.cgi?article=1014&context=ccer> p)
  - a. Experiment on security of IoT using Arduino Kit
  - b. Experiment on security of IoT using Discovery Kit
  - c. Experiment on security of IoT using Intel Galileo Kit
  - d. Experiment on security of IoT using Keil Kit
2. Study/Experiment on security of Consumer/Educational IoT (e.g. ref: <https://www.samlabs.com/app>)
  - a. Hardware
  - b. Software
  - c. Applications
  - d. Cloud
3. Study/Experiment on security of Industrial IoT (e.g. ref: <http://www.eigen.in/pdf/sensenutsuniversity.pdf>)
4. Study/Experiment on security of IoT Lock (e.g. ref: [https://tapplock.com/?utm\\_expid=.ALnxhORwQBifvx3mq\\_nDA.0&utm\\_referrer=https%3A%2F%2Fwww.google.com%2F](https://tapplock.com/?utm_expid=.ALnxhORwQBifvx3mq_nDA.0&utm_referrer=https%3A%2F%2Fwww.google.com%2F))
  - a. Fingerprint
  - b. Bluetooth
  - c. Cloud
5. Study/Experiment on security of IoT Switch (e.g. ref: <https://www.geekbuying.com/item/Vstarcam-WF831-Smart-WiFi-Power-Socket-with-US-Plug>)
6. Identify list of security challenges in IoT (e.g. ref: <http://resources.infosecinstitute.com/security-challenges-in-the-internet-of-things-iot/>)
7. Lab Study/Conduct pentest on IoT devices (e.g. ref: [https://security.electronicsforu.com/wp-content/uploads/2017/06/RISC\\_IoT\\_101.pdf](https://security.electronicsforu.com/wp-content/uploads/2017/06/RISC_IoT_101.pdf))
8. Experiment on security of IoT BT Earbuds/Beacon (e.g. ref: <https://www.amazon.in/Padraig-Bluetooth-Headphone-Compatible-Smartphones> or <https://www.amazon.in/Zoook-Wireless-Bluetooth-Improved-Smallest>)
9. Cyber Vulnerability Assessment and reporting the major threats and their controls.
10. Experiments on Penetration Testing at various levels Hardware, OS, Network and Application.
11. Experiments on Mobile and Web Security and Endpoint Security.
12. Experiments on Ethical Hacking and Forensics.
13. Experiments on IoT Attacks
  - a. Wireless Reconnaissance and Mapping
  - b. Security Protocol Attacks
  - c. Physical Security Attacks
  - d. Application Security Attacks

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### SOFT SKILLS LAB (Activity-based)

#### Course Objectives

- ✎ 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

#### Learning Outcomes

- ☞ Developed critical acumen and creative ability besides making them industry- ready.
- ☞ Appropriate use of English language while clearly articulating ideas.
- ☞ Developing insights into Language and enrich the professional competence of the students.
- ☞ Enable students to meet challenges in job and career advancement.

#### 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](http://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 Gopaldaswamy 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. *Dixon, 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