ACADEMIC REGULATIONS
COURSE STRUCTURE AND
DETAILED SYLLABUS

COMPUTER SCIENCE & ENGINEERING

For

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

JNTUH 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 I 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 (EtC).
- Core Courses (CoC) and Elective Courses (EtC) 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 …

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

| Total Credits for PGP | 90 |
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 ± 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 ≥ 5.0 (in each Semester) and final CGPA (i.e., CGPA at the end of PGP) ≥ 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 subsequent 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:

<table>
<thead>
<tr>
<th>% of Marks Secured (Class Intervals)</th>
<th>Letter Grade (UGC Guidelines)</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% and above (≥ 80%, ≤ 100%)</td>
<td>O (Outstanding)</td>
<td>10</td>
</tr>
<tr>
<td>Below 80% but not less than 70% (≥ 70%, &lt; 80%)</td>
<td>A+ (Excellent)</td>
<td>9</td>
</tr>
<tr>
<td>Below 70% but not less than 60% (≥ 60%, &lt; 70%)</td>
<td>A (Very Good)</td>
<td>8</td>
</tr>
<tr>
<td>Below 60% but not less than 55% (≥ 55%, &lt; 60%)</td>
<td>A* (Good)</td>
<td>7</td>
</tr>
<tr>
<td>Below 55% but not less than 50% (≥ 50%, &lt; 55%)</td>
<td>B (above Average)</td>
<td>6</td>
</tr>
<tr>
<td>Below 50% (≤ 50%)</td>
<td>F (FAIL)</td>
<td>0</td>
</tr>
<tr>
<td>Absent</td>
<td>Ab</td>
<td></td>
</tr>
</tbody>
</table>

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 (ΣCP) secured from ALL Subjects/Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

\[ \text{SGPA} = \frac{\sum_{i=1}^{N} C_i S_i}{\sum_{i=1}^{N} C_i} \] .... 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 \( i^{th} \) Subject, and \( S_i \) represents the Grade Points (GP) corresponding to the Letter Grade awarded for that \( i^{th} \) 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

\[ \text{CGPA} = \frac{\sum_{i=1}^{M} C_i S_i}{\sum_{i=1}^{M} C_i} \] ... 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 1st Semester onwards upto and inclusive of the Semester S (obviously \( M > N \)), \( S \) 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 \( j^{th} \) Subject, and \( S_j \) represents the Grade Points (GP) corresponding to the Letter Grade awarded for that \( j^{th} \) 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 he 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:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>$\geq 7.75$</td>
</tr>
<tr>
<td>First Class</td>
<td>$6.75 \leq \text{CGPA} &lt; 7.75$</td>
</tr>
<tr>
<td>Second Class</td>
<td>$6.0 \leq \text{CGPA} &lt; 6.75$</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Nature of Malpractices</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the candidate:</td>
<td></td>
</tr>
<tr>
<td>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)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>1 (b)</td>
<td>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.</td>
</tr>
<tr>
<td>2</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>Impersonates any other candidate in connection with the examination.</td>
</tr>
<tr>
<td>4</td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners</td>
</tr>
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<tr>
<td>6</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>7</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>8</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>
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 police 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.

*****
### I – SEMESTER

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Subject</th>
<th>L</th>
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<td>1</td>
<td>Fundamentals of Cyber Security</td>
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<td>2</td>
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### II – SEMESTER

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### III – SEMESTER

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### IV – SEMESTER

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</thead>
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<tr>
<td>1</td>
<td>Project Phase-II &amp; Dissertation</td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td><strong>Total credits</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>
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)  

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:

UNIT-II:

UNIT-III:

UNIT-IV:

UNIT-V:

**Text Books:**
2. Cyber Security ,Understanding Cyber crimes,Computer Forensics and Legal Persepectives, Sunita Belapure and Nina Godbole, Wiley India Pvt Ltd.2011

**References:**
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:

Reference Book:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year I-Sem (Cyber Forensics & Information Security)  L  T  P  C
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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

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:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

ANDROİD 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

References:
1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

L T P C  
4 0 0 4

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 your 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 TCL eval, 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

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” Edition, Jason Gilmore, Apress Publications (Dream tech.)

REFERENCE BOOKS
• Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen 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,l.Bayross and S.Shah, The X Team, SPD.
• Core Python Programming, Chun, Pearson Education.
• Pen 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.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

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<tr>
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IoT SECURITY  
Elective – II

Prerequisites: NIL

Objectives:

ksz To introduce the terminology, technology and its applications  
ksz To introduce the raspberry PI platform, that is widely used in IoT applications  
ksz To introduce the implementation of web based services on IoT devices

Outcomes:

ksz Understand the new computing technologies  
ksz Able to apply the latest computing technologies like cloud computing technology and Big Data  
ksz Ability to introduce the concept of M2M (machine to machine) with necessary protocols  
ksz Get the skill to program using python scripting language which is used in many IoT devices

Unit I


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:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

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 upacking, 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:
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

Unit- II
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

Unit -V

References
3. Jalote : Software Project Management 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
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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 & MPEG)

References:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year I-Sem (Cyber Forensics & Information Security) L T P C
DATA MINING
Elective – III

4 0 0 4

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, Distribute 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:
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
- 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:**
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year I-Sem (Cyber Forensics & Information Security)          L    T    P    C
R PROGRAMMING                                                     4    0    0    4
   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

32
DEEP LEARNING
Elective - IV

Prerequisites: Machine Learning

Unit I

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

Unit III

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 Research in NLP using Deep Learning: Factoid Question Answering, similar question detection, Dialogue topic tracking, Neural Summarization, Smart Reply.

Reference Books and Papers:


JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year I-Sem (Cyber Forensics & Information Security)  L  T  P  C
4    0    0   4

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”
INFORMATION SECURITY LAB

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

<table>
<thead>
<tr>
<th>S.No.</th>
<th>IoT Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>USB real time signal analyzer</td>
</tr>
<tr>
<td>3</td>
<td>Vector Signal Analysis Software</td>
</tr>
<tr>
<td>4</td>
<td>WLAN 802.11a/b/g/j/p measurement application</td>
</tr>
<tr>
<td>5</td>
<td>FLUKE - 17B+ Multimeter</td>
</tr>
<tr>
<td>6</td>
<td>WSD 81i SOLDERING STATION 230V IND</td>
</tr>
<tr>
<td>7</td>
<td>USB MICROSCOPE `WITH STAND</td>
</tr>
<tr>
<td>8</td>
<td>Board Type Breadboard / Solderless Board Material POM Plastic Steel Hole Diameter 0.8mm External Height 210mm External Width 240mm</td>
</tr>
<tr>
<td>9</td>
<td>MICROCHIP DV102411 MRF24WB0MA, WI FI, DEMO BOARD</td>
</tr>
<tr>
<td>10</td>
<td>MICROCHIP DV102412 WIFI G / 802.11, DEVELOPMENT BOARD</td>
</tr>
<tr>
<td>11</td>
<td>WiFi Module - ESP8266 - PCB Antenna</td>
</tr>
<tr>
<td>12</td>
<td>GSM Modem - RS232 - SIM900A</td>
</tr>
<tr>
<td>13</td>
<td>40x1 Socket Strip , Machine Round pins</td>
</tr>
<tr>
<td>14</td>
<td>40x1 header strip, machine round pins.</td>
</tr>
<tr>
<td>15</td>
<td>MULTICOMP MCBBJ65 Kit contents:65 pcs of 22AWG Jumper wire</td>
</tr>
<tr>
<td>16</td>
<td>WISHER WJW60B JUMPER WIRE KIT</td>
</tr>
<tr>
<td>17</td>
<td>Intel galileo gen 2 Development board</td>
</tr>
<tr>
<td>18</td>
<td>Arduino IoT starter kit</td>
</tr>
<tr>
<td>19</td>
<td>Raspberry pi 3 (WiFi , BLE, and 64Bit)</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
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<td>-----</td>
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</tr>
<tr>
<td>20</td>
<td>KEIL MCBSTM32F400 STM32F407IG, CORTEX M4, EVAL BOARD</td>
</tr>
<tr>
<td>21</td>
<td>STM32VLDISCOVERY</td>
</tr>
<tr>
<td>22</td>
<td>ARM7 LPC2148 Development board</td>
</tr>
<tr>
<td>23</td>
<td>STM32F0DISCOVERY</td>
</tr>
<tr>
<td>24</td>
<td>NU-LB-NUC140-ND</td>
</tr>
<tr>
<td>25</td>
<td>PIC based dev boards(16,24,32 bit)</td>
</tr>
<tr>
<td>26</td>
<td>Gas sensor</td>
</tr>
<tr>
<td>27</td>
<td>THERMOCOUPLE KIT(temperature)</td>
</tr>
<tr>
<td>28</td>
<td>Temperature sensor module- NTC</td>
</tr>
<tr>
<td>29</td>
<td>Flexible flexi force pressure sensor 1lb</td>
</tr>
<tr>
<td>30</td>
<td>Vibration detecting module</td>
</tr>
<tr>
<td>31</td>
<td>Microwave doppler radar sensor for motion and speed sensing</td>
</tr>
<tr>
<td>32</td>
<td>Heartbeat sensor- digital pulse out</td>
</tr>
<tr>
<td>33</td>
<td>Heartbeat pulse sensor- analog out</td>
</tr>
<tr>
<td>34</td>
<td>Blood pressure sensor- analog out</td>
</tr>
<tr>
<td>35</td>
<td>gyro+Accelerator sensor, 3 Axis based on MPU-6050</td>
</tr>
<tr>
<td>36</td>
<td>RC brushless motor 2212 1000KV with propeller adaptor</td>
</tr>
<tr>
<td>37</td>
<td>NEMA34 stepper motor 45 kgcm torque with RMCS-1101 drive</td>
</tr>
<tr>
<td>38</td>
<td>Stepper motors MINI STEPPING MOTOR BOARD</td>
</tr>
<tr>
<td>39</td>
<td>High torque encoder DC servo motor 60RPM with UART/I2C/PPM drive and power supply</td>
</tr>
<tr>
<td>40</td>
<td>OLIMEX ARM-USB-OCD-H debugger, ARM JTAG, OPEN SOURCE</td>
</tr>
<tr>
<td>41</td>
<td>Debug adapter for ARM/Cortex</td>
</tr>
<tr>
<td>42</td>
<td>Step down DC-DC Adjustable voltage regulator 3A output</td>
</tr>
<tr>
<td>43</td>
<td>Triple channel DC power supply</td>
</tr>
<tr>
<td>44</td>
<td>Resistor kit contents 100-pcs of each 85 values 10 ohm to 1Mohm carbon film axial leaded resistors</td>
</tr>
</tbody>
</table>
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

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<thead>
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<td>4</td>
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</tbody>
</table>

 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:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year II-Sem (Cyber Forensics & Information Security)  L  T  P  C
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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

References:
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

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:

REFERENCE BOOKS:
1. Developing Secure Software: Jason Grembi, Cengage Learning
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year II-Sem (Cyber Forensics & Information Security)  L T P C
ETHICAL HACKING  4 0 0 4
Elective – V

UNIT I

UNIT II

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

UNIT IV

UNIT V
Draft copy w.e.f. academic year 2015-16

TEXT BOOK

REFERENCE BOOKS
1. EC-Council, “Ethical Hacking and Countermeasures Attack Phases”, Cengage Learning
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

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:

UNIT IV:

UNIT V:

TEXT BOOK:
REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year II-Sem (Cyber Forensics & Information Security)  L  T  P  C
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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
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

CYBER LAWS AND SECURITY POLICIES  
Elective - VI

UNIT-I

UNIT-II

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

REFERENCES
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

UNIT II

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

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

REFERENCES:
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 copyrights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, 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 secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.
Unfair competition: 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.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year II-Sem (Cyber Forensics & Information Security) C T P C

4 0 0 4

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:


JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year II-Sem (Cyber Forensics & Information Security)  L  T  P  C
IT SECURITY METRICS  4  0  0  4
Elective – VII

UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:

UNIT-V:

Text Books:
1. IT SECURITY METRICS, Lance Hayden, TATA McGraw-HILL.
2. SECURITY METRICS, CAROLINE WONG, TATA McGraw-HILL.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

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<tbody>
<tr>
<td>QUANTUM CRYPTOGRAPHY</td>
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</tbody>
</table>

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:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

<table>
<thead>
<tr>
<th>Unit</th>
<th>Module</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>BIG DATA ANALYTICS</td>
</tr>
<tr>
<td>II</td>
<td>Understanding Analytics and Big Data</td>
</tr>
<tr>
<td>III</td>
<td>Understanding MapReduce Fundamentals and HBase</td>
</tr>
<tr>
<td>IV</td>
<td>Big Data Technology Landscape and Hadoop</td>
</tr>
<tr>
<td>V</td>
<td>Social Media Analytics and Text Mining</td>
</tr>
</tbody>
</table>

**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, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, 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; HDFC (Hadoop Distributed File System), HDFC 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.
3. BUSINESS ANALYTICS 5e, BY Albright | Winston

REFERENCE BOOKS:
2. Lariss T. Moss, Shaku Atre, “Business Intelligence Roadmap”, Addison-Wesley It Service.
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:

Reference Books:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

M.Tech. I Year II-Sem (Cyber Forensics & Information Security)  L T P C
0 0 4 2

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=ccerp)
   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=ALnxhORwQBifxvx3mg_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)
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.
13. Experiments on IoT Attacks
    a. Wireless Reconnaissance and Mapping
    b. Security Protocol Attacks
    c. Physical Security Attacks
    d. Application Security Attacks
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

1. Exercises on Productivity Development
   - Effective/ Assertive Communication Skills (Activity based)
   - Time Management (Case Study)
   - Creativity & Critical Thinking (Case Study)
   - Decision Making and Problem Solving (Case Study)
   - Stress Management (Case Study)

2. Exercises on Personality Development Skills
   - Self-esteem (Case Study)
   - Positive Thinking (Case Study)
   - Emotional Intelligence (Case Study)
   - Team building and Leadership Skills (Case Study)
   - Conflict Management (Case Study)

3. Exercises on Presentation Skills
   - Netiquette
   - Importance of Oral Presentation – Defining Purpose- Analyzing the audience- Planning Outline and Preparing the Presentation- Individual & Group Presentation- Graphical Organizers- Tools and Multi-media Visuals
   - One Minute Presentations (Warming up)
   - PPT on Project Work- Understanding the Nuances of Delivery- Body Language – Closing and Handling Questions – Rubrics for Individual Evaluation (Practice Sessions)

4. Exercises on Professional Etiquette and Communication
   - Role-Play and Simulation- Introducing oneself and others, Greetings, Apologies, Requests, Agreement & Disagreement….etc.
   - Telephone Etiquette
   - Active Listening
• Group Discussions (Case study)- Group Discussion as a part of Selection Procedure- Checklist of GDs
• Analysis of Selected Interviews (Objectives of Interview)
• Mock-Interviews (Practice Sessions)
• Job Application and Preparing Resume
• Process Writing (Technical Vocabulary) – Writing a Project Report- Assignments

5. Exercises on Ethics and Values
Introduction — Types of Values - Personal, Social and Cultural Values - Importance of Values in Various Contexts
• Significance of Modern and Professional Etiquette – Etiquette (Formal and Informal Situations with Examples)
• Attitude, Good Manners and Work Culture (Live Examples)
• Social Skills - Dealing with the Challenged (Live Examples)
• Professional Responsibility – Adaptability (Live Examples)
• Corporate Expectations

Note: Hand-outs are to be prepared and given to students.
Training plan will be integrated in the syllabus.
Topics mentioned in the syllabus are activity-based.

SUGGESTED SOFTWARE:
The following software from ‘train2success.com’
- Preparing for being Interviewed
- Positive Thinking
- Interviewing Skills
- Telephone Skills
- Time Management
- Team Building
- Decision making

SUGGESTED READING:
12. The Hindu Speaks on Education by the Hindu Newspaper