ACADEMIC REGULATIONS, COURSE STRUCTURE and DETAILED SYLLABUS

R22

M.Tech – Computer Networks & Information Security

M.Tech - Regular Two Year Degree Programme
(For batches admitted from the academic year 2022 - 2023)

Holy Mary Institute of Technology & Science
Bogaram (V), Keesara (M), Medchal (Dist) - 501 301

FOREWORD

The autonomy is conferred on Holy Mary Institute of Technology & Science by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

Holy Mary Institute of Technology & Science is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a two decades in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college to order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

ACADEMIC REGULATIONS

M. Tech. - Regular Two Year Degree Programme
(For batches admitted from the academic year 2022 - 23)

For pursuing two year post graduate Masters Degree Programme of study in Engineering (M.Tech) offered by Holy Mary Institute of Technology & Science under Autonomous status and herein referred to as HITS (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2022-23 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Holy Mary Institute of Technology & Science (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Holy Mary Institute of Technology & Science shall be the Chairman, Academic Council.

1. ADMISSION

Admission into first year of two year M. Tech. degree Program of study in Engineering:

Eligibility:

Admission to the above programme shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit/rank obtained by the candidates at the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt., From time to time.

The medium of instructions for the entire post graduate programme in Engineering & technology will be English only.

2. AWARD OF M. Tech. DEGREE

A student shall be declared eligible for the award of the M. Tech. Degree, if he pursues a course of study in not less than two and not more than four academic years. However, he is permitted to write the examinations for two more years after two academic years of course work, failing which he shall forfeit his seat in M. Tech. programme.

The student shall register for all **68** credits and secure all the **68** credits.

The minimum instruction days in each semester are 90.

3. BRANCH OF STUDY

The following specializations are offered at present for the M. Tech programme of study.

1. Highway Engineering
2. CSE
3. Computer Networks & Information Security
4. Embedded Systems
5. VLSI Design
6. Electrical Power Systems
7. Power Electronics
8. CAD / CAM
9. Machine Design

4. COURSE REGISTRATION

4.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him on the Post Graduate Programme (PGP), its Course Structure and Curriculum, Choice / Option for Courses, based on his competence, progress, pre-requisites and interest.

4.2 Academic Section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work, ensuring 'DATE and TIME Stamping'. The Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

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

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

4.5 Course Registrations are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new course (subject to offering of such a course), or for another existing course (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5. ATTENDANCE

The programmes are offered on a unit basis with each subject being considered a unit.

5.1 Attendance in all classes (Lectures/Laboratories etc.) is compulsory. The minimum required attendance in each theory / Laboratory etc. is 75% including the days of attendance in sports, games, NCC and NSS activities for appearing for the End Semester examination. A student shall not be permitted to appear for the Semester End Examinations (SEE) if his attendance is less than 75%.

5.2 Condonation of shortage of attendance in each subject up to 10% (65% and above and below75%) in each semester shall be granted by the College Academic Committee.

5.3 Shortage of Attendance below 65% in each subject shall not be condoned.

5.4 Students whose shortage of attendance is not condoned in any subject are not eligible to write their end semester examination of that subject and their registration shall stand cancelled.

5.5 A prescribed fee shall be payable towards condonation of shortage of attendance.

5.6 A Candidate shall put in a minimum required attendance at least three (3) theory courses in I Year I semester for promoting to I Year II Semester. In order to qualify for the award of the M.Tech. Degree, the candidate shall complete all the academic requirements of the courses, as per the course structure.

5.7 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present Semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission in to the same class.

6. ACADEMIC REQUIREMENTS

The following academic requirements must be satisfied, in addition to the attendance requirements mentioned in item no. 5. The performance of the candidate in each semester shall be evaluated subject wise, with a maximum of 100 marks per subject / course (theory / practical), based on Internal Evaluation and Semester End Examination.

6.1 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% of Marks (24 out of 60 marks) in the Semester End Examination;
- 40% of Marks in the internal examinations (16 out of 40 marks allotted for CIE); and A minimum of 50% of marks in the sum total of CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades this implies securing **'B'** Grade or above in a subject.

6.2 A student shall register for all subjects for total of **68** credits as specified and listed in the course structure for the chosen specialization, put in the required attendance and fulfill the academic requirements for securing **68** credits obtaining a minimum of 'B' Grade or above in each subject, and all **68** credits securing Semester Grade Point Average **(SGPA)**

- **6.0** (in each semester) and final Cumulative Grade Point Average **(CGPA)** (i.e., CGPA at the end of PGP**)**
- **6.0**, and shall ***pass all the mandatory Audit Courses*** to complete the PGP successfully.

Note: (1) The SGPA will be computed and printed on the marks memo only if the candidate passes in all the subjects offered and gets minimum B grade in all the subjects.

(2) CGPA is calculated only when the candidate passes in all the subjects offered in all the Semesters.

6.3 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Mini Project with seminar, if student secures not less than 50% marks (i.e. 50 out of 100 allotted marks). The student would be treated as failed, if student (i) does not submit a seminar report on Mini Project or does not make a presentation of the same before the evaluation committee as per schedule or (ii) secures less than 50% marks in Mini Project with seminar evaluation. The failed student shall reappear for the above evaluation when the notification for supplementary examination is issued.

6.4 A candidate shall be deemed to have secured the minimum academic requirement in a Course if he secures a minimum of 40% of marks in the Semester End Examination and a minimum aggregate of 50% of the total marks in the Semester End Examination and Continuous Internal Evaluation taken together.

6.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.1) he has to re appear for the Semester End Examination in that course.

6.6 A candidate shall be given one chance to re-register for the courses if the internal marks secured by a candidate is less than 50% and failed in that course for maximum of two courses and should register within four weeks of commencement of the class work. In such a case, the candidate must re-register for the courses and secure the required minimum attendance. The candidate's attendance in the re-registered course(s) shall be calculated separately to decide upon his eligibility for writing the Semester End Examination in those courses. In the event of the student taking another chance, his Continuous Internal Evaluation (internal) marks and Semester End Examination marks obtained in the previous attempt stands cancelled.

6.7 In case the candidate secures less than the required attendance in any course, he shall not be permitted to write the Semester End Examination in that course. He shall re-register for the course when next offered.

6.8 Offering one open elective courses in III-Semester along with core and specialized courses as a part of inculcating knowledge to the student.

7. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

Continuous Internal Evaluation (CIE)

The performance of a student in each semester shall be evaluated subject- wise (irrespective of credits assigned) for a maximum of 100 marks.

7.1 The performance of a student in every subject/course (including practical's and Project) will be Evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination). The Continuous Internal Evaluation shall be made based on the average of the marks secured in the two Mid-Term Examinations conducted, first Mid-Term examinations in the middle of the Semester and second Mid-Term examinations during the last week of instruction.

7.1.1 **Continuous Internal Evaluation:**

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts,

i) Part – A for 10 marks,

- ✓ Part - A: Objective/quiz paper for 10 marks. (The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks.)

ii) Part – B for 20 marks with a total duration of 2 hours as follows:

- ✓ Part - B : Descriptive paper for 20 marks (The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.)

iii) The remaining 10 marks of Continuous Internal Evaluation are distributed as

a) Assignment for 5 marks (Average of 2 Assignments each for 5 marks)

b) Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks

7.1.2 While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks before II Mid-Term Examination.

7.1.3 The Student, in each subject, shall have to earn 40% of marks (i.e. 16 marks out of 40 marks) in CIE, 40% of marks (i.e. 24 marks out of 60) in SEE and Overall 50% of marks (i.e. 50 marks out of 100 marks) both CIE and SEE marks taking together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 40% (16 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 40% of CIE marks (16 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

The details of the end semester question paper pattern are as follows:

Semester End Examination (SEE):

The Semester End Examinations (SEE), for theory subjects, will be conducted for 60 marks consisting of two parts viz. i) Part- A for 10 marks, ii) Part - B for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these Questions is from each unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- The duration of Semester End Examination is 3 hours.

7.2 For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
2. 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software /Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

7.3 The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the institution.

In the Semester End Examination, held for 3 hours, total 60 marks are divided and allocated as shown below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the same laboratory course
5. 10 marks for viva-voce on concerned laboratory course.

The Student, in each subject, shall have to earn 40% of marks (i.e. 16 marks out of 40 marks) in CIE, 40% of marks (i.e. 24 marks out of 60) in SEE and Overall 50% of marks (i.e. 50 marks out of 100 marks) both CIE and SEE marks taking together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 40% (16 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 40% of CIE marks (16 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

For conducting laboratory end examinations of all PG Programmes, one internal examiner and one external examiner are to be appointed by the Chief Controller of Examination in one week before for commencement of the lab end examinations.

7.4 A candidate shall be deemed to have secured the minimum academic requirement in a Course if he secures a minimum of 40% of marks in the Semester End Examination and a minimum aggregate of 50% of the total marks in the Semester End Examination and Continuous Internal Evaluation taken together.

7.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 6) he has to re appear for the Semester End Examination in that course.

8. RE-ADMISSION/RE-REGISTRATION

8.1 **Re-Admission for Discontinued Student:** A student, who has discontinued the M. Tech. degree programme due to any reason whatsoever, may be considered for '**readmission**' into the same degree programme (with the same specialization) with the academic regulations of the batch into which he gets readmitted, with prior permission from the authorities concerned, subject to item 5.1.

8.2 If a student is detained in a subject (s) due to shortage of attendance in any semester, he may be permitted to **re-register** for the same subject(s) 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 and 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 authorities concerned, subject to item 6.2.

8.3 ***A candidate shall be given only one-time chance to re-register and attend the classes for a maximum of two subjects in a semester***, if the internal marks secured by a candidate are less than 40% and failed in those subjects but fulfilled the attendance requirement. A candidate must re-register for failed subjects within four weeks of commencement of the class work, in the next academic year and secure the required minimum attendance. In the event of the student taking this chance, his Continuous Internal Evaluation (internal) marks and Semester End Examination marks obtained in the previous attempt stand cancelled.

9. EXAMINATIONS AND ASSESSMENT - THE GRADING SYSTEM

9.1 Marks will be awarded to indicate the performance of each student in each Theory Course, 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 Item6above, and a corresponding Letter Grade shall be given.

9.2 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:

% of Marks Secured (Class Intervals)	*Letter Grade (UGC Guidelines)*	*Grade Points*
90% and above (≥ 90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (≥ 80% , < 90%)	A^+ (Excellent)	9
Below 80% but not less than 70% (≥ 70% , < 80%)	A (Very Good)	8
Below 70% but not less than 60% (≥ 60% , < 70%)	B^+ (Good)	7
Below 60% but not less than 50% (≥ 50% , < 60%)	B (above Average)	6
Below 50% (< 50%)	F (FAIL)	0
Absent	AB	0

9.3 A student obtaining F Grade in any Course 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 Courses will remain the same as those he obtained earlier.

9.4 A student not appeared for examination then 'AB' Grade will be allocated in any Course shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered.

9.5 A Letter Grade does not imply any specific Marks percentage and it will be the range of marks percentage.

9.6 In general, a student shall not be permitted to repeat any Course(s) only for the sake of 'Grade Improvement' or 'SGPA / CGPA Improvement'.

9.7 A student earns Grade Point (GP) in each Course, on the basis of the Letter Grade obtained by him in that Course. 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

9.8 The Student passes the Course only when he **gets GP>=6 (B Grade or above).**

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

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

9.10 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP)secured from ALL 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

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

where 'i' is the Course indicator index (takes into account all Courses in a Semester), 'N' is the no. of Courses '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 that ix Course, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that its Course.

Illustration of Computation of SGPA

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	3	A	8	3 x 8 = 24
Course2	3	B+	7	4 x 7 = 28
Course3	3	B	6	3 x 6 = 18
Course4	3	O	10	3 x10= 30
Course5	3	C	5	3 x 5 = 15
Course6	3	B	6	4 x 6 = 24

Thus, **SGPA =139/18 =7.72**

9.11 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

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

(i.e., up to and inclusive of S Semesters, S ≥ 2)

where 'M' is the TOTAL no. of Courses (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards upto and inclusive of the Semester S (obviously M > N), 'j' is the Course indicator index (takes into account all Courses from 1 to S Semesters), C_j is the no. of Credits allotted to the jth Course, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Course. 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.

For CGPA Computation

Semester 1	Semester 2	Semester 3	Semester 4
Credits : 18 SGPA : 7.72	Credits : 18 SGPA : 7.8	Credits : 12 SGPA : 5.6	Credits : 20 SGPA : 6.0

Thus, **CGPA =** $\dfrac{18 \times 7.72 + 18 \times 7.8 + 12 \times 5.6 + 20 \times 6.0}{68}$ = 6.86

9.12 For Calculations listed in Item 9.6 – 9.11, performance in failed Courses (securing F Grade) will also be taken into account, and the Credits of such Courses will also be included in the multiplications and summations.

9.13 No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given semester.

9.14 Conversion formula for the conversion of GPA into indicative percentage is

% of marks scored = (final CGPA -0.50) x 10

10 EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

10.1 A Project Review Committee (PRC) shall be constituted with Head of the Department as Chairperson, Project Supervisor and one senior faculty member of the Departments offering the M. Tech. programme.

10.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses, both theory and practical.

10.3 After satisfying 10.2, a candidate has to submit, in consultation with his Project Supervisor, the title, objective and plan of action of his project work to the PRC for approval. Only after obtaining the approval of the PRC the student can initiate the Project work.

10.4 If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

10.5 A candidate shall submit his project status report in two stages at least with a gap of three months between them.

10.6 The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate

shall submit the draft copy of thesis to the Head of the Department and make an oral presentation before the PRC.

10.7 After approval from the PRC, the soft copy of the thesis should be submitted to the College for **ANTI-PLAGIARISM** for the quality check and the plagiarism report should be included in the final thesis. If the copied information is less than **30%**, then only thesis will be accepted for submission.

10.8 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.

10.9 For **Dissertation work Review-I** in II Year I Sem. there is an internal marks of 100, the evaluation should be done by the PRC for 50 marks and Supervisor will evaluate for 50 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work and Literature Survey in the same domain. A candidate has to secure a minimum of 50% of marks to be declared successful for Project Phase-I. If he fails to fulfill minimum marks, he has to reappear during the supplementary examination.

10.10 *For **Dissertation Work Review - II*** in II Year II Sem. carries 100 internal marks. Evaluation should be done by the DRC for 50 marks and the Supervisor will evaluate it for the other 50 marks. The DRC will examine the overall progress of the Dissertation Work and decide whether or not the Dissertation is eligible for final submission. A candidate has to secure a minimum of 50% of marks to be declared successful in Dissertation Work Review - II. If he fails to obtain the required minimum marks, he has to reappear for Dissertation Work Review - II as and when conducted. For Dissertation Evaluation (Viva Voce) in II Year II Semester there are external marks of 100 and it is evaluated by the external examiner. The candidate has to secure a minimum of 50% marks in Dissertation Evaluation (Viva-Voce) examination.

10.11 Dissertation Work Reviews - I and II shall be conducted in phase I (Regular) and Phase II (Supplementary). Phase II will be conducted only for unsuccessful students in Phase I. The unsuccessful students in Dissertation Work Review - II (Phase II) shall reappear for it at the time of Dissertation Work Review - II (Phase I). These students shall reappear for Dissertation Work Review - II in the next academic year at the time of Dissertation Work Review - II only after completion of Dissertation Work Review - I, and then Dissertation Work Review - II follows. The unsuccessful students in Dissertation Work Review - II (Phase II) shall reappear for Dissertation Work Review – II in the next academic year only at the time of Dissertation Work Review - II (Phase I).

10.12 If he fails to fulfill as specified in 10.10, he will reappear for the Viva-Voce examination only after three months. In the reappeared examination also, fails to fulfill, he will not be eligible for the award of the degree.

10.13 The thesis shall be adjudicated by one examiner selected by the Chief Controller of Examinations. For this, the HOD of the Department shall submit a panel of 3 examiners, eminent in that field, with the help of the guide concerned and Head of the Department.

10.14 If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

10.15 If the report of the examiner is favorable, Project dissertation shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis.

10.16 The Head of the Department shall coordinate and make arrangements for the conduct of Project dissertation.

10.17 For mandatory non-credit Audit courses, a student has to secure 40 marks out of 100 marks (i.e.40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. These marks should also be uploaded along with the internal marks of other subjects. No marks or Letter Grade shall be allotted for these courses/activities. However, for non-credit courses

'**SATISFACTORY'** or "**UNSATISFACTORY'** shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

11. AWARD OF DEGREE AND CLASS

11.1 A Student who registers for all the specified Courses/ 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 68 Credits (with CGPA ≥ 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.

11.2 **Award of Class**

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

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA ≥ 7.75
First Class	6.75 to < 7.75 CGPA
Second Class	6.00 to < 6.75 CGPA

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

12. WITHOLDING OF RESULTS

If the student has not paid the dues, if any, to the college or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

13. TRANSITORY REGULATIONS

13.1 If any candidate is detained due to shortage of attendance in one or more courses, they are eligible for re-registration to maximum of two earlier or equivalent courses at a time as and when offered.

13.2 The candidate who fails in any course will be given two chances to pass the same course; otherwise, he has to identify an equivalent course as per HITS21 Academic Regulations.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed or absent in regular examinations. Such candidates writing supplementary examinations may have to write more than one examination.

15. REVALUATION

Students shall be permitted for revaluation after the declaration of end semester examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

16. AMENDMENTS TO REGULATIONS

The Academic Council of Holy Mary Institute of Technology & Science reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

17. GENERAL

17.1 **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.

17.2 **Credit Point:** It is the product of grade point and number of credits for a course.

17.3 Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”.

17.4 The academic regulation should be read as a whole for the purpose of any interpretation.

17.5 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

Malpractices Rules - Disciplinary Action For /Improper Conduct in Examinations

S. No	Nature of Malpractices / Improper Conduct	Punishment
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 course 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 course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(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 course 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 course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Principal.
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 courses of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses 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 course 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 course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course 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 or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Addl. Controller of examinations / 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 addl. Controller of examinations 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 addl. Controller of examinations, 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 course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses 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 course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course 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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course and all other courses 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 principal for further action to award suitable punishment.	

COURSE STRUCTURE

Dept. of M.Tech – Computer Networks & Information Security

I M.Tech I Semester									
Course Code	Course Title	Category	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
B2CI101PC	Advanced Computer Networks	PC	3	-	-	3	40	60	100
B2CI102PC	Advanced Data Structures	PC	3	-	-	3	40	60	100
B2CI103PC	Data Science	PC	3			3	40	60	100
	Professional Elective-I	PE	3	-	-	3	40	60	100
	Professional Elective-II	PE	3	-	-	3	40	60	100
B2CI104PC	Advanced Computer Networks Lab	PC	-	-	3	1.5	40	60	100
B2CI105PC	Advanced Data Structures Lab	PC	-	-	3	1.5	40	60	100
Total			**15**	**-**	**6**	**18**	**280**	**420**	**700**
Audit Course (Non-Credit)									
	Audit Course – I	AC	2	-	-	-	100	-	100

I M.Tech II Semester									
Course Code	Course Title	Category	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
B2CI201PC	Information Security	PC	3	-	-	3	40	60	100
B2CI202PC	Web & Database Security	PC	3	-	-	3	40	60	100
	Professional Elective-III	PE	3	-	-	3	40	60	100
	Professional Elective-IV	PE	3	-	-	3	40	60	100
B2CI203PC	Web & Database Security Lab	PC	-	-	3	1.5	40	60	100
B2CI204PC	Information Security Lab	PC	-	-	3	1.5	40	60	100
B2CI205PW	Mini Project with Seminar	PWC	-	-	6	3	100	--	100
Total			**15**	**-**	**12**	**18**	**340**	**360**	**700**
Audit Course (Non-Credit)									
	Audit Course – II	AC	2	-	-	-	100	-	100

II M.Tech I Semester									
Course Code	Course Title	Category	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
	Professional Elective-V	PE	3	-	-	3	40	60	100
	Open Elective	OE	3	-	-	3	40	60	100
B2CI301PW	Dissertation Phase – I	PWC	-	-	12	6	100	-	100
Total			**8**	**-**	**12**	**12**	**180**	**120**	**300**

II M.Tech II Semester									
Course Code	Course Title	Category	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
B2CI401PW	Dissertation Phase - II	PWC	-	-	12	6	100	-	100
B2CI402PW	Dissertation Viva-Voce	PWC	-	-	28	14	-	100	100
Total			**-**	**-**	**32**	**20**	**100**	**100**	**200**

PROFESSIONAL ELECTIVES			
PE-I		PE-II	
Course Code	Course Title	Course Code	Course Title
B2CI101PE	Network Coding Theory	B2CI104PE	Network Security
B2CI102PE	Cryptanalysis	B2CI105PE	Advanced Wireless Networks
B2CI103PE	Artificial Intelligence	B2CI106PE	Adhoc & Sensor Networks
PE-III		PE-IV	
B2CI207PE	Computer Vision	B2CI210PE	Block Chain Technology
B2CI208PE	Digital Image Processing	B2CI211PE	Biometrics
B2CI209PE	Cloud Security	B2CI212PE	Network Design
PE-V			
B2CI313PE	Digital Forensics		
B2CI314PE	Surveillance and Video Analytics		
B2CI315PE	Data Analytics for FraudDetection		

Course Code	Open Electives
B2CI301OE	mantic Web and Social Networks
B2CI302OE	ellectual Property Rights
B2CI303OE	orage Area Networks
B2CI304OE	ripting Language

Audit Course I		Audit Course II	
B2CI101AC	English for Research Paper Writing	B2CI203AC	Disaster Management
B2CI102AC	Research Methodology and IPR	B2CI204AC	Personality Development Through Life Enlightenment Skills

DETAILED SYLLABUS

I-YEAR (I-SEMESTER)

ADVANCED COMPUTER NETWORKS

I M.Tech I Semester | **L T P C**
Course Code: B2CI101PC | **3 - - 3**

COURSE OBJECTIVES:

1. To review the computer networking concepts
2. To impart concepts of advanced computer networking.
3. To introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. To facilitate students in gaining expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

1. Apply Data Communications System and its components.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network

UNIT - I

Computer Networks and the Internet: History of Computer Networking and the Internet, Networking Devices, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones. Networking Models: 5-layer TCP/IP Model,
7-Layer OSI Model, Internet Protocols and Addressing, Equal- Sized Packets Model: ATM.

UNIT - II

Network Routing Routing and its concepts: Structure of a Router, Basic Router Configuration, Building a Routing Table, Static Routing, Dynamic Routing – Distance Vector Routing Protocol (RIPv1, RIPv2, EIGRP), Link State Routing Protocols (OSPF).

UNIT - III

LAN Switching: Switching and its concepts: Structure of a Switch, Basic Switch Configuration, Virtual LANs (VLANs), VLAN Trunking Protocol (VTP), Spanning Tree Protocol (STP), Inter-VLAN Routing.

UNIT - IV

Wide Area Networks (WANs): Introduction to WANs, Point-to-Point Protocol (PPP) concepts, Frame Relay concepts, Dynamic Host Configuration Protocol (DHCP), Network Address Translation (NAT), IPv6.

UNIT - V

Network Programming using Java: TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI) - Basic RMI Process, Implementation details - ClientServer Application.

TEXT BOOKS:

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Fifth Edition, Pearson Education, 2012.
2. Network Fundamentals, Mark Dye, Pearson Education.

REFERENCE BOOKS:

1. Computer Networks: A Systems approach, Larry L. Peterson & Bruce S. Davie, Fifth edition, Elsevier, rp2012.
2. Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, Firoz Mosharaf, Tata McGraw Hill, 2012.
3. Java Network Programming,3rd edition, E.R. Harold, SPD, O‟Reilly.(Unit V)

ADVANCED DATA STRUCTURES

I M.Tech I Semester **L T P C**
Course Code: B2CI102PC **3 - - 3**

COURSE OBJECTIVES:

1. The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
2. Students should be able to understand the necessary mathematical abstraction to solve problems.
3. To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
4. Student should be able to come up with analysis of efficiency and proofs of correctness.

COURSE OUTCOMES: After completion of course, students would be able to

1. Understand the implementation of symbol table using hashing techniques.
2. Understand the implementation of symbol table using hashing techniques.
3. Develop algorithms for text processing applications.
4. Identify suitable data structures and develop algorithms for computational geometry problems.

UNIT - I

Dictionaries: Definition, Dictionary, Abstract Data Type, Implementation of Dictionaries. Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate
Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, ExtendibleHashing.

UNIT - II

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

UNIT - III

Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees

UNIT - IV

Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem

UNIT - V

Computational Geometry: One Dimensional Range Searching, Two-Dimensional Range Searching, constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees.
Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem

REFERENCE BOOKS:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

DATA SCIENCE

I M.Tech I Semester | **L T P C**
Course Code: B2CI103PC | **3 - - 3**

COURSE OBJECTIVES:

1 To understand about big data, to learn the analytics of Big Data
2 To understand how data is stored and processed in Hadoop
3 To learn about NoSQL databases
4 To learn R tool and understand how data is analyzed using R features
5 To learn about spark and to understand what features of it are making it to overtake Hadoop

UNIT I

Types of Digital data: Classification of Digital Data, Introduction to Big Data: What is big data, Evolution of Big Data, Traditional BusinessIntelligence vs Big Data, Coexistence of Big Data and Data Warehouse.

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, Terminologies used in Big Data Environments.

UNIT II

Hadoop: Features of Hadoop, Key advantages of hadoop, versions of hadoop, overview of hadoop ecosystem, Hadoop distributions.

Why hadoop? RDBMS vs Hadoop, Distribution computing challenges, History of hadoop, Hadoop overview, HDFS

UNIT III

Processing data with hadoop, interfacing with hadoop ecosystem.

NoSQL: Where it is used? What is it? Types of NoSQL Databases, Why NoSQL? Advantages ofNoSQL, What we miss with NoSQL? Use of NoSQL in industry, SQL vs NoSQL.

UNIT IV

What is R? Why use R for analytics? How to run R? First R example, functions a shortprogramming example, some important R data structures, vectors, matrices, lists, R programming structures.

UNIT V

Introduction to Spark, Scala language: values, data types, variables, expressions, conditional expressions, evaluation order, compound expressions, functions, tuple with functions, List, Length, ++, ::, sorted, reverse, sum. slice, mkString, contains, map, filter, leftfold, reduce, Map, Contains, getOrElse, WithDefault, Keys and Values, groupBy, set, mapValues, keys andvalues, Option(Some and None), Objects, classes, inheritance, traits

TEXT BOOKS:

1. BIG DATA and ANALYTICS, Seema Acharya, Subhashini Chellappan, Wileypublications.(Unit I, II, III) BIG DATA, Black Book™, DreamTech Press, 2015 Edition
2. "The art of R programming" by Norman matloff, 2009.(Unit IV)
3. "Atomic Scala", 2nd edition, Bruce Eckel, Dianne Marsh. (Unit V)

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 ItService.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.
4. "Hadoop: The definitive guide", by O'reilly, yahoo press, 2nd edition.
5. "Introduction to R" by Sandeep Rakshit, McGrawHill Education, 2016.

NETWORK CODING THEORY
(Professional Elective - I)

I M.Tech I Semester | **L T P C**
Course Code: B2CI101PE | **3 - - 3**

COURSE OBJECTIVES:
1. Learn the fundamentals of network coding theory.
2. Understand the performance parameters required for network coding.
3. Gain the knowledge of the network coding design methods.
4. Learn different approaches for the network coding.
5. Understand error correction and detection methods of adversarial errors.

COURSE OUTCOMES:
1. Demonstrate knowledge and understanding of the fundamentals of NetworkCoding Theory.
2. Summarize all the performance parameters and resources for network coding.
3. Construct the network code for different networks.
4. Deal with different approaches of Network Coding in lossy and lossless networks.
5. Deal with multiple sources network coding and detect adversarial errors.

UNIT - I
Introduction: A historical Perspective, Network Coding; Network Coding Benefits: Throughput,Robustness, Complexity, Security; Network Model.

Main Theorem of Network Multicast: The Min-Cut Max-flow Theorem, The Main network coding Theorem.

Theoretical Framework for Network Coding: A Network Multicast Model, algebraic Framework, Combinatorial Framework, Information-Theoretic Framework, Types of Routing and coding**.**

UNIT - II
Throughput Benefits of Network Coding: Throughput Measures, Linear Programming Approach, Configurations with Large Network Coding Benefits, Configurations with Small Network Coding Benefits, Undirected Graphs.

Networks with Delay and Cycles: Dealing with Delay, Optimizing for Delay, Dealing with Cycles. **Resources for Network Coding:** Bounds on Code Alphabet Size, Bounds on the Number of Coding Points, Coding with Limited Resources.

UNIT - III
Network Code Design Methods For Multicasting: Common initial procedure, centralized algorithms, decentralized algorithms, scalability to network changes Single-Source Linear Network Coding

Acyclic Networks: Acyclic Networks, Linear network code, Desirable properties of a linear network code, Existence and construction, Algorithm refinement for multicast.

Cyclic Networks: Delay-Free Cyclic Code, Non-equivalence between local and global descriptions, Convolutional network code, decoding of convolution network code.

UNIT - IV
Inter-Session Network Coding: Scalar and vector linear network coding, Fractional coding problem formulation, Insufficiency of linear network coding, Information theoretic approaches: Multiple unicast networks; Constructive approaches: Pairwise XOR coding in wire line networks, XOR coding in wireless networks.

Network Coding in Lossy Networks: Random linear network coding, Coding theorems: Unicast connections, Multicast connections, Error exponents for Poisson traffic with i.i.d. losses.

Subgraph Selection: Flow-based approaches: Intra-session coding, Computation- constrained coding, Inter-session coding; Queue-Length-Based approaches: Intra-session network coding for multicast sessions, Inter-session coding.

UNIT - V

Multiple Sources Network Coding: Superposition coding and max-flow bound; Network Codes for Acyclic Networks: Achievable information rate region, Inner bound Rin, Outer bound Rout, RLP – An explicit outer bound.

Security against adversarial Errors: Error correction: Error Correcting bounds for centralized network coding, Distributed random network coding and polynomial-complexity error correction; Detection of adversarial errors: Model and problem formulation, Detection probability.

TEXT BOOKS:

1. Raymond W. Yeung, Shuo-Yen Robert Li, Ning Cai, Zhen Zhang, "Network Coding Theory",now publishers Inc, 2006, ISBN: 1-933019-24-7.
2. Christina Fragouli, Emina Soljanin, "Network Coding Fundamentals", now publishers Inc,2007,ISBN: 978-1-60198-032-8.

REFERENCE BOOKS:

1. Tracey Ho, Desmond Lun, "Network Coding: An Introduction", Cambridge University Press,2008, ISBN: 978-0-521-87310-9.
2. Muriel Medard, Alex Sprintson, "Network Coding: Fundamentals and Applications", 1st Edition,2012, Academic Press, Elsevier, ISBN: 978-0-12-380918-6.

CRYPTANALYSIS
(Professional Elective - I)

I M.Tech I Semester | **L T P C**
Course Code: B2CI102PE | **3 - - 3**

COURSE OBJECTIVES:
1. To understand the importance of cryptanalysis in our increasingly computer- driven world.
2. To understand the fundamentals of Cryptography
3. To understand the Lattice- based cryptanalysis and elliptic curves and pairings
4. To understand birthday- based algorithms for functions and attacks on stream ciphers
5. To apply the techniques for secure transactions in real world applications

COURSE OUTCOMES:
1. Ability to apply cryptanalysis in system design to protect it from various attacks.
2. Ability to identify and investigate vulnerabilities and security threats and the mechanisms to counter them.
3. Ability to analyze security of cryptographic algorithm against brute force attacks, birthday attacks.

UNIT – I
A bird's – eye view of modern Cryptography: Preliminaries, Defining Security in Cryptography **Monoalphabetic Ciphers:** Using Direct Standard Alphabets, The Caesar Cipher, Modular arithmetic, Direct Standard alphabets, Solution of direct standard alphabets by completing the plain component, Solving direct standard alphabets by frequency considerations, Alphabets based on decimations of the normal sequence, Solution of decimated standard alphabets, Mono alphabets based on linear transformation.
Polyalphabetic Substitution: Polyalphabetic ciphers, Recognition of polyalphabetic ciphers, Determination of number of alphabets, Solution of individual alphabets if standard, Polyalphabetic ciphers with a mixed plain sequence, Matching alphabets, Reduction of a polyalphabetic cipher to a monoalphabetic ciphers with mixed cipher sequences

UNIT - II
Transposition: Columnar transposition, Solution of transpositions with Completely filled rectangles, Incompletely filled rectangles, Solution of incompletely filled rectangles – Probable word method, Incompletely filled rectangles general case, Repetitions between messages; identical length messages. **Sieve algorithms:** Introductory example: Eratosthenes's sieve, Sieving for smooth composites

UNIT - III
Brute force Cryptanalysis: Introductory example: Dictionary attacks, Brute force and the DES Algorithm, Brute force as a security mechanism, Brute force steps in advanced cryptanalysis, Brute force and parallel computers.
The birthday paradox: Sorting or not?:
Introductory example: Birthday attacks on modes of operation, Analysis of birthday paradox bounds, Finding collisions, Application to discrete logarithms in generic groups.

UNIT - IV
Birthday- based algorithms for functions: Algorithmic aspects, Analysis of random functions, Number-theoretic applications, A direct cryptographic application in the context of block wise security, Collisions in hash functions. **Attacks on stream ciphers:** LFSR- based key stream generators, Correlation attacks, Noisy LFSR model, Algebraic attacks, Extension to some non- linear shift registers, The cube attack.

UNIT - V
Lattice- based cryptanalysis: Direct attacks using lattice reduction, Coppersmith's small roots attacks. **Elliptic curves and pairings:** Introduction to elliptic curves, The Weil pairing, the elliptic curve factoring method.

TEXT BOOKS:

1. Elementary Cryptanalysis A Mathematical Approach by Abraham Sinkov, The mathematical Association of America (lnc).
2. Algorithmic Cryptanalysis" by Antoine joux, CRC Press'

REFERENCE BOOKS:

1. Algebraic Cryptanalysis, Bard Gregory, Springer, 2009
2. Cryptanalysis of Number Theoretic Ciphers, Sameul S. Wag staff, Champan & Hall/CRC.
3. Cryptanalysis: A Study of Cipher and Their Solution, Helen F. Gaines,1989

ARTIFICIAL INTELLIGENCE
(Professional Elective - I)

I M.Tech I Semester **L T P C**
Course Code: B2CI103PE **3 - - 3**

COURSE OBJECTIVES:
1. To learn the difference between optimal reasoning Vs human like reasoning
2. To understand the notions of state space representation, exhaustive search, heuristicsearch along with the time and space complexities
3. To learn different knowledge representation techniques
4. To understand the applications of AI: namely Game Playing, Theorem Proving, ExpertSystems, Machine Learning and Natural Language Processing

UNIT-I
Introduction: What is AI? Foundations of AI, History of AI, Agents and environments, The nature of the Environment, Problem solving Agents, Problem Formulation, Search Strategies

UNIT-II
Knowledge and Reasoning: Knowledge-based Agents, Representation, Reasoning and Logic, Prepositional logic, First-order logic, Using First-order logic, Inference in First-order logic, forward and Backward Chaining

UNIT-III
Learning: Learning from observations, Forms of Learning, Inductive Learning, Learning decision trees, why learning works, Learning in Neural and Belief networks

UNIT-IV
Practical Natural Language Processing: Practical applications, Efficient parsing, Scaling up thelexicon, Scaling up the Grammar, Ambiguity, Perception, Image formation, Image processing operations for Early vision, Speech recognition and Speech Synthesis

UNIT-V
Robotics: Introduction, Tasks, parts, effectors, Sensors, Architectures, Configuration spaces,Navigation and motion planning, Introduction to AI based programming Tools.

TEXT BOOKS:
1. Stuart Russell, Peter Norvig: “Artificial Intelligence: A Modern Approach”,2nd Edition, Pearson Education, 2007

REFERENCE BOOKS:
1. Artificial Neural Networks B. Yagna Narayana, PHI
2. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).
3. Artificial Intelligence and Expert Systems – Patterson PHI.
4. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
5. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition – PearsonEducation.
6. Neural Networks Simon Haykin PHI

NETWORK SECURITY
(Professional Elective - II)

I M.Tech I Semester **L T P C**
Course Code: B2CI104PE **3 - - 3**

COURSE OBJECTIVES:
1. To learn the basics of security and various types of security issues.
2. To study different cryptography techniques available and various security attacks.
3. Explore network security and how they are implemented in real world.
4. To get an insight of various issues of Web security and biometric authentication.

COURSE OUTCOMES: After completion of course, students would be able to:
1. To understand basics of security and issues related to it.
2. Understanding of biometric techniques available and how they are used in today's world.
3. Security issues in web and how to tackle them.
4. Learn mechanisms for transport and network security.

UNIT – I
Data security: Review of cryptography. Examples RSA, DES, ECC

UNIT – II
Authentication, non-repudiation and message integrity, Digital signatures and certificates. Protocols using cryptography (example Kerberos), Attacks on protocols

UNIT - III
Network security: Firewalls, Proxy-Servers, Network intrusion detection.
Transport security: Mechanisms of TLS, SSL, IPSec.

UNIT – IV
Web security – SQL injection, XSS, etc., Software security and buffer overflow, Malware types and case studies. Access Control, firewalls and host/network intrusion detection.

UNIT - V
Other topics: Biometric authentication, Secure E-Commerce (ex. SET), Smart Cards, Security in Wireless Communication. Recent trends in IOT security, IDS and Biometric.

REFERENCE BOOKS:
1. W. R. Cheswick and S. M. Bellovin. Firewalls and Internet Security. Addison Wesley, 1994.
2. W. Stallings. Cryptography and Network Security. Prentice Hall, 1999.
3. B. Schneier. Applied Cryptography. Wiley, 1999.

ADVANCED WIRELESS NETWORKS
(Professional Elective - II)

I M.Tech I Semester **L T P C**
Course Code: B2CI105PE **3 - - 3**

COURSE OBJECTIVES:
1. The students should get familiar with the wireless/mobile market and the future needs andchallenges.
2. To get familiar with key concepts of wireless networks, standards, technologies and their basic Operations.
3. To learn how to design and analyze various medium access.
4. To learn how to evaluate MAC and network protocols using network simulation software tools.
5. The students should get familiar with the wireless/mobile market and the future needs andchallenges.

COURSE OUTCOMES: After completion of course, students would be able to:
1. Demonstrate advanced knowledge of networking and wireless networking and understand varioustypes of wireless networks, standards, operations and use cases.
2. Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
3. Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
4. Design wireless networks exploring trade-offs between wire line and wireless links.
5. Develop mobile applications to solve some of the real-world problems.

UNIT - I
Introduction: Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies - CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modeling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc.

Wireless Local Area Networks: IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF& PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs. Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues

UNIT – II
Wireless Cellular Networks: 1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks, Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies.

UNIT - III
WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE802.22 WirelessRegional Area Networks, IEEE 802.21 Media Independent Handover Overview

Wireless Sensor Networks: Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview

UNIT - IV
Wireless PANs: Bluetooth AND Zigbee, Introduction to Wireless Sensors,.

UNIT - V
Security: Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi Security, DoS in wireless communication.

Advanced Topics: IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular Adhoc Networks

REFERENCE BOOKS:

1. Schiller J., Mobile Communications, Addison Wesley 2000
2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
3. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc2002
4. Yi Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architectures, John Wiley andSons Inc 2000
5. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI 200

ADHOC AND SENSOR NETWORKS
(Professional Elective - II)

I M.Tech I Semester | **L T P C**
Course Code: B2CI106PE | **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to:
1. Describe the concepts of adhoc wireless networks.
2. Analyze different routing protocols of mobile adhoc networks.
3. Apply the energy management policies in routing algorithms.
4. Implement protocols for location based QoS.
5. Design and simulate sensor networks and evaluate performance.

COURSE OUTCOMES:
1. Students will be able to describe an adhoc network and analyze various technologiesassociated with it.
2. Students will be able to analyze various transport layer and analyze various protocolsassociated with it.
3. Students will apply this knowledge to analyze adhoc & sensor based networks and compute various parameters associated with it.
4. Students will Discuss the challenges in designing routing and transport protocols for wireless Ad-hoc/sensor networks

UNIT - I
Ad Hoc Wireless Networks and MAC Introduction: Issues in ad Hoc wireless networks, issues in designing a MAC protocol for ad hoc wireless networks, design goals of a MAC protocols for ad hoc networks, classifications of MAC protocols.

UNIT - II
Routing Protocols in Ad Hoc Networks: Issues in designing a routing protocol for ad hoc wireless networks, classifications of routing protocols, table driven routing protocol, on-demand routing protocols,hybrid routing protocols, hierarchical routing protocols, and power aware routing protocols.

UNIT - III
Energy Management in Ad hoc Wireless Networks: Energy-Efficient Communication in Ad Hoc Wireless Networks, Ad Hoc Networks Security, Self-Organized and Cooperative Ad Hoc Networking, Simulation and Modeling of Wireless, Mobile, and Ad Hoc Networks, Modeling Cross-Layering Interaction Using Inverse Optimization, Algorithmic Challenges in Ad Hoc Networks.
Energy Management in Ad hoc Wireless Networks: Introduction, need for energy management in ad hoc networks, battery management schemes-overview of battery characteristic, device dependent schemes.

UNIT - IV
Quality of Service in Ad Hoc Wireless Networks: Introduction, issues and challenges in providing QoSin ad hoc networks, classification of QoS solutions, MAC layer solutions, QoS routing protocols, ticket based, predictive location based QoS routing protocols.

UNIT - V
Wireless Sensor Networks: Introduction, sensor network architecture, data dissemination, gathering, MAC protocols for sensor networks–self organizing, hybrid TDMA/FDMA, CSMA based MAC, location Discovery.

TEXT BOOKS:

1. C. Siva Ram Murthy and B. S. Manoj, Ad Hoc Wireless Networks-Architectures andProtocols, New Delhi: Pearson Education, 2013.
2. "Adhoc and Sensor Networks" by Stefano Basagni, Silvia Giordano, Ivan Stojmenvic. IEEE Press, A John Wiley & Sons, Inc., Publication 2004.

REFERENCE BOOKS:

1. Feng Zhao and Leonidas Guibas, Wireless Sensor Networks. Noida: Morgan KaufmanPublishers, 2004.
2. C. K. Toh, Ad Hoc Mobile Wireless Networks. New Delhi: Pearson Education, 2002.
3. Thomas Krag and SebastinBuettrich, Wireless Mesh Networking. Mumbai: O'Reilly Publishers,2007

ADVANCED COMPUTER NETWORKS LAB

I M.Tech I Semester **L T P C**
Course Code: B2CI104PC **- - 3 1.5**

LIST OF EXPERIMENTS:

1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands.
2. Configuration of IP addressing for a given scenario for a given set of topologies.
3. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.
4. Configure, implement and debug the following: Use open source tools for debugging and diagnostics.
   a. ARP/RARP protocols
   b. RIP routing protocols
   c. BGP routing
   d. OSPF routing protocols
   e. Static routes (check using netstat)
5. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down.
6. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterize file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.
7. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails.
8. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.

ADVANCED DATA STRUCTURES LAB

I M.Tech I Semester | **L T P C**
Course Code: BICI105PC2 | **- - 3 1.5**

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

LIST OF PROGRAMS

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

2. Write a program for implementing the following sorting methods:
   a) Merge sort b) Heap sort c) Quick sort

3. Write a program to perform the following operations:
   a) Insert an element into a B- tree.
   b) Delete an element from a B- tree.
   c) Search for a key element in a B- tree.

4. Write a program to perform the following operations:
   a) Insert an element into a Min-Max heap
   b) Delete an element from a Min-Max heap
   c) Search for a key element in a Min-Maxheap

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

6. Write a program to perform the following operations:
   a) Insert an element into a binomial heap
   b) Delete an element from a binomial heap.
   c) Search for a key element in a binomial heap.

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

8. Write a program to perform the following operations:
   a) Insert an element into a Red-Black tree.
   b) Delete an element from a Red-Black tree.
   c) Search for a key element in a Red-Black tree.

9. Write a program to implement all the functions of a dictionary usinghashing.

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

11. Write a program for implementing Brute Force pattern matching algorithm.

12. Write a program for implementing Boyer pattern matching algorithm.

TEXT BOOKS:

1. Fundamentals of Data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press
2. Data Structures Using C – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein,PHI/Pearson education.
3. Introduction to Data Structures in C, Ashok Kamthane, 1st Edition, Pearson.

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.

ENGLISH FOR RESEARCH PAPER WRITING
(Audit Course- I)

I M.Tech I Semester | **L T P C**
Course Code: B2CI101AC | **2 - - -**

COURSE OBJECTIVES: Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

UNIT-I:
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

UNIT-II:
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction.

UNIT-III:
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

UNIT-V:
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

TEXT BOOKS/ REFERENCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

RESEARCH METHODOLOGY & IPR

(Audit Course- I)

I M.Tech I Semester | **L T P C**
Course Code: B2CI102AC | **2 - - -**

COURSE OBJECTIVES:

1. To understand the research problem
2. To know the literature studies, plagiarism and ethics
3. To get the knowledge about technical writing
4. To analyze the nature of intellectual property rights and new developments
5. To know the patent rights

COURSE OUTCOMES: At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II:

Effective literature studies approach, analysis, Plagiarism, Research ethics

UNIT-III:

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development.

International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science &engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

REFERENCE BOOKS:

1. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd, 2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Asimov, “Introduction to Design”, Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
7. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

I-YEAR (II-SEMESTER)

INFORMATION SECURITY

I M.Tech II Semester **L T P C**
Course Code: B2CI201PC **3 - - 3**

COURSE OBJECTIVES

1. To understand the fundamentals of Cryptography
2. To understand various key distribution and management schemes
3. To understand how to deploy encryption techniques to secure data in transit across data networks
4. To apply algorithms used for secure transactions in real world applications

COURSE OUTCOMES

1. Demonstrate the knowledge of cryptography, network security concepts and applications.
2. Ability to apply security principles in systemdesign.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counterthem.

UNIT - I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

UNIT - II

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.

Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

UNIT - III

Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT - IV

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security(TLS), Secure Electronic Transaction (SET).

UNIT – V

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

TEXT BOOK:

1. Cryptography and Network Security (principles and approaches) by William Stallings PearsonEducation, 4th Edition.

REFERENCE BOOKS:

2. Network Security Essentials (Applications and Standards) by William Stallings PearsonEducation.
3. Principles of Information Security, Whitman, Thomson.

WEB AND DATABASE SECURITY

I M.Tech II Semester **L T P C**
Course Code: B2CI202PC **3 - - 3**

COURSE OBJECTIVES:

1. Give an Overview of information security
2. Give an overview of Access control of relational databases

COURSE OUTCOMES: Students should be able to

1. Understand the Web architecture and applications
2. Understand client side and service side programming
3. Understand how common mistakes can be bypassed and exploit the application
4. Identify common application vulnerabilities

UNIT - I

The Web Security: The Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web**:** Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II

The Web Privacy: The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities

UNIT – V

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location- based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:

1. Web Security, Privacy and Commerce, Simson G. Arfinkel, Gene Spafford, O'Reilly**.**
2. Handbook on Database security applications and trends, Michael Gertz, Sushil Jajodia.

COMPUTER VISION
(Professional Elective - III)

I M.Tech II Semester **L T P C**
Course Code: B2CI207PE **3 - - 3**

COURSE OBJECTIVES:
1. To study the development of algorithms and techniques to analyze and interpret the visible worldaround us.
2. Be familiar with both the theoretical and practical aspects of computing with images.
3. To understand the basic concepts of Computer Vision.
4. Understand the geometric relationships between 2D images and the 3D world.
5. Ability to apply the various concepts of Computer Vision in other application areas.

COURSE OUTCOMES:
1. Understand the fundamental problems of computer vision.
2. Implement various techniques and algorithms used in computer vision.
3. Analyze and evaluate critically the building and integration of computer vision algorithms.
4. Demonstrate awareness of the current key research issues in computer vision

UNIT-I: DIGITAL IMAGE FORMATION AND LOW-LEVEL PROCESSING
Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing

UNIT-II: DEPTH ESTIMATION AND MULTI-CAMERA VIEWS
Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.
Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

UNIT-III: IMAGE SEGMENTATION
Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.
Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

UNIT-IV: MOTION ANALYSIS
Motion Analysis: Background Subtraction and Modelling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

UNIT-V: SHAPE FROM X
Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; PhotometricStereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.
Applications: CBIR, CBVR, activity recognition, computational photography, biometrics, stitching and document processing. Recent Trends: 3-D Printing, 3-D sensing, simultaneous location and mapping, GPU, edge-computing, augmented reality, virtual reality cognitive models, fusion and super resolution.

TEXT BOOKS:
1. Computer Vision: Algorithms and Applications by Richard Szeliski, Springer-Verlag.

REFERENCE BOOKS:

1. Computer Vision: A Modern Approach by D. A. Forsyth and J. Ponce, Pearson Education.
2. Multiple View Geometry in Computer Vision by Richard Hartley and Andrew Zisserman, Cambridge University Press.
3. Introduction to Statistical Pattern Recognition by K. Fukunaga, Academic Press, Morgan Kaufmann.
4. Digital Image Processing by R.C. Gonzalez and R.E. Woods, PHI.

DIGITAL IMAGE PROCESSING
(Professional Elective - III)

I M.Tech II Semester | **L T P C**
Course Code: B2CI208PE | **3 - - 3**

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

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

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

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

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

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

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

TEXT BOOK:
1. Digital Image Processing: R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson Education,2^{n} Ed, 2004.

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

CLOUD SECURITY
(Professional Elective - III)

I M.Tech II Semester **L T P C**
Course Code: B2CI209PE **3 - - 3**

COURSE OBJECTIVES:
1. Understand the fundamentals of cloud computing.
2. Understand the requirements for an application to be deployed in a cloud.
3. Become knowledgeable in the methods to secure cloud.

UNIT – I
Cloud Computing Fundamentals: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture.

UNIT – II
Cloud Applications: Technologies and the processes required when deploying web services- Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages- Development environments for service development; Amazon, Azure, Google App.

UNIT – III
Securing The Cloud: Security Concepts -Confidentiality, privacy, integrity, authentication, nonrepudiation, availability, access control, defence in depth, least privilege- how these concepts apply in the cloud and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud

UNIT - IV
Virtualization Security: Multi-tenancy Issues: Isolation of users/VMs from each other- How the cloud provider can provide this- Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file system security- storage considerations, backup and recovery- Virtualization System Vulnerabilities.

UNIT - V
Cloud Security Management: Security management in the cloud – security management standards- SaaS, PaaS, IaaS availability management- access control- Data security and storage in cloud.

REFERENCE BOOKS:

1. Gautam Shroff, “Enterprise Cloud Computing Technology Architecture Applications”, Cambridge University Press; 1 edition [ISBN: 978- 0521137355], 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”,Tata McGraw-Hill Osborne Media; 1 edition 22, [ISBN: 0071626948], 2009.
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, “Cloud Security and Privacy: An EnterprisePerspective on Risks and Compliance”, O'Reilly Media; 1 edition, [ISBN: 0596802765], 2009.
4. Ronald L. Krutz, Russell Dean Vines, “Cloud Security”, Wiley [ISBN: 0470589876],, 2010.

BLOCKCHAIN TECHNOLOGY
(Professional Elective - IV)

I M.Tech II Semester **L T P C**
Course Code: B2CI210PE **3 - - 3**

COURSE OBJECTIVE:
1. Introduce block chain technology and Cryptocurrency

COURSE OUTCOME:
1. Learn about research advances related to one of the most popular technological areas today.

UNIT- I
Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowd funding

UNIT- II
Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digitalart, Block chain Environment

UNIT- III
Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bitcoin MOOCs

UNIT - IV
Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Mutiplicity, Demurrage currency

UNIT - V
Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations

TEXT BOOK:
1. Blockchain Blue print for Economy by Melanie Swan

REFERENCE BOOK:
1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st ed. Edition, by Daniel Drescher

BIOMETRICS
(Professional Elective - IV)

I M.Tech II Semester **L T P C**
Course Code: B2CI211PE **3 - - 3**

COURSE OBJECTIVES:
1. To learn the biometric technologies.
2. To learn the computational methods involved in the biometric systems.
3. To learn methods for evaluation of the reliability and quality of the biometric systems.

UNIT – I
Introduction & Handwritten Character Recognition Introduction – history – type of Biometrics – General Architecture of Biometric Systems – Basic Working of biometric Matching – Biometric System Error and performance Measures – Design of Biometric Systems – Applications of Biometrics – Benefits of Biometrics Versus Traditional Authentication Methods – character Recognition – System Overview – Gesture Extraction for character Recognition – Neural Network for handwritten Character Recognition , Multilayer Neural Network for Handwritten Character Recognition – Devanagari Numeral Recognition Isolated Handwritten Devanagari Character Recognition suing Fourier Descriptor and Hidden markov Model.

UNIT – II
Face Biometrics & Retina And Iris Biometrics Introduction –Background of Face Recognition – Design of Face Recognition System – Neural Network for Face Recognition Face Detection in Video Sequences – Challenges in Face Biometrics – Face Recognition Methods – Advantages and Disadvantages – Performance of Biometrics – Design of Retina Biometrics – Iris Segmentation Method – Determination of Iris Region – Experimental Results of Iris Localization – Applications of Iris Biometrics – Advantages and Disadvantages.

Vein And Fingerprint Biometrics & Biometric Hand Gesture Recognition For Indian Sign Language Biometrics Using Vein Pattern of Palm – Fingerprint Biometrics – Fingerprint Recognition System – Minutiae Extraction – Fingerprint Indexing – Experimental Results – Advantages and Disadvantages – Basics of Hand Geometry – Sign Language – Indian Sign Language – SIFT Algorithms- Practical Approach Advantages and Disadvantages.

UNIT – III
Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics Introduction – Privacy Concerns Associated with Biometric Developments – Identity and Privacy –Privacy Concerns – Biometrics with Privacy Enhancement – Comparison of Various Biometrics in Terms of Privacy – Soft Biometrics - Introduction to Biometric Cryptography – General Purpose Cryptosystem – Modern Cryptography and Attacks – Symmetric Key Ciphers – Cryptographic Algorithms – Introduction to Multimodal Biometrics – Basic Architecture of Multimodal Biometrics –Multimodal Biometrics Using Face and Ear – Characteristics and Advantages of Multimodal Biometrics Characters – AADHAAR : An Application of Multimodal Biometrics.

UNIT – IV
Watermarking Techniques & Biometrics: Scope and Future
Introduction – Data Hiding Methods – Basic Framework of Watermarking – Classification of Watermarking– Applications of Watermarking – Attacks on Watermarks – Performance Evaluation – Characteristics of Watermarks – General Watermarking Process – Image Watermarking Techniques – Watermarking Algorithm – Experimental Results – Effect of Attacks on Watermarking Techniques –Scope and Future Market of Biometrics – Biometric Technologies – Applications of Biometrics - Biometrics – and Information Technology Infrastructure – Role of Biometrics in Enterprise Security – Role of Biometrics in Border Security – Smart Card Technology and Biometric – Radio Frequency Identification Biometrics – DNA Biometrics – Comparative Study of Various Biometrics Techniques.

UNIT – V

Image Enhancement Techniques & Biometrics Stands: Introduction – current Research in image Enhancement Techniques – Image Enhancement – Frequency Domain Filters – Databases and Implementation – Standard Development Organizations – Application Programming Interface – InformationSecurity and Biometric Standards – Biometric Template Interoperability.

TEXT BOOKS:

1. Biometrics: Concepts and Applications by G R Sinha and Sandeep B. Patil, Wiley, 2013.
2. Biometrics for Network Security – Paul Reid, Pearson Education.

REFERENCE BOOKS:

1. Biometrics – Identity verification in a networked world – Samir Nanavathi, Micheal Thieme, Raj Nanavathi, Wiley – dream Tech.
2. Biometrics – The Ultimate Reference – John D. Woodward, Jr.Wiley Dreamtech.

NETWORK DESIGN
(Professional Elective - IV)

I M.Tech II Semester | **L T P C**
Course Code: B2CI212PE | **3 - - 3**

UNIT- I
Switching technologies, multiplexing, circuit switching, packet switching X.25, frame relax, SMDs ATM, B-ISDN, traffic matrix, traffic pattern calculations, performance issues of packet networks, delay, availability and reliability

UNIT-II
Network Design for Access: Campus network design, leased line and radio modems, DDR & ISDN Access Network design, X.25 remote access network design, Frame-relay interfaces & traffic shaping VSAT & WLAN network design. Scaling access networks

UNIT-III
Network Design for Backbone: Identification & selection of internetworking devices, CISCO routers & Nortel switches, EIGRP

UNIT-IV
Network Design for convergence: UDP broadcasts, IP Networks for Voice, Data, Video, Fax, Soft & hard design examples for IP Technology networks, network design for digital video broadcast

UNIT-V
Data Network Management Systems: Managing IP, ICMP, TCP, UDP, X.25 reporting Ethernet traffic, managing bridges & routers. Microsoft & HP, NMS Tools
Case Studies: selected from design, architecture & topology areas of internetworks.

REFERENCE BOOKS:
1. Data Network Design; D L Spolin, Mc-Graw Hill, 1993
2. SNMP “Feit” Mc-Graw Hill Inc., 1995
3. Network Design & Case Studies “CISCO Systems Inc.” , CISCO Press, 1993

WEB AND DATABASE SECURITY LAB

I M.Tech II Semester | **L T P C**
Course Code: B2CI203PC | **- - 3 1.5**

COURSE OUTCOMES:

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

1. Design of access control methods for secure web & database application development Analyze Classify the vulnerabilities in the Web and Database applications.
2. Design & implementation various methods for web & database intrusion detection. Design and Implementation security audit methods.

LIST OF EXPERIMENTS:

1. Creation and manipulation of database using SQL scripts and graphical interfaces.
2. Implementing DAC: Implementation of database security policies using DAC in oracle 10g/SQLserver
3. Implementing of MAC to ensure confidentiality and control information flow using either Oracle 10g or SQL server. This provides exposure to understand the concepts of MAC and Trojan hose
4. Implementation of Virtual Private Database using View using Oracle 10gor SQL server
5. Design a method to simulate the HTML injections and cross-site scripting (XSS) to exploit theattackers.
6. Determine HTML injection bugs and possible measures to prevent HTML injection exploits.
7. Implement Secure coding for buffer flow heap attacks.
8. Implementation of Design methods to break authentication schemes
9. Implementation of methods for abusing Design Deficiencies against web sites

INFORMATION SECURITY LAB

I M.Tech II Semester | **L T P C**
Course Code: B2CI204PC | **- - 3 1.5**

COURSE OBJECTIVES:

1. To implement the cryptographic algorithms
2. To implement the security algorithms
3. To implement cryptographic, digital signatures algorithms

LIST OF EXPERIMENTS:

1. Implementation of symmetric cipher algorithm (AES and RC4)
2. Random number generation using a subset of digits and alphabets.
3. Implementation of RSA based signature system
4. Implementation of Subset sum
5. Authenticating the given signature using MD5 hash algorithm.
6. Implementation of Diffie-Hellman algorithm
7. Implementation EIGAMAL cryptosystem.
8. Implementation of Goldwasser-Micali probabilistic public key system
9. Implementation of Rabin Cryptosystem. (Optional).
10. Implementation of Kerberos cryptosystem
11. Firewall implementation and testing.
12. Implementation of a trusted secure web transaction.
13. Cryptographic Libraries-Sun JCE/Open SSL/Bouncy Castle JCE.
14. Digital Certificates and Hybrid (ASSY/SY) encryption, PKI.
15. Message Authentication Codes.
16. Elliptic Curve cryptosystems (Optional)
17. PKCS Standards (PKCS1, 5, 11, 12), Cipher modes.

DISASTER MANAGEMENT
(Audit Course - II)

I M.Tech II Semester **L T P C**
Course Code: B2CI203AC **2 - - -**

COURSE OBJECTIVES: Students will be able to

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches,
5. Planning and programming in different countries, particularly their home country or the countries they work in.

UNIT-I:
Introduction: Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude. Disaster Prone Areas in India: Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics.

UNIT-II:
Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT-III:
Disaster Preparedness and Management: Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT-IV:
Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT-V:
Disaster Mitigation: Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

TEXT BOOKS/ REFERENCES:
1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep &Deep Publication Pvt. Ltd., New Delhi.

PERSONALITY DEVELOPMENT THROGH LIFE ENLIGHTMENT SKILLS

(Audit Course II)

I M.Tech II Semester **L T P C**

Course Code: B2CI204AC **2 - - -**

PREREQUISITE: None

COURSE OBJECTIVES:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

COURSE OUTCOMES: Students will be able to

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achievethe highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT-I:

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT-II:

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT-III:

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT-IV:

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

UNIT-V:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/ REFERENCES:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

II-YEAR (I-SEMESTER)

DIGITAL FORENSICS
(Professional Elective - V)

II M.Tech I Semester | **L T P C**
Course Code: B2CI313PE | **3 - - 3**

COURSE OBJECTIVES:
1. Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
2. Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
3. Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools
4. E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics

COURSE OUTCOMES: On completion of the course the student should be able to
1. Understand relevant legislation and codes of ethics.
2. Computer forensics and digital detective and various processes, policies and procedures.
3. E-discovery, guidelines and standards, E-evidence, tools and environment.
4. Email and web forensics and network forensics.

UNIT – I
Digital Forensics Science: Forensics science, computer forensics, and digital forensics.
Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber- criminalistics area, holistic approach to cyber-forensics.

UNIT – II
Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

UNIT - III
Evidence Management & Presentation: and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

UNIT – IV
Computer Forensics: Prepare a case, begin an investigation, understand computer forensics workstations and software, conduct an investigation, Complete a case, Critique a case
Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data.

UNIT - V
Mobile Forensics: mobile forensics techniques, mobile forensics tools.
Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008.
Recent trends in mobile forensic technique and methods to search and seizure electronic evidence

REFERENCE BOOKS:
1. John Sammons, The Basics of Digital Forensics, Elsevier
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications

SURVEILLANCE AND VIDEO ANALYTICS
(Professional Elective - V)

II M.Tech I Semester **L T P C**
Course Code: B2CI314PE **3 - - 3**

COURSE OUTCOMES:
1. Understand the algorithms available for performing analysis on video data and address the challenges
2. Understand the approaches for identifying and tracking objects and person with motion-based algorithms.
3. Understand the algorithms available for searching and matching in video content
4. Analyze approaches for action representation and recognition
5. Identify, Analyze and apply algorithms for developing solutions for real world problems

UNIT – I
Introduction: Video Analytics. Computer Vision: Challenges- Spatial Domain Processing – Frequency Domain Processing-Background Modeling-Shadow Detection-Eigen Faces - Object Detection -Local Features-Mean Shift: Clustering, Tracking - Object Tracking using Active Contours

UNIT – II
Tracking & Video Analysis: Tracking and Motion Understanding – Kalman filters, condensation, particle, Bayesian filters, hidden Markov models, change detection and model- based tracking- Motion estimation and Compensation-Block Matching Method, Hierarchical Block Matching,

UNIT - III
Overlapped Block Motion and compensation, Pel-Recursive Motion Estimation, Mesh Based Method, Optical Flow Method - Motion Segmentation -Thresholding for Change Detection, Estimation of Model parameters - Optical Flow Segmentation-Modified Hough Transform Method-

UNIT - IV
Segmentation for Layered Video Representation-Bayesian Segmentation -Simultaneous Estimation and Segmentation-Motion Field Model –Action Recognition - Low Level Image Processing for Action Recognition: Segmentation and Extraction, Local Binary Pattern, Structure from Motion –

UNIT - V
Action Representation Approaches: Classification of Various Dimension of Representation, View Invariant Methods, Gesture Recognition and Analysis, Action Segmentation.
Case Study: Face Detection and Recognition, Natural Scene Videos, Crowd Analysis, Video Surveillance, Traffic Monitoring, Intelligent Transport System.

TEXT BOOKS/REFERENCES:

1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2011.
2. Yao Wang, Jorn Ostermann and Ya-Qin Zhang, “Video Processing and Communications”, Prentice Hall, 2001.
3. A.MuratTekalp, “Digital Video Processing”, Pearson, 1995
4. Thierry Bouwmans, FatihPorikli, Benjamin Höferlin and Antoine Vacavant, “Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and Francis Group, 2014.
5. Md. Atiqur Rahman Ahad, "Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding", Atlantis Press, 2011.

DATA ANALYTICS FOR FRAUD DETECTION
(Professional Elective - V)

II M.Tech I Semester **L T P C**
Course Code: B2CI315PE **3 - - 3**

COURSE OBJECTIVES:
1. Discuss the overall process of how data analytics is applied
2. Discuss how data analytics can be used to better address and identify risks
3. Help mitigate risks from fraud and waste for our clients and organizations

COURSE OUTCOMES:
1. Formulate reasons for using data analysis to detect fraud.
2. Explain characteristics and components of the data and assess its completeness.
3. Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.
4. Automate the detection process.
5. Verify results and understand how to prosecute fraud

UNIT - I
Introduction: Defining Fraud, Anomalies versus, Fraud, Types of Fraud, Assess the Risk of Fraud, Fraud Detection, Recognizing Fraud, Data Mining versus Data Analysis and Analytics, Data Analytical Software, Anomalies versus Fraud within Data, Fraudulent Data Inclusions and Deletions.

UNIT - II
The Data Analysis Cycle, Evaluation and Analysis, Obtaining Data Files, Performing the Audit, File Format Types, Preparation for Data Analysis, Arranging and Organizing Data,
Statistics and Sampling, Descriptive Statistics, Inferential Statistics

UNIT - III
Data Analytical Tests, Benford's Law, Number Duplication Test , Z-Score, Relative Size Factor Test, Same-Same-Same Test , Same-Same-Different Test.

UNIT - IV
Advanced Data Analytical Tests, Correlation, Trend Analysis, GEL-1 and GEL-2 , Skimming and Cash Larceny, Billing schemes : and Data Familiarization, Benford's Law Tests, Relative Size Factor Test , Match Employee Address to Supplier data.

UNIT - V
Payroll Fraud, Expense Reimbursement Schemes, Register disbursement schemes

TEXT BOOK:
1. Fraud and Fraud Detection: A Data Analytics Approach by Sunder Gee, Wiley.

SEMANTIC WEB AND SOCIAL NETWORKS
(Open Elective)

II M.Tech I Semester **L T P C**
Course Code: B2CI301OE **3 - - 3**

COURSE OBJECTIVES:
1. To learn Web Intelligence
2. To learn Knowledge Representation for the Semantic Web
3. To learn Ontology Engineering
4. To learn Semantic Web Applications, Services and Technology
5. To learn Social Network Analysis and semantic web

UNIT –I:
Web Intelligence: Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT -II:
Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT-III:
Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV:
Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT-V:
Social Network Analysis and semantic web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features

TEXT BOOKS:
1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:
1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly, SPD

INTELLECTUAL PROPERTY RIGHTS
(Open Elective)

II M.Tech I Semester **L T P C**
Course Code: B2CI302OE **3 - - 3**

UNIT-I
Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para - Legal Tasks in Intellectual Property Law Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right

UNIT-II
Introduction to Trade mark – Trade mark Registration Process – Post registration Procedures – Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution Ownership of Trade mark – Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law

UNIT-III
Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration - Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act

UNIT -IV
The law of patents-patent searches –Patent ownership and transfer-Patent infringement- International Patent Law

UNIT-V
Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law

TEXT BOOKS:
1. Debirag E.Bouchoux: "Intellectual Property" 4e . Cengage learning, New Delhi
2. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi
5. J Martin and C Turner "Intellectual Property" CRC Press
6. Richard Stimm " Intellectual Property" Cengage Learning

STORAGE AREA NETWORKS
(Open Elective)

II M.Tech I Semester **L T P C**
Course Code: B2CI303OE **3 - - 3**

COURSE OBJECTIVES:
1. To understand Storage Area Networks characteristics and components.
2. To become familiar with the SAN vendors and their products
3. To learn Fibre Channel protocols and how SAN components use them to communicate with each other
4. To become familiar with Cisco MDS 9000 Multilayer Directors and Fabric Switches Thoroughly learn Cisco SAN-OS features.
5. To understand the use of all SAN-OS commands. Practice variations of SANOS features

UNIT I
Introduction to Storage Technology Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

UNIT II
Storage Systems Architecture Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system

UNIT III
Introduction to Networked Storage Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need , Understand the appropriateness of the different networked storage options for different application environments

UNIT IV
Information Availability & Monitoring & Managing Datacenter List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center.

UNIT V
Securing Storage and Storage Virtualization Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes
Case Studies The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

TEXT BOOK:
1. EMC Corporation, Information Storage and Management, Wiley.

REFERENCE BOOKS:

1. Robert Spalding, “Storage Networks: The Complete Reference“, Tata McGraw Hill, Osborne, 2003.
2. Marc Farley, “Building Storage Networks”, Tata McGraw Hill, Osborne, 2001.
3. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002.

SCRIPTING LANGUAGE
(Open Elective)

II M.Tech I Semester **L T P C**
Course Code: B2CI304OE **3 - - 3**

UNIT I
Basic features of Python-Interactive execution, comments, types ,variables, operators, expressions, Statements-assignment, input ,print, Control flow-Conditionals ,Loops ,break statement, continue statement, pass statement, Functions, definition, call, scope and lifetime of variables, keyword arguments ,default parameter values, variable length arguments, recursive functions, Functional programming-mapping ,filtering and reduction, Lambda functions ,Scope ,namespaces and modules-import statement ,creating own modules, avoiding namespace collisions when importing modules, module reload, LEBG rule, dir( ) function, iterators and generators, Sequences-Strings ,Lists and Tuples-basic operations and functions, iterating over sequences, list comprehensions, Packing and Unpacking of Sequences ,Sets and Dictionaries- operations, regular expressions, Python program examples.

UNIT II
Files-operations-opening, reading, writing, closing, file positions, file names and paths ,functions for accessing and manipulating files and directories on disk, os module, Exceptions – raising and handling exceptions, try/except statements, finally clause, standard exceptions, Object oriented programming- classes, constructors, objects, class variables, class methods, static methods, Inheritance-is-a relationship, composition, polymorphism, overriding, multiple inheritance, abstract classes, multithreaded programming, time and calendar modules, Python program examples.

UNIT III
GUI Programming with Tkinter, Widgets (Buttons, Canvas, Frame, Label, Menu, Entry, Text, Scrollbar, Combobox, Listbox, Scale), event driven programming-events, callbacks, binding, layout management-geometry managers:pack and grid, creating GUI based applications in Python.

UNIT IV
Network Programming-Sockets, Socket addresses, Connection-oriented and Connectionless Sockets, socket module, urllib module, Socket object methods, Client/Server applications(TCP/IP and UDP/IP),Socket server module, handling multiple clients, Client side scripting-Transferring files-FTP, ftplib module, ftplib. FTP class methods, sending and receiving emails- smtplib module, smtplib. SMTP class methods, poplib module, poplib.POP3 methods, Python program examples.

UNIT V
Database Programming-SQL Databases,SQLite,sqlite3 module, connect function( ),DB-API 2.0 Connection object methods, Cursor object Attributes and methods, creating Database applications in Python, Web programming-Simple web client, urllib, urlparse modules, Server side scripting-Building CGI applications-Setting up a web server, Creating the form page, Generating the results page, Saving state information in CGI Scripts, HTTP Cookies, Creating a cookie, Using cookies in CGI scripts, Handling cookies with urllib2 module, cgi module.

TEXT BOOKS:
1. Exploring Python, Timothy A. Budd, McGraw Hill Publications.
2. Core Python Programming, 2nd edition, W.J.Chun, Pearson.
3. Python Programming, R.Thareja, Oxford University Press.
4. Programming Python, 3rd edition, Mark Lutz, SPD,O'Reilly.

REFERENCE BOOKS:

1. Introduction to Computer Science using Python, Charles Dierbach, Wiley India Edition.
2. Fundamentals of Python, K. A. Lambert, B.L. Juneja, Cengage Learning.
3. Beginning Python, 2nd edition, Magnus Lie Hetland, Apress, dreamtech press.
4. Starting out with Python, 3rd edition, Tony Gaddis, Pearson.
5. Python Essential Reference, D.M.Beazley, 3rd edition, Pearson.
6. Programming in Python3, Mark Summerfield, Pearson.
7. Think Python, How to think like a computer scientist, Allen B. Downey,SPD, O'Reilly.
8. www.python.org web site.