UNIVERSITY VISION AND MISSION

VISION

B.S. Abdur Rahman Institute of Science & Technology aspires to be a leader in Education, Training and Research in Engineering, Science, Technology and Management and to play a vital role in the Socio-Economic progress of the Country.

MISSION

- To blossom into an internationally renowned University.
- To empower the youth through quality education and to provide professional leadership.
- To achieve excellence in all its endeavors to face global challenges.
- To provide excellent teaching and research ambience.
- To network with global Institutions of Excellence, Business, Industry and Research Organizations.
- To contribute to the knowledge base through Scientific enquiry, Applied Research and Innovation.

VISION AND MISSION OF THE DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To be a leader in providing quality education and training in the field of Information Technology at Undergraduate and Postgraduate levels and undertake Research activities thereby contributing to the progress of the country.

MISSION

- To impart quality education and inculcate professionalism to suit the needs of the industries and society.
- To involve graduates in undertaking need based Research activities and disseminate the knowledge to develop entrepreneur skills.
- To improve the professionalism through extension activities, industrial visits and in-plant training.
- To communicate effectively both in documentation and presentation.
- To discharge professional, social & economic responsibilities ethically.

PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES
M.Tech. (InformationTechnology)

PROGRAMME EDUCATIONAL OBJECTIVES

- To impart knowledge and skill in the analysis, design, testing and implementation of software systems.
- To focus on need based research in different domains relevant to Information Technology and carry out research projects of national and social relevance.
- To provide problem solving capability through IT tools and techniques with adequate hands on experience to meet industry/ societal needs.
- To develop communication, problem solving, team spirit and leadership skills for a successful professional carrier.

PROGRAMME OUTCOMES

On completion of the programme the graduates will

- Have professional knowledge and skill in the analysis, design, testing and implementation of software systems.
- Be empowered with adequate tools and techniques to solve problems and undertake research activities.
- Possess necessary software documentation and effective communication skills.
- Have the capability to develop, manage and lead a team of highly competent Information technologists.

B.S.ABDUR RAHMAN
UNIVERSITY
B.S. ABDUR RAHMAN INSTITUTE OF SCIENCE & TECHNOLOGY
(Estd.u/s 3 of the UGC Act, 1956)
(FORMERLY B.S.ABDUR RAHMAN CRESCENT ENGINEERING COLLEGE)
Seethakathi Estate, G.S.T. Road, Vandalur, Chennai - 600 048.

REGULATIONS 2013
FOR
M.TECH. DEGREE PROGRAMMES

B.S. ABDUR RAHMAN UNIVERSITY, CHENNAI 48.
REGULATIONS - 2013 FOR M.TECH / MCA / M.Sc. DEGREE PROGRAMMES

1.0 PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires

i) **"Programme"** means Post Graduate Degree Programme (M.Tech./ MCA / M.Sc.)

ii) **"Course"** means a theory or practical subject that is normally studied in a semester, like Applied Mathematics, Structural Dynamics, Computer Aided Design, etc.

iii) **"University"** means B.S.Abdur Rahman University, Chennai, 600048.

iv) **"Institution"** unless otherwise specifically mentioned as an autonomous or off campus institution means B.S.Abdur Rahman University.

v) **"Academic Council"** means the Academic Council of this University.

vi) **"Dean (Academic Affairs)"** means Dean (Academic Affairs) of B.S.Abdur Rahman University.

vii) **"Dean (Student Affairs)"** means Dean(Student Affairs) of B.S.Abdur Rahman University.

viii) **"Controller of Examinations"** means the Controller of Examinations of B.S.Abdur Rahman University who is responsible for conduct of examinations and declaration of results.

2.0 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

2.1 P.G. Programmes Offered

The various P.G. Programmes and their modes of study are as follows:

Degree	Mode of Study
M.Tech.	Full Time
M.Tech.	Part Time – Day / Evening
M.C.A.	Full Time
M. Sc.	Full Time

2.2 MODES OF STUDY

2.2.1 Full-time

Students admitted under "Full-Time" shall be available in the Institution during the complete working hours for curricular, co-curricular and extra-curricular activities assigned to them.

2.2.2 A full time student, who has completed all non-project courses desiring to do the Project work in part-time mode for valid reasons, shall apply to the Dean (Academic Affairs) through the Head of the Department, if the student satisfies the clause 2.3.4 of this Regulation. Permission may be granted based on merits of the case. Such conversion is not permitted in the middle of a semester.

2.2.3 Part time - Day time

In this mode of study, the students are required to attend classes for the courses registered along with full time students.

2.2.4 Part time - Evening

In this mode of study, the students are required to attend normally classes in the evening and on Saturdays, if necessary.

2.2.5 A part time student is not permitted to convert to full time mode of study.

2.3 ADMISSION REQUIREMENTS

2.3.1 Students for admission to the first semester of the Master's Degree Programme shall be required to have passed the appropriate degree examination of this University as specified in the Table shown for eligible entry qualifications for admission to P.G. programmes or any other degree examination of any University or authority accepted by this University as equivalent thereto.

2.3.2 Eligibility conditions for admission such as class obtained, number of attempts in the qualifying examination and physical fitness will be as prescribed by this Institution from time to time.

2.3.3 All part-time students should satisfy other conditions regarding experience, sponsorship etc., which may be prescribed by this Institution from time to time.

2.3.4 A student eligible for admission to M.Tech. Part Time / Day Time programme shall have his/her permanent place of work within a distance of 65km from the campus of this Institution.

2.3.5 Student eligible for admission to M.C.A under lateral entry scheme shall be required to have passed three year degree in B.Sc (Computer Science) / B.C.A / B.Sc (Information Technology)

3.0 DURATION AND STRUCTURE OF THE P.G. PROGRAMME

3.1 The minimum and maximum period for completion of the P.G. Programmes are given below:

Programme	Min.No.of Semesters	Max.No.of Semesters
M.Tech. (Full Time)	4	8
M.Tech. (Part Time)	6	12
M.C.A. (Full Time)	6	12
M.C.A. (Full Time) – (Lateral Entry)	4	8
M.Sc. (Full Time)	4	8

3.2 The PG. programmes consist of the following components as prescribed in the respective curriculum

i. Core courses
ii. Elective courses
iii. Project work / thesis / dissertation
iv. Laboratory Courses
v. Case studies
vi. Seminars
vii. Industrial Internship

3.3 The curriculum and syllabi of all PG. programmes shall be approved by the Academic Council of this University.

3.4 The minimum number of credits to be earned for the successful completion of the programme shall be specified in the curriculum of the respective specialization of the P.G. programme.

3.5 Each academic semester shall normally comprise of 80 working days. Semester-end examinations will follow immediately after the last working day.

ELIGIBLE ENTRY QUALIFICATIONS FOR ADMISSION TO P.G. PROGRAMMES

Sl. No.	Name of the Department	P.G. Programmes offered	Qualifications for admission
01.	Civil Engineering	M.Tech. (Structural Engineering)	B.E / B.Tech. (Civil Engineering) / (Structural Engineering)
		M.Tech. (Construction Engineering and Project Management)	
02.	Mechanical Engineering	M.Tech. (Manufacturing Engineering)	B.E. / B.Tech. (Mechanical / Auto / Manufacturing / Production / Industrial / Mechatronics / Metallurgy / Aerospace /Aeronautical / Material Science / Marine Engineering)
		M.Tech. CAD / CAM	
03.	Polymer Engineering	M.Tech. (Polymer Technology)	B.E./ B.Tech. degree Mech./Production/ Polymer Science or Engg or Tech / Rubber Tech / M.Sc (Polymer Sc./ Chemistry Appl. Chemistry)
04.	Electrical and Electronics Engineering	M.Tech. (Power Systems Engg)	B.E / B.Tech (EEE / ECE / E&I / I&C / Electronics / Instrumentation)
		M.Tech. (Power Electronics & Drives)	
05.	Electronics and Communication Engineering	M.Tech. (Communication Systems)	B.E / B.Tech (EEE/ ECE / E&I / I&C / Electronics / Instrumentation)
		M.Tech.(VLSI and Embedded Systems)	B.E./ B.Tech. in ECE / Electronics / EIE / ICE / EEE
		M.Tech.(Signal Processing)	
06.	ECE Department jointly with Physics Dept	M.Tech. (Optoelectronics and Laser Technology)	B.E./B.Tech. (ECE / EEE / Electronics / EIE / ICE) M.Sc (Physics / Materials Science / Electronics / Photonics)
07.	Electronics and Instrumentation Engineering	M.Tech. (Electronics and Instrumentation Engineering)	B.E./ B.Tech. (EIE/ICE/Electronics/ECE/ EEE)
08.	Computer Science and Engineering	M.Tech. (Computer Science and Engineering)	B.E. /B.Tech. (CSE/IT/ECE/EEE/EIE/ICE/ Electronics) MCA
		M.Tech. (Software Engineering)	B.E. / B.Tech. (CSE / IT) MCA
		M.Tech (Network Security)	B.E. /B.Tech. (CSE/IT/ECE/EEE/EIE/ICE/ Electronics) MCA
		M.Tech (Computer and Predictive Analytics)	
		M.Tech. (Computer Science and Engineering with specialization in Big Data Analytics)	
09	Information Technology	M.Tech. (Information Technology)	B.E /B.Tech. (IT/CSE/ECE/EEE/EIE/ICE/ Electronics) MCA
		M.Tech. (Information Security & Digital Forensics)	

ELIGIBLE ENTRY QUALIFICATIONS FOR ADMISSION TO P.G. PROGRAMMES

Sl. No.	Name of the Department	P.G. Programmes offered	Qualifications for admission
10	Computer Applications	M.C.A.	Bachelor Degree in any discipline with Mathematics as one of the subjects (or) Mathematics at +2 level
		M.C.A. (Full Time) – (Lateral Entry)	B.Sc Computer Science / B.Sc Information Technology / B.C.A
		M.Tech. (Systems Engineering and Operations Research)	BE / B.Tech. (Any Branch) or M.Sc., (Maths / Physics / Statistics / CS / IT / SE) or M.C.A.
		M.Tech. (Data & Storage Management)	
11	Mathematics	M.Sc. (Actuarial Science)	Any Degree with Mathematics / Statistics as one of the Subjects of Study.
		M.Sc. Mathematics	B.Sc. (Mathematics)
12	Physics	M.Sc.(Physics)	B.Sc.(Physics / Applied Science / Electronics / Electronics Science / Electronics & Instrumentation)
		M.Sc. (Material Science)	
13	Chemistry	M.Sc.(Chemistry)	B.Sc (Chemistry) of B.Sc. (Applied Science)
14	Life Sciences	M.Sc. Molecular Biology & Biochemistry	B.Sc. in any branch of Life Sciences
		M.Sc. Genetics	
		M.Sc. Biotechnology	
		M.Sc. Microbiology	
		M.Sc. Bioscience	

3.6 The curriculum of PG programmes shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits specified below:

Programme	Minimum prescribed credit range
M.Tech.	75 to 85
M.C.A.	120 to 130
M.Sc.	75 to 85

3.7 Credits will be assigned to the courses for all P.G. programmes as given below:

* One credit for one lecture period per week
* One credit for one tutorial period per week
* One credit each for seminar/practical session/project of two or three periods per week
* One credit for two weeks of industrial internship.

3.8 The number of credits registered by a student in non-project semester and project semester should be within the range specified below:

P.G. Programme	Non-project Semester	Project semester
M.Tech. (Full Time)	15 to 29	12 to 20
M.Tech. (Part Time)	6 to 18	12 to 16
M.C.A. (Full Time)	15 to 29	12 to 20
M.Sc. (Full Time)	15 to 25	12 to 20

3.9 The electives from the curriculum are to be chosen with the approval of the Head of the Department.

3.10 A student may be permitted by the Head of the Department to choose electives offered from other PG programmes either within the Department or from other Departments up to a maximum of three courses during the period of his/her study, provided the Heads of the Departments offering such courses also agree.

3.11 To help the students to take up special research areas in their project work and to enable the department to introduce courses in latest/emerging areas in the curriculum, "Special Electives" may be offered. A student may be permitted to register for a "Special Elective" up to a maximum of three credits during the period of his/her study, provided the syllabus of this course is recommended by the Head of the Department and approved by the Chairman, Academic Council before the commencement of the semester, in which the special elective course is offered. Subsequently, such course shall be ratified by the Board of Studies and Academic Council.

3.12 The medium of instruction, examination, seminar and project/thesis/ dissertation reports will be English.

3.13 Industrial internship, if specified in the curriculum shall be of not less than two weeks duration and shall be organized by the Head of the Department.

3.14 PROJECT WORK/THESIS/DISSERTATION

3.14.1 Project work / Thesis / Dissertation shall be carried out under the supervision of a qualified teacher in the concerned Department.

3.14.2 A student may however, in certain cases, be permitted to work for the project in an Industrial/Research Organization, on the recommendation of the Head of the Department. In such cases, the project work shall be jointly supervised by a faculty of the Department and an Engineer / Scientist from the organization and the student shall be instructed to meet the faculty periodically and to attend the review committee meetings for evaluating the progress.

3.14.3 Project work / Thesis / Dissertation (Phase - II in the case of M.Tech.) shall be pursued for a minimum of 16 weeks during the final semester, following the preliminary work carried out in Phase-1 during the previous semester.

3.14.4 The Project Report/Thesis / Dissertation report / Drawings prepared according to approved guidelines and duly signed by the supervisor(s) and the Head of the Department shall be submitted to the concerned department.

3.14.5 The deadline for submission of final Project Report / Thesis / Dissertation is within 30 calendar days from the last working day of the semester in which Project / Thesis / Dissertation is done.

3.14.6 If a student fails to submit the Project Report / Thesis / Dissertation on or before the specified deadline he / she is deemed to have not completed the Project Work / Thesis / dissertation and shall re-register the same in a subsequent semester.

3.14.7 A student who has acquired the minimum number of total credits prescribed in the Curriculum for the award of Masters Degree will not be permitted to enroll for more courses to improve his/her cumulative grade point average (CGPA).

4.0 CLASS ADVISOR AND FACULTY ADVISOR

4.1 CLASS ADVISOR

A faculty member will be nominated by the HOD as Class Advisor for the whole class.

He/she is responsible for maintaining the academic, curricular and co-curricular records of all students throughout their period of study.

4.2 FACULTY ADVISOR

To help the students in planning their courses of study and for general counseling on the academic programme, the Head of the Department of the students will attach a certain number of students to a faculty member of the department who shall function as Faculty Advisor for the students throughout their period of study. Such Faculty Advisor shall offer advice to the students on academic and personal matters, and guide the students in taking up courses for registration and enrolment every semester.

5.0 CLASS COMMITTEE

5.1 Every class of the PG Programme will have a Class Committee constituted by the Head of the Department as follows:

i. Teachers of all courses of the programme

ii. One senior faculty preferably not offering courses for the class, as Chairperson.

iii. Minimum two students of the class, nominated by the Head of the Department.

iv. Class Advisor / Faculty Advisor of the class - Ex-Officio Member

v. Professor in-charge of the PG Programme - Ex-Officio Member.

5.2 The Class Committee shall be constituted by the respective Head of the Department of the students.

5.3 The basic responsibilities of the Class Committee are to review periodically the progress of the classes to discuss problems concerning curriculum and syllabi and the conduct of classes. The type of assessment for the course will be decided by the teacher in consultation with the Class Committee and will be announced to the students at the beginning of the semester. Each Class Committee will communicate its recommendations to the Head of the Department and Dean (Academic Affairs). The class committee, without the student members, will also be responsible for finalization of the semester results and award of grades.

5.4 The Class Committee is required to meet at least thrice in a semester, first within a week of the commencement of the semester, second, after the first

assessment and the third, after the semester-end examination to finalize the grades.

6.0 COURSE COMMITTEE

Each common theory course offered to more than one group of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course coordinator. The nomination of the Course coordinator shall be made by the Head of the Department / Dean (Academic Affairs) depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The Course Committee shall meet as often as possible and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the Course Committee may also prepare a common question paper for the test(s).

7.0 REGISTRATION AND ENROLMENT

7.1 For the first semester every student has to register and enroll for all the courses.

7.2 For the subsequent semesters registration for the courses will be done by the student during a specified week before the semester-end examination of the previous semester. The curriculum gives details of the core and elective courses, project and seminar to be taken in different semester with the number of credits. The student should consult his/her Faculty Adviser for the choice of courses. The Registration form shall be filled in and signed by the student and the Faculty Adviser.

7.3 From the second semester onwards all students shall pay the prescribed fees and enroll on a specified day at the beginning of a semester.

7.4 A student will become eligible for enrolment only if he/she satisfies clause 9 and in addition he/she is not debarred from enrolment by a disciplinary action of the Institution. At the time of enrolment a student can drop a course registered earlier and also substitute it by another course for valid reasons with the consent of the Faculty Adviser. Late enrolment will be permitted on payment of a prescribed fine up to two weeks from the date of commencement of the semester.

7.5 Withdrawal from a course registered is permitted up to one week from the date of the completion of the first assessment test.

7.6 Change of a course within a period of 15 days from the commencement of the course, with the approval of Dean (Academic Affairs), on the recommendation of the HOD, is permitted.

7.7 Courses withdrawn will have to be taken when they are offered next if they belong to the list of core courses.

8.0 TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

A student may be permitted by the Dean (Academic Affairs) to avail temporary break of study from the programme up to a maximum of two semesters for reasons of ill health or other valid grounds. Such student has to rejoin only in the same semester from where he left. However the total duration for completion of the programme shall not exceed the prescribed maximum number of semesters (vide clause 3.1).

9.0 MINIMUM REQUIREMENTS TO REGISTER FOR PROJECT / THESIS / DISSERTATION

9.1 A student is permitted to register for project semester, if he/she has earned the minimum number of credits specified below:

Programme	Minimum No. of credits to be earned to enroll for project semester
M.Tech. (Full time)	18 (III semester)
M.Tech. (Part time)	18 (V semester)
M.C.A. (Full time)	45 (V semester)
M.C.A. (Full time) – (Lateral Entry)	22 (V semester)
M.Sc. (Full time)	30 (IV semester) if project is in IV semester 18 (III semester) if project is in III semester

9.2 If the student has not earned minimum number of credits specified, he/she has to earn the required credits, at least to the extent of minimum credits specified in clause 9.1 and then register for the project semester.

10.0 DISCIPLINE

10.1 Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity, which will tend to bring down the prestige of the Institution.

10.2 Any act of indiscipline of a student reported to the Head of the Institution will be referred to a Discipline and Welfare Committee for taking appropriate action.

10.3 Every student should have been certified by the HOD that his / her conduct and discipline have been satisfactory.

11.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

Attendance rules for all Full-time programme and Part-time – Day-time programmes are given in the following sub-clause.

11.1 A student should secure not less than 75% overall attendance in that semester taking into account the total no. of periods in all courses put together attended by the student as against the total no. of periods in all courses offered during that semester. If a student who could secure overall attendance between 65% and 75% only in a particular semester due to medical reasons (hospitalization / accident / specific illness) or due to participation in the College / University / State / National / International level sports events with prior permission from the Officials concerned shall be given exemption from the prescribed attendance requirement and he / she shall be permitted to appear for the current semester examinations.

The students who do not fulfill the above attendance requirement will not be permitted to write the semester end examination and will not be permitted to move to next semester. Such students should repeat all the courses of the semester in the next Academic year.

11.2 The faculty member of each course shall furnish the cumulative attendance details to the class advisor. The class advisor will consolidate and furnish the list of students who have earned less than 75% overall attendance, to the Dean (Academic Affairs) through the Head of the Department / School Dean. Thereupon, the Dean (Academic Affairs) shall issue orders preventing students from appearing for the semester end examination of all the courses of that semester.

11.3 A student who is awarded "U" grade in a course will have the option of either to write semester end arrear examination at the end of the subsequent semesters, or to redo the course whenever the course is offered. Marks earned during the redo period in the continuous assessment for the course, will be used for grading along with the marks earned in the semester-end (re-do) examination. If any student obtained "U" grade, the marks earned during the redo period for the continuous assessment for that course will be considered for further appearance as arrears.

11.4 If a student with "U" grade prefers to redo any particular course fails to earn the minimum 75% attendance while doing that course, then he/she will not be permitted to write the semester end examination and his / her earlier 'U' grade and continuous assessment marks shall continue.

12.0 ASSESSMENTS AND EXAMINATIONS

12.1 The following rule shall apply to the full-time and part-time PG programmes (M.Tech./ M.C.A. / M.Sc.)

For lecture-based courses, normally a minimum of two assessments will be made during the semester. The assessments may be combination of tests and assignments. The assessment procedure as decided in the Class Committee will be announced to the students right from the beginning of the semester by the course teacher.

12.2 There shall be one examination of three hours duration, at the end of the semester, in each lecture based course.

12.3 The evaluation of the Project work will be based on the project report and a Viva-Voce Examination by a team consisting of the supervisor concerned, an Internal Examiner and External Examiner to be appointed by the Controller of Examinations.

12.4 At the end of industrial internship, the student shall submit a certificate from the organization and also a brief report. The evaluation will be made based on this report and a Viva-Voce Examination, conducted internally by a Departmental Committee constituted by the Head of the Department.

13.0 WEIGHTAGES

13.1 The following shall be the weightages for different courses:

i)	**Lecture based course**	
	Two continuous assessments	- 50%
	Semester-end examination	- 50%
ii)	**Laboratory based courses**	
	Laboratory work assessment	- 75%
	Semester-end examination	- 25%
iii)	**Project work**	
	Periodic reviews	- 50%
	Evaluation of Project Report by External Examiner	- 20%
	Viva-Voce Examination	- 30%

13.2 Appearing for semester end examination for each course (Theory and Practical) is mandatory and a student should secure a minimum of 40% marks in semester end examination for the successful completion of the course.

13.3 The markings for all tests, tutorial, assignments (if any), laboratory work and examinations will be on absolute basis. The final percentage of marks is calculated in each course as per the weightages given in clause 13.1.

14.0 SUBSTITUTE EXAMINATION

14.1 A student who has missed for genuine reasons any one of the three assessments including semester-end examination of a course may be permitted to write a substitute examination. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accident or admissions to a hospital due to illness, etc.

14.2 A student who misses any assessment in a course shall apply in a prescribed form to the Dean (Academic Affairs) through the Head of the department within a week from the date of missed assessment. However the substitute tests and examination for a course will be conducted within two weeks after the last day of the semester-end examinations.

15.0 COURSEWISE GRADING OF STUDENTS AND LETTER GRADES

15.1 Based on the semester performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and the corresponding grade points are as follows, but grading has to be relative grading

Letter grade	Grade points
S	10
A	9
B	8
C	7
D	6
E	5
U	0
W	-
AB	-

Flexible range grading system will be adopted

“W” denotes withdrawal from the course.

"U" denotes unsuccessful performance in a course.

“AB” denotes absent for the semester end examination

15.2 A student is considered to have completed a course successfully if he / she secure five grade points or higher. A letter grade ‘U’ in any course implies unsuccessful performance in that course.

15.3 A course successfully completed cannot be repeated for any reason.

16.0 AWARD OF LETTER GRADE

16.1 A final meeting of the Class Committee without the student member(s) will be convened within ten days after the last day of the semester end examination. The letter grades to be awarded to the students for different courses will be finalized at the meeting.

16.2 After finalization of the grades at the class committee meeting the Chairman will forward the results to the Controller of Examinations, with copies to Head of the Department and Dean (Academic Affairs).

17.0 DECLARATION OF RESULTS

17.1 After finalization by the Class Committee as per clause 16.1 the Letter grades awarded to the students in the each course shall be announced on the

departmental notice board after duly approved by the Controller of Examinations.

17.2 In case any student feels aggrieved about the results, he/she can apply for revaluation after paying the prescribed fee for the purpose, within one week from the announcement of results.

A committee will be constituted by the concerned Head of the Department comprising of the Chairperson of the concerned Class Committee (Convener), the teacher concerned and a teacher of the department who is knowledgeable in the concerned course. If the Committee finds that the case is genuine, it may jointly revalue the answer script and forward the revised marks to the Controller of Examinations with full justification for the revision, if any.

17.3 The “U” and “AB” grade once awarded stays in the grade sheet of the students and is not deleted when he/she completes the course successfully later. The grade acquired by the student later will be indicated in the grade sheet of the appropriate semester.

18.0 COURSE REPETITION AND ARREARS EXAMINATION

18.1 A student should register to re-do a core course wherein "W" grade is awarded. If the student is awarded "W" grade in an elective course either the same elective course may be repeated or a new elective course may be taken.

18.2 A student who is awarded “U” or “AB” grade in a course shall write the semester-end examination as arrear examination, at the end of the next semester, along with the regular examinations of next semester courses.

18.3 A student who is awarded “U” or “AB” grade in a course will have the option of either to write semester end arrear examination at the end of the subsequent semesters, or to redo the course whenever the course is offered. Marks earned during the redo period in the continuous assessment for the course, will be used for grading along with the marks earned in the end-semester (re-do) examination.

18.4 If any student obtained “U” or “AB” grade, the marks earned during the redo period for the continuous assessment for that course will be considered for further appearance as arrears.

18.5 If a student with “U” or “AB” grade prefers to redo any particular course fails to earn the minimum 75% attendance while doing that course, then he/she

will not be permitted to write the semester end examination and his / her earlier 'U' grade and continuous assessment marks shall continue.

19.0 GRADE SHEET

19.1 The grade sheet issued at the end of the semester to each student will contain the following:

(i) the credits for each course registered for that semester.

(ii) the performance in each course by the letter grade obtained.

(iii) the total credits earned in that semester.

(iv) the Grade Point Average (GPA) of all the courses registered for that semester and the Cumulative Grade Point Average (CGPA) of all the courses taken up to that semester.

19.2 The GPA will be calculated according to the formula

$$GPA = \frac{\sum_{i=1}^{n}(C_i)(GPi)}{\sum_{i=1}^{n} C_i} \qquad Where\ \ n = number\ of\ courses$$

where C_i is the number of credits assigned for i^{th} course GP_i - Grade point obtained in the i^{th} course For the cumulative grade point average (CGPA) a similar formula is used except that the sum is over all the courses taken in all the semesters completed up to the point of time.

'W' grade will be excluded for GPA calculations.

'U', 'AB' and 'W' grades will be excluded for CGPA calculations.

19.3 Classification of the award of degree will be as follows:

CGPA	Classification
8.50 and above, having completed all courses in first appearance	First class with Distinction
6.50 and above, having completed within a period of 2 semesters beyond the programme period	First Class
All others	Second Class

However, to be eligible for First Class with Distinction, a student should not have obtained U grade in any course during his/her study and should have completed the PG Programme within a minimum period covered by the minimum duration (clause 3.1) plus authorized break of study, if any (clause 8). To be eligible for First Class, a student should have passed the examination in all courses within the specified minimum number of semesters reckoned from his/her commencement of study plus two semesters. For this purpose, the authorized break of study will not be counted. The students who do not satisfy the above two conditions will be classified as second class. For the purpose of classification, the CGPA will be rounded to two decimal places. For the purpose of comparison of performance of students and ranking, CGPA will be considered up to three decimal places.

20.0 ELIGIBILITY FOR THE AWARD OF THE MASTERS DEGREE

20.1 A student shall be declared to be eligible for the award of the Masters Degree, if he/she has:

i) successfully acquired the required credits as specified in the Curriculum corresponding to his/her programme within the stipulated time,

ii) no disciplinary action is pending against him/her

20.2 The award of the degree must be approved by the University.

21.0 POWER TO MODIFY

Notwithstanding all that have been stated above, the Academic Council has the right to modify any of the above regulations from time to time.

CURRICULUM & SYLLABI FOR M.TECH.(INFORMATION TECHNOLOGY)

(FOUR SEMESTERS / FULL TIME)

CURRICULUM

SEMESTER I

Sl. No.	Course Code	Course Title	L	T	P	C
1.	MAB 6192	Discrete Mathematics	3	1	0	4
2.	ITB 6102	Data Structures & Algorithms	3	0	0	3
3.	CSB 6102	Computer Architecture	3	1	0	4
4.	ITB6 103	Object Oriented Software Engineering	3	0	0	3
5.	ITB6 104	Computer Networks & Management	3	0	0	3
6.	ITB6 101	Research Methodology for Engineers	3	1	0	4
7.	ITB6 105	Data Structures Lab	0	0	3	1
8.	ITB 6106	Seminar	0	0	2	1
						23

SEMESTER II

Sl. No.	Course Code	Course Title	L	T	P	C
1.	ITB 6211	Computer Forensics and Information Security	3	0	0	3
2.	ITB 6212	Software Testing & Quality Assurance	3	0	0	3
3.	ITB 6213	Web Services	3	0	0	3
4.		Elective - I	3	0	0	3
5.		Elective - II	3	0	0	3
6.		Elective - III	3	0	0	3
7.	ITB 6214	Web Services Lab	0	0	3	1
8.	ITB 6215	Software Development and Testing Lab	0	0	3	1
						20

SEMESTER III

Sl. No.	Course Code	Course Title	L	T	P	C
1.		Elective - IV	3	0	0	3
2.		Elective - V	3	0	0	3
3.		Elective - VI	3	0	0	3
4.	ITB 7102	Software Project Management	3	0	0	3
5.	ITB 7101	Project Work - Phase I	0	0	12	6*
						12

SEMESTER IV

Sl. No.	Course Code	Course Title	L	T	P	C
1.	ITB 7101	Project Work - Phase II	0	0	36	18*
						18 + 6 = 24

* Credits for Project work - Phase I to be accounted along with Project work - Phase II in IV semester

TOTAL CREDITS : 79

LIST OF ELECTIVES

Sl. No.	Course Code	Course Title
1.	ITBY 01	Advanced Database Management Systems
2.	ITBY 02	Multimedia Technology and Applications
3.	ITBY 03	Distributed Systems
4.	ITBY 04	Grid Computing
5.	ITBY 05	Pervasive Computing
6.	ITBY 06	Bio Informatics
7.	ITBY 07	Cloud Computing
8.	ITBY 08	Supply Chain Management
9.	ITBY 09	Wireless Networks
10.	ITBY 10	Enterprise Resource Planning
11.	ITBY 11	Soft Computing
12.	ITBY 12	Component Based Technology
13.	ITBY 13	Web Design and Management
14.	ITBY 14	Design Patterns
15.	ITBY 15	Data Warehousing and Data Mining
16.	ITBY 16	Wireless Mobile Communication
17.	ITBY 17	Applied Cryptography
18.	ITBY 18	Digital Image Processing
19.	ITBY 19	Software Metrics
20.	ITBY 20	Service Oriented Architecture
21.	ITBY 21	Information Security In Scalable Web Applications
22.	ITBY 22	Video Processing
23.	ITBY 23	User Interface Design
24.	ITBY 24	High Speed Networks
25.	ITBY 25	Software Requirements Management
26.	SSB 7181	Society, Technology & Sustainability

SEMESTER I

		L	T	P	C
MAB6192	**DISCRETE MATHEMATICS**	**3**	**1**	**0**	**4**

OBJECTIVES:

The aim of this course is to

- Expose students to techniques of combinatorics and group theory.
- Familiarize students with graph theory.

MODULE I LOGIC **8**

Statement Calculus: Statements – Connectives – Truth Tables – Normal Forms. Predicate Calculus – Inference Theory for Statement Calculus and Predicate Calculus.

MODULE II COMBINATORICS **8**

Permutations and Combinations – Mathematical Induction – Pigeonhole principle – Principle of Inclusion and Exclusion – Recurrence relations – Solution by generating functions and characteristics equations.

MODULE III GRAPHS **7**

Graphs and graph models – Graph terminology and special types of graphs – presenting graphs and graph isomorphism – connectivity – Euler and Hamilton paths.

MODULE IV ALGEBRAIC STRUCTURES **8**

Groups – Cyclic group – Permutation group (Sn and Dn) – Substructures – Homomorphism – Cosets and Lagranges Theorem – Normal Subgroups – Rings and Fields (definition and examples).

MODULE V RECURSIVE FUNCTIONS **7**

Recursive functions – Primitive recursive functions – Computable and Non-Computable functions.

MODULE VI LATTICES **7**

Partial order relation – Posets – Hasse diagram – Lattices – Special Lattices – Boolean algebra.

L – 45; T – 15; Total Hours: 60

REFERENCES:

1. Trembley.J.P. and Manohar R. “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw – Hill Publishing Company Limited, New Delhi. Reprinted in 2007.
2. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, Tata McGraw Hill Publishing Company Limited, New Delhi. (6th Edition) Reprinted in 2007.
3. Thomas Koshy, “Discrete Mathematics with Applications”, Academic Press, Reprinted in 2005.
4. Richard Johnsonbaugh, “Discrete Mathematics”, 5th edition, Pearson Education Asia, New Delhi, 2002.
5. Grimaldi R.P. and Ramana B.V. “Discrete and Combinatorial Mathematics”, 5th edition, Pearson Education, Reprinted in 2006.

OUTCOMES:

At the end of the course students will be able to

- Test the logic of a program and identify patterns on many levels.
- Solve problems in engineering using graph and group theory.

ITB6102 DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To develop proficiency in the specification, representation and implementation of Data Types and Data Structures.
- To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
- To get a good understanding of applications of Data Structures.
- To develop a base for advanced computer science study.

MODULE I INTRODUCTION **8**

Basic concepts of OOPs - Templates - Algorithm Analysis - ADT - List (Singly, Doubly and Circular) Implementation - Array, Pointer, Cursor Implementation.

MODULE II BASIC DATA STRUCTURE **11**

Stacks and Queues - ADT, Implementation and Applications - Trees - General, Binary, Binary Search, Expression, Search, AVL, Splay, B-Trees - Implementations - Tree Traversals.

MODULE III ADVANCED DATASTRUCTURES **10**

Set - Implementation - Basic operations on set - Priority Queue - Implementation - Graphs - Directed Graphs - Shortest Path Problem - Undirected Graph - Spanning Trees - Graph Traversals.

MODULE IV MEMORY MANAGEMENT **7**

Issues - Managing Equal Sized Blocks - Garbage Collection Algorithms for Equal Sized Blocks - Storage Allocation for Objects with Mixed Sizes - Buddy Systems - Storage Compaction.

MODULE V SEARCHING, SORTING AND DESIGN TECHNIQUES **9**

Searching Techniques, Sorting - Internal Sorting - Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort - External Sorting - Merge Sort, Multi-way Merge Sort, Polyphase Sorting - Design Techniques - Divide and Conquer - Dynamic Programming - Greedy Algorithm - Backtracking - Local Search Algorithms.

Total Hours: 45

REFERENCES:

1. Mark Allen Weiss, 'Data Structures and Algorithm Analysis in C++', Pearson Education, 2002.
2. Aho, Hopcroft, Ullman, 'Data Structures and Algorithms', Pearson Education, 2002.
3. Horowitz, Sahni, Rajasekaran, 'Computer Algorithms', Galgotia, 2000
4. Tanenbaum A.S., Langram Y, Augestien M.J., 'Data Structures using C & C++', Prentice Hall of India, 2002 .

OUTCOMES:

- Implement and evaluate the appropriate data structures for specific programming problems.
- Use and manage memory efficiently in data presentation.

CSB6102	COMPUTER ARCHITECTURE Common to M.Tech. (CSE), M.Tech. (IT) & M.Tech (IS&DF)	L T P C 3 1 0 4

OBJECTIVES:

- To understand the various parameters that contribute to the performance of a computer system and the technology of achieving the best performance through these parameters.
- To acquire essential knowledge to measure or predict system performance.
- To understand the approaches in designing a new system through instruction level parallel processing to improve the performance, meeting the functionality.
- To understand how the memory hierarchy and optimization contribute to the performance of the system.

MODULE I FUNDAMENTALS OF COMPUTER DESIGN 10

Measuring and reporting performance - Quantitative principles of computer design - Classifying instruction set architecture - Memory addressing - Addressing modes - Type and size of operands - Operations in the instruction set - Operands and operations for media and signal processing - Instructions for control flow - Encoding an instruction set - Example architecture - MIPS and TM32.

MODULE II INSTRUCTION LEVEL PARALLELISM-HARDWARE APPROACHES 10

Pipelining and hazards - Concepts of ILP - Dynamic scheduling - Dynamic hardware prediction - Multiple issues - Hardware based speculation - Limitations of ILP - Case studies: IP6 Micro architecture.

MODULE III INSTRUCTION LEVEL PARALLELISM-SOFTWARE APPROACHES 9

Compiler techniques for exposing ILP - Static branch prediction - Static multiple issues: VLIW - Advanced compiler support - Hardware Vs software speculation. Case study - IA 64 and Itanium processor.

MODULE IV MEMORY HIERARCHY DESIGN 9

Memory Hierarchy - Cache performance - Reducing cache miss penalty and miss rate - Reducing hit time - Main memory and performance - Memory technology-Virtual memory and Virtual Machine and protection.

MODULE V MULTIPROCESSORS MULTI-CORE PROCESSORS 7

Symmetric and distributed shared memory architectures - Performance issues - Synchronization - Models of memory consistency - Trends in processor design – Need for multi-core processor-difference between multiprocessor and multi core processor-Thread level processing-Simultaneous multithreading – Memory Hierarchy and Cache Coherency in multi-core processor.

L – 45; T – 15; Total Hours: 60

REFERENCES:

1. John L. Hennessey and David A. Patterson, “Computer Architecture: A Quantitative Approach”, Morgan Kaufmann / Elsevier, 4th Edition, 2007.
2. D.Sima, T. Fountain and P. Kacsuk, “Advanced Computer Architectures: A Design Space Approach”, Addison Wesley, 2000.
3. Kai Hwang, “Advanced Computer Architecture Parallelism Scalability Programmability”, Tata McGraw Hill, 2001.
4. Vincent P. Heuring and Harry F. Jordan, “Computer System Design and Architecture”, Addison Wesley, 2nd Edition, 2004.
5. B.Govindarajalu, “Computer Architecture and Organization”, Tata McGraw Hill Education Pvt.Ltd., 2010.

OUTCOMES:

Students who complete this course will be able to

- suggest methods of organization of various components of a computer system and instruction set, to meet the functional requirement and to contribute to performance.
- to test the performance of a computer system.
- exploit instruction level parallel processing through software and improve the performance of the system.
- optimize the Memory Hierarchy and protection of memory.
- compare Multi-processing and Multi-core processing to optimize cost performance.

ITB6103 OBJECT ORIENTED SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To give students a detailed understanding of processes and techniques for building large object-oriented software systems.
- To develop skills to evolve object-oriented systems from analysis, to design, to implementation.
- To understand most of the major object-oriented technologies including basic OO concepts, processes, languages, databases, user interfaces, frameworks, and design patterns.
- To develop skills to work as a team for developing a software project
- To discuss and explore recent innovations in OOSE.

MODULE I CLASSICAL PARADIGM **9**

System Concepts - Project Organization - Communication - Project Management

MODULE II PROCESS MODEL **9**

Life cycle models - Unified Process - Iterative and Incremental - Workflow - Agile Processes

MODULE III ANALYSIS **9**

Requirements Elicitation - Use Cases - Unified Modeling Language, Tools - Analysis Object Model (Domain Model) - Analysis Dynamic Models - Non-functional Requirements - Analysis Patterns.

MODULE IV DESIGN **9**

System Design, Architecture - Design Principles - Design Patterns - Dynamic Object Modeling - Static Object Modeling - Interface Specification - Object Constraint Language.

MODULE V IMPLEMENTATION, DEPLOYMENT AND MAINTENANCE **9**

Mapping Design (Models) to Code - Testing - Usability - Deployment - Configuration Management – Maintenance.

Total Hours: 45

REFERENCES:

1. Bernd Bruegge, Alan H Dutoit, 'Object-Oriented Software Engineering', 2nd ed, Pearson Education, 2004.
2. Craig Larman, 'Applying UML and Patterns' 3rd ed, Pearson Education, 2005.
3. Stephen Schach, 'Software Engineering' 7th ed, McGraw-Hill, 2007.
4. Ivar Jacobson, Grady Booch, James Rumbaugh, 'The Unified Software Development Process', Pearson Education, 1999.
5. Alistair Cockburn, 'Agile Software Development' 2nd ed, Pearson Education, 2007.

OUTCOMES:

At the end of the course, the students will be able to,

- analyse and model requirements and develop software using object-oriented analysis and design.
- express object models in UML.
- use tools for software design.
- work as a member of a software development team.

ITB6104 COMPUTER NETWORKS AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the organization and functioning of computer networks.
- To explain the basic concepts of protocol design including algorithms for congestion control and flow control.
- To provide background knowledge on the basic concepts of link layer properties.
- To give some exposure on the basic concepts of wireless networks and the multimedia networks.
- To prepare the students on the basic concepts of network security.

MODULE I COMPUTER NETWORKS AND THE INTERNET 9

Network edge - Network core - Delay, loss and throughput in Packet-switched networks - Protocol layers and their service models - Networks under attack - History of computer networking and the Internet.

MODULE II APPLICATION AND TRANSPORT LAYER 9

Principles of network applications - The Web and HTTP - File transfer: File transfer protocol - DNS - Peer-to-Peer applications - Socket programming - Transport - layer and services - Multiplexing and demultiplexing - Connectionless transport: User datagram protocol - Principles of reliable data transfer - Connection-oriented transport: Principles of congestion control - Congestion control mechanism.

MODULE III THE NETWORK LAYER AND THE LINK LAYER AND LOCAL AREA NETWORKS 9

Introduction - Virtual circuit and datagram networks - Internet Protocol (IP): Routing algorithms - Routing in the Internet - Broadcast and multicast routing - Link layer : Services - Error-detection and correction techniques - Multiple access protocols - Link-layer addressing - Ethernet - Link-layer switches - Point-to-Point protocol - Link virtualization: A Network as a Link Layer.

MODULE IV WIRELESS AND MOBILE NETWORKS AND MULTIMEDIA NETWORKING 9

Introduction - Wireless links and network characteristics - WiFi: 802.11 Wireless LANs - Cellular internet access - Mobility management: Mobile IP - Managing mobility in cellular networks - Impact on higher-layer protocols - Multimedia networking applications - Streaming stored audio and video - Making the best of the Best-effort service - Protocols for real-time interactive applications - Quality of service guarantees.

MODULE V SECURITY IN COMPUTER NETWORKS & NETWORK MANAGEMENT 9

Introduction - Principles of cryptography - Message integrity - End-point authentication - Securing e-mail - Securing TCP Connections: SSL - Network layer security: Ipsec - Securing wireless LANs - Operational security: Firewalls and intrusion detection systems - Network management - The infrastructure for network management - The Internet-Standard management framework - ASN.1.

Total Hours: 45

REFERENCES:

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach”, 4th edition, Addison-Wesley, 2007.
2. Larry Peterson and Bruce Davie, “Computer Networks: A System Approach”, 4th edition, Morgan Kaufmann, 2007.
3. C. Siva Ram Murthy and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols”, Prentice Hall, 2004.
4. William Stallings, “Wireless Communications & Networks”, 2nd edition, Prentice Hall, 2005.
5. Jochen Schiller, “Mobile Communications”, 2nd edition, Addison-Wesley, 2003.

OUTCOMES:

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

- understand the concepts of security, management.
- design a networking model.
- expertise with layer services in TCP/IP.
- understand the concept of streaming for real time applications.

ITB6101 RESEARCH METHODOLOGY FOR ENGINEERS **L T P C**
3 1 0 4

OBJECTIVES:

The aim of this course is to

- make the students well versed in Data analysis.
- describe the steps involved in research process.
- explain them how to formalize research problems.
- discuss clearly the approaches for research through some case studies.

MODULE I RESEARCH PROBLEM **8**

The research problem – Sources of research problem – Information, how to deal with it – Criteria / characteristics of a good research problem – Errors in selecting a good research problem – Types of research – Nature and use of arguments.

MODULE II SAMPLING DESIGN AND SCALING TECHNIQUES **7**

Census and Sample survey – Steps in Sampling Design – Different types of Sample Designs – Complex Random Sampling Designs – Measurement scales – Techniques of Developing Measurement Tools – Scaling – Important Scaling Techniques.

MODULE III METHODS OF DATA COLLECTION AND ANALYSIS OF DATA **8**

Collection of Primary Data – different types – Some other methods of Data Collection – Collection of Secondary Data – Processing Operations – Types of Analysis – Measures of Central tendency – Measures of Dispersion.

MODULE IV LINEAR PROGRAMMING **10**

Basic of Operations Research(OR): Characteristics of Operations Research – OR and Decision making- Linear programming – Stimulation and Graphical solution of canonical and standard forms of Linear programming problem – Algebraic solution – Simplex method – Charne's method of penalties – Concept of duality – properties of duality.

MODULE V TRANSPORTATION AND ASSIGNMENT MODELS 6

Transportation Problem – Assignment Problem – Travelling Salesman Problem.

MODULE VI CASE STUDIES 6

Presentation by students on their area of research.

L – 45; T – 15; Total Hours: 60

REFERENCES:

1. Kothari, C.R., "Research Methodology: Methods and Techniques", 2nd edition, New Age International, New Delhi, 2012.
2. Nicholas Walliman, "Your Research Project", 2nd edition, Vistaar Publication, New Delhi, 2005.
3. Taha, H.A., "Operations Research - An Introduction", 9th edition, Pearson Prentice Hall, 2011.
4. Richard A. Johnson, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th edition, 2011.

OUTCOMES:

At the end of the course the students will be able to

- analyze data and apply probability concepts in research.
- solve linear programming and transportation models.

ITB6105	DATA STRUCTURES LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To become proficient with the fundamental tools of program design using structured problem solving, data representation and comparative analysis of algorithms.
- To develop the ability to design and write programs for implementation of advanced data structures.

LIST OF EXERCISES

1. Min/Max Heaps (Insertion, Delete Min / Delete Max)
2. Binary Search Trees (Insertion, Deletion and Search)
3. AVL Trees (Insertion, Deletion and Search)
4. B-Trees (Insertion, Deletion and Search)
5. Finding Spanning Trees
6. Finding connected components of a graph
7. Knapsack problem
8. Graph coloring
9. Depth-first and Breadth-first searches
10. Real time Case Studies in Data Structures

OUTCOMES:

By the end of the course, the student will

- develop intermediate to advanced level programming techniques.
- define and build various data structures.
- understand applicability for various data structures.

SEMESTER II

ITB6211	COMPUTER FORENSICS AND INFORMATION SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To have a fundamental understanding of Computer Forensics.
- To apply appropriate skills and knowledge in solving computer forensics problems.
- To apply theoretical and practical knowledge in forensic computing into the future.
- To understand the basics of Information Security.
- To know the legal, ethical and professional issues in Information Security.
- To know the technological aspects of Information Security.

MODULE I CRYPTOGRAPHY **9**

Security problem in computing – Elementary Cryptography – Symmetric Key Encryption Public Key Encryption – Uses of Encryption.

MODULE II PROGRAM & NETWORK SECURITY **9**

Security Programs – Non-malicious program Errors – Virus and other Malicious Code – Targeted Malicious Code – Control against program threats - Threats in Networks – Network Security Controls – firewalls – Intrusion Detection Systems – Secure E-Mail.

MODULE III OPERATING SYSTEM AND DATABASE **9**

Memory and Address Protection – File Protection Mechanisms – User Authentication – Trusted Operating Systems – Designing Trusted Operating Systems - Database Security Requirements – Multilevel Databases and Multilevel Security.

MODULE IV INTRODUCTION TO COMPUTER FORENSICS **9**

History of Forensics – Computer Forensic Flaws and Risks – Rules of Computer Forensics – Legal issues – Digital Forensic Principles – Digital Environments – Digital Forensic Methodologies

MODULE V AN OVERVIEW OF COMPUTER FORENSICS INVESTIGATION **9**

Router Forensics and Network Forensics – An overview of Routers – Hacking Routers – Investigating Routers – Investigating Wireless Attacks – Basics of wireless – Wireless Penetration Testing – Direct Connections to Wireless Access Point – Wireless Connect to a Wireless Access Point.

Total Hours: 45

REFERENCES:

1. Charles B. Pfleeger, Shari Lawrence Pfleeger, Fourth Edition, "Security in Computing", Pearson Education, 2006.
2. William Stallings, "Cryptography and Network Security – Principles and Practices", Sixth Edition, Pearson Education 2013.
3. Anthony Reyes, Jack Wiles, "Cybercrime and Digital Forenscis",
4. John Sammons, "The Basics of Digital Forensics", Elesvier 2012
5. Linda Volonins, Reynalds Anzaldua, "Computer Forensics for dummies", Wiley Publishing 2008.

OUTCOMES:

Upon completion of this program, students will be able to:

- have a fundamental understanding of Computer Forensics and how resultant evidence can be applied within legal cases.
- display their competence in the various forensic computing field.
- understand why security and its management are important for any modern organization.
- select appropriate techniques to tackle and solve problems in the discipline of information security.
- perform competitively as a technical support in any organization.

ITB6212 SOFTWARE TESTING AND QUALITY ASSURANCE **L T P C**
3 0 0 3

OBJECTIVES:

- To learn the basic concepts of software testing and quality assurance.
- To know the software quality standards and models.
- To learn how to write test cases for both white-box and black-box testing.

MODULE I FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE 8

Ethical basis for software quality – Total Quality Management Principles – Software processes and Methodologies.

MODULE II QUALITY STANDARDS 8

Quality Standards, Practices and Conventions – Software Configuration Management – Reviews and Audits – Enterprise Resource Planning Software.

MODULE III QUALITY METRIC SYSTEM 8

Measurement Theory – Software Quality Metrics – Designing Software Measurement Programs – Complexity Metrics and Models – Organizational Learning – Improving Quality with Methodologies – Structured/ Information Engineering.

MODULE IV SOFTWARE TESTING – INTRODUCTION 10

Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions, Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/ Tester Support for Developing a Defect Repository.

MODULE V TESTING ISSSUES 11

Introduction to Testing Design Strategies – The Smarter tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Equivalence Class Partitioning – Boundary Value Analysis – Other Black-box Test Design Approaches – Black-Box testing and COTS – Using White-Box Approach to Test design – Test Adequacy Criteria – Coverage and Control Flow Graphics – Covering Code Logic – Paths – White-box Based

Test Design – Additional White Box Test Design Approaches – Evaluating Test Adequacy Criteria.

Total Hours: 45

REFERENCES:

1. Schulmeyer G. Georden, James McManus, “Handbook of Software Quality Assurance”, Second Edition, Van Naostrand Reinhold, 1992.
2. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, 2004.
3. William E. Perry, “Effective methods for Software Testing”, Second Edition, Willey, 2000.

OUTCOMES:

- Students will be able to choose the appropriate testing technique.
- They will have capability to model the software quality.
- Students will be ready to write test cases for given software.

ITB6213	WEB SERVICES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand and effectively use the most current versions of HTML, XHTML, and CSS languages in order to produce basic Web pages.
- To understand and effectively use structure tags, format tags, hypertext links, graphics, image maps, tables, forms, and other concepts in the creation of Web pages.
- To evaluate the design and effectiveness of Web pages.
- To design attractive, dynamic, and effective Web sites.
- To announce and promote their Web sites efficiently.

MODULE I WEB SERVICES TECHNOLOGIES 8

Introduction of Web services, Evolution and differences with Distributed computing, Overview - Architecture, WSDL, SOAP, UDDI, Transactions, Business Process Execution Language for Web Services, WS-Security.

MODULE II XML TECHNOLOGY 9

XML - benefits - Advantages of XML over HTML, EDI, Databases - XML based standards - Structuring with schemas - DTD - XML Schemas - XML processing - DOM - SAX - presentation technologies - XSL - XFORMS - XHTML - Transformation - XSLT - XLINK - XPATH - XQuery.

MODULE III SOAP 9

Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns And Faults - SOAP With Attachments.

MODULE IV WEB 2.0 TECHNOLOGIES 9

Introduction to Ajax, Ajax Design Basics, JavaScript, Blogs, Wikis, and RSS feeds.

MODULE V SOA FUNDAMENTALS 10

Defining SOA, Business Value of SOA, Evolution of SOA, SOA characteristics, concept of a service in SOA, misperceptions about SOA, Basic SOA

architecture, infrastructure services, Enterprise Service Bus (ESB), SOA Enterprise Software models.

Total Hours: 45

REFERENCES:

1. Sandy Carter, “The New Language of Business: SOA & Web 2.0”, IBM Press, 2007.
2. Ferguson, “Web Services Platform Architecture: SOAP, WSDL, WS-Policy, WSAddressing, WS-BPEL, WS-Reliable Messaging, and More”, Prentice Hall Publication, 2005.
3. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Prentice Hall Publication, 2005.
4. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, “Developing Java Web Services”, Wiley Publishing Inc., 2004.
5. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services”, Pearson Education, 2004.
6. Ron Schmeltzer et al. “XML and Web Services”, Pearson Education, 2002.
7. Frank. P. Coyle, XML, “Web Services and The Data Revolution”, Pearson Education, 2002.

OUTCOMES:

After completion of the course the student will be able to do the following.

- Demonstrate the ability to design, develop and implement a simple website using HTML5.
- Demonstrate knowledge of key principles and technologies in basic website design, such as the purpose and application of HTML and CSS.
- Demonstrate knowledge and understanding of current development in web design and web standards.
- Understand Server Configurations and Services.

ITB6214	WEB SERVICES LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To understand and implement web services protocols.
- To develop XML applications and explore advanced concepts in XML.

LIST OF EXERCISES

1. XML Implementation - XML Schema – Namespaces – XQuery.
2. Parsing XML Documents using DOM Parser - Java Code for XML Tree operations.
3. Application of CSS to XML Documents
4. Implementation of JAX-RPC and XML-RPC.
5. Development and Deployment of Simple Web Service in Java.
6. Experiment of SOAP Messaging – With client and service creations.
7. Experiment of SOAP based Web Services with Modules.
8. Experiment of SOAP based Web Services with Handlers.
9. Implementation of SOAP and Web Services in PHP.
10. Implementation of AJAX and JSON.

OUTCOMES:

- To develop dynamic asynchronous web applications.
- To deploy server side applications using latest web development techniques.

ITB6215 SOFTWARE DEVELOPMENT AND TESTING LAB

L	T	P	C
0	0	3	1

OBJECTIVES:

- To practice software engineering concepts using automated tools.
- To practice object oriented system development methodologies.

LIST OF SAMPLE EXERCISES

1. Insurance Management System
2. University Mark Analyzing System
3. On line Hotel Reservation System
4. Conference Management System
5. E-Banking System

Develop the above applications using the Object Oriented System Methodologies namely:

1. Project Planning
2. Software Requirement Analysis
3. Software Estimation
4. Software Design
5. Data Modeling & Implementation
6. Software Testing
7. Software Debugging

OUTCOMES:

After completion of the course the student will be able to

- Develop any software in a systematic manner.
- To test software using automated tools.

SEMESTER III

		L	T	P	C
ITB7102	**SOFTWARE PROJECT MANAGEMENT**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To learn the basic concepts of software project management and software estimation methods.
- To know the software product and process metrics.
- To learn how to allocate resources for software projects.

MODULE I PROJECT MANAGEMENT CONCEPT 9

Evolution of Software Economics – Software Management Process Framework (Phases, Artifacts, Workflows, Checkpoints) – Agile Methodology -Software Management Disciplines (Planning / Project Organization and Responsibilities / Automation / Project Control) – Modern Project Profiles – CMMI – ISO Standards.

MODULE II SOFTWARE ESTIMATION & COSTING 10

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card.

MODULE III RISK MANAGEMENT 10

Risk Definition – Risk Categories – Risk Assessment (Identification / Analysis / Prioritization) – Risk Control (Planning / Resolution / Monitoring) – Failure Mode and Effects Analysis (FMEA)

MODULE IV METRICS 10

Need for Software Metrics – Classification of Software Metrics: Product Metrics (Size Metrics, Complexity Metrics, Halstead's Product Metrics, Quality Metrics), and Process metrics (Empirical Models, Statistical Models, Theory-based Models, Composite Models, and Reliability Models).

MODULE V PEOPLE MANAGEMENT **6**

Team Management – Client Relationship Management, PCMM

Total Hours: 45

REFERENCES:

1. McConnell, S. “Software Project: Survival Guide”, Microsoft Press, 1998.
2. Royce, W. “Software Project management: A Unified Framework”, Addison-Wesley, 1998.
3. Cooper, R., “The Rise of Activity-Based Costing- PartOne: What is an Activity-Based Cost System” Journal of Cost Management, Vol.2, No.2, pp.45 (Summer 1988).
4. Grant, J.L. “Foundations of Economic Value Added”, John Wiley & Sons, 1997.Kaplan, R.S., Norton, D.P. “The Balanced Scorecard: Translating Strategy into Action”, Harvard Business School Press, 1996.
5. Demarco, T. and Lister, T. “Peopleware: Productive Projects and Teams, 2nd Ed.”, Dorset House, 1999.

OUTCOMES:

- Students will know the software project management and software estimation methods.
- They will have capability to prepare project plan.
- Students will be ready to identify and analyze risks.

ELECTIVES

ITBY01 ADVANCED DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the architecture of database management systems.
- To get experience with analysis and design of database.
- To know the difference between DBMS, RDBMS and OODBMS.
- To understand the concept of distributed databases.
- To know about semi structured and web databases.
- To acquire knowledge about data analysis and mining.

MODULE I DATABASE SYSTEM ARCHITECTURES 9

Centralized, Client-Server, Parallel and Distributed, Relational Databases-Overview of Relational Database Design, Query Processing and Optimization.

MODULE II OBJECT & OBJECT RELATIONAL DATABASES 10

Complex Data Types, Implementing Object and Object-Relational Features, SQL3, Parallel Databases: Data Partitioning, Interquery, Intraquery, Intraoperation and Interoperation Parallelisms.

MODULE III DISTRIBUTED DATABASES 9

Distributed data storage, Transactions, Commit Protocols, Concurrency and Availability and Query Processing.

MODULE IV SEMI STRUCTURED AND WEB DATABASES 7

Data Models, XML, XML schema, Querying and Transformation, Storage of XML data.

MODULE V DATA ANALYSIS AND MINING 10

Decision-Support Systems, Data Analysis and OLAP, Data Warehousing and Data Mining, Other Emerging Database Technologies and Applications Time in Databases, Spatial and Geographic Data, Active Databases, Multimedia Databases, Mobile Databases, Genome Data Management.

Total Hours: 45

REFERENCES:

1. Ramez Elmasri and S B Navathe, 'Fundamentals of Database Systems', Fifth Edition Addison-Wesley, 2006.
2. Silberschatz, Korth and Sudarshan, 'Database System Concepts', Fifth Edition, McGraw Hill, 2005.
3. Ramakrishnan and Gehrke, 'Database Management Systems', Third Edition, McGraw Hill, 2002.

OUTCOMES:

- Understand the basic concepts of database management systems.
- Understand the concepts of transaction processing- concurrency control techniques and recovery procedures.
- Design the Databases for different applications.
- Mining the knowledge in different databases like mobile, multimedia, active, time in databases.

ITBY02 MULTIMEDIA TECHNOLOGY AND APPLICATIONS **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce students to various multimedia elements along with the theoretical underpinnings and to expose them to integration of these elements.
- Gives the technological knowledge necessary for creating multimedia content for the web, video, DVD and cellular phones, 2D and 3D graphics, sound and programming.
- Provides an insight into digital technologies, media authoring, storage and distribution tools.
- Keep up with the current development of contemporary systems of multimedia technology.

MODULE I MULTIMEDIA CONCEPTS **9**

Introduction to Multimedia: Multimedia Elements - Multimedia System Architecture - Evolving technologies for Multimedia - Defining objects for Multimedia systems - Multimedia Data interface standards - Multimedia Databases.

MODULE II MULTIMEDIA COMPONENTS **9**

Overview of Text and Character representations - Audio: Basic Concepts - Data acquisition and digitization - Audio Formats - Image : Image Representation Formats and compression techniques - Color Schemes - Video : Analogue and Digital Video - Recording Formats and Standards - Transmission of Video Signals - Video Capture - Video compression techniques.

MODULE III DOCUMENT ARCHITECTURE & CONTENT MANAGEMENT **9**

Content Management: Content Design and Development - General Design Principles - Hypertext Concepts - Open Document Architecture (ODA) - Multimedia and Hypermedia Coding Expert Group (MHEG) - Standard Generalized Markup Language (SGML) - Document Type Definition (DTD) - Hypertext Markup Language (HTML) in Web Publishing.

MODULE IV MULTIMEDIA NETWORKS **9**

Multimedia Networks: Basics of Multimedia Networks - Multimedia Network Communications and Applications - Quality of Multimedia Data Transmission

- Multimedia over IP - Multimedia over ATM Networks - Transport of MPEG-4 - Media-on-Demand (MOD).

MODULE V APPLICATIONS **9**

Multimedia in the Real World: Video conferencing - Virtual reality - Interactive video - video on demand - Training and Education - Kiosks - Image Processing - The Multimedia Office - Multimedia in the Home - Case Study: Application for Industrial - Educational and Medical Domains.

Total Hours: 45

REFERENCES:

1. Ralf Steinmetz and Klara Nahrstedt, "Multimedia:Computing, Communications and Applications", Prentice - Hall, India. 2008.
2. Vaughan T, Multimedia, Tata McGraw Hill, Seventh Edition ,2008
3. Jeffcoate, J. 'Multimedia in Practice: Technology and Application.' Prentice Hall, 2009.
4. Nalin K. Sharda, Multimedia Information Networking, Prentice-Hall, 2009.
5. Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia , Pearson Education, 2008.
6. Andleigh P.K., Thakrar K., Multimedia Systems Design (PHI).2003.
7. Steinmetz R., Nahrstedt K. Multimedia Fundamentals (Vol I: Media coding & content processing) 2nd ed - (Pearson Ed.).2002.
8. Halsall F. Multimedia Communications: Applications, Networks, Protocols and Standards, Pearson Ed., 2002.
9. Mark J Bunzel, Sandra K. Morris, Multimedia Application Development - Second Edition, McGraw Hill, 1994.

OUTCOMES:

- Familiar with features of text, audio, images, video and active contents as multimedia elements.
- Familiar with representational methods for the above elements.
- Familiar with the file formats for the above elements.
- Aware of various application softwares used to process the above elements.
- Aware of various applications of multimedia.

ITBY03 DISTRIBUTED SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the importance of communication in distributed environment and the actual implementation of various communication mechanisms.
- To study how a distributed operating system works and how it differs from the single processor OS.
- To learn how to manage the resources in a distributed environment.
- To learn how to make a distributed systems fault tolerant.
- To study how the above-mentioned techniques have been used in actual, real-life distributed systems.
- To study the various distributed systems as case studies.
- To develop a fault tolerant real time distributed system.

MODULE I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 8

Introduction - Client - Server Paradigm - Threads in distributed Systems - Remote Procedure Call - Remote Object Invocation - Message-Oriented Communication - Unicasting - group Communication - Reliable and Unreliable Multicasting.

MODULE II DISTRIBUTED OPERATING SYSTEMS 12

Issues in Distributed Operating System - Lamport's Logical clock - Vector Clock - Causal Ordering - Global States - Election Algorithms - Distributed Mutual Exclusion - Distributed Transaction - Distribute Deadlock - Agreement Protocol.

MODULE III DISTRIBUTED SHARED MEMORY 10

Introduction - Data - Centric Consistency Models - Client - Centric Consistency Models - Distribution Protocols - Consistency Protocols - ivy - Munin - Atomic Transaction.

MODULE IV FAULT TOLERENCE &DISTRIBUTED SYSTEM 8

Introduction to fault Tolerance - Distributed Commit Protocol - Distributed File System Architecture - Issues in Distributed File Systems - Sun NFS.

MODULE V CASE STUDIES **8**

Distributed Object - Based System - CORBA - COM - Distributed Coordination-Based System - JINI.

Total Hours: 45

REFERENCES:

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education Asia, 2002.
2. Mukesh Singhal, “Advanced Concepts in Operating Systems”, McGraw Hill Series in Computer Science, 1994.
3. A.S. Tanenbaum, M. Van Steen, “Distributed Systems”, Pearson Education, 2004.
4. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.

OUTCOMES:

- To understand the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
- To understand the concepts of deadlock in operating systems and how they can be managed/avoided.
- To understand communication in distributed systems and how it can be used in remote procedure calls, remote objects and message-oriented communication.
- To understand organizing principles for distributed systems through election algorithms.
- To improve the performance and reliability of distributed programs.

ITBY04	GRID COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide an overview of the basic concepts of Grid Computing.
- To highlight the advantages of deploying Grid Computing.
- To illustrate the practical adoption of a Grid deployment through real life case studies.

MODULE I CONCEPTS AND ARCHITECTURE 9

Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing- Anatomy and Physiology of Grid- Web and Grid Services-Grid Standards - OGSA-WSRF - Trends, Challenges and applications.

MODULE II GRID MONITORING 9

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems-R-GMA -Grid ICE - MDS- Service Level Agreements (SLAs) - Other Monitoring Systems- Ganglia, Grid Mon, Hawkeye and Network Weather Service.

MODULE III GRID SECURITY AND RESOURCE MANAGEMENT 9

Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principles of Local Schedulers- Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.

MODULE IV DATA MANAGEMENT AND GRID PORTALS 9

Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-Generations of Grid Portals.

MODULE V GRID MIDDLEWARE 9

List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features. Features of Next generation grid.

Total Hours: 45

REFERENCES:

1. Vladimir Silva, “Grid Computing for Developers”, Charles River Media, January 2006.

2. Borja Sotomayor, Lisa Childers, “Globus Toolkit 4 : Programming Java Services, The Elsevier Series in Grid Computing”, Morgan Kaufmann, 2005.

3. Ian Foster, Carl Kesselman, “The Grid 2: Blueprint for a New Computing Infrastructure”, Elsevier Series, 2004.

4. Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, “Grid Resource Management: State of the Art and Future Trends”, (International Series in Operations Research & Management Science), Springer; First edition, 2003

OUTCOMES:

- Upon completion of the course students will be able to understand and explain the basic concepts of Grid Computing and explain the advantages of using Grid Computing within a given environment.

ITBY05 PERVASIVE COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the fundamentals involving all elements and aspects of Pervasive Computing.
- To learn the design process of Pervasive Computing Environments / Solutions.
- To understand about hardware, software / services aspects involved.
- To have comparative study of protocols, languages, models & technologies involved.

MODULE I WIRELESS TECHNOLOGIES 9

Wireless networks- emerging technologies- Blue tooth, WiFi, WiMAX, 3G, WATM.-Mobile IP protocols -WAP push architecture-WML scripts and applications.

MODULE II MOBILE COMPUTING ENVIRONMENT 8

Mobile computing environment-functions-architecture-design considerations, content architecture -CC/PP exchange protocol, context manager. Data management in WAE-Coda files system- caching schemes- Mobility QOS. Security in mobile computing.

MODULE III MOBILITY MODELS 8

Handoff in wireless mobile networks-reference model-handoff schemes. Location management in cellular networks - Mobility models- location and tracking management schemes- time, movement, profile and distance based update strategies. ALI technologies.

MODULE IV FEATURES OF PERVASIVE COMPUTING 10

Pervasive Computing- Principles, Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing- Pervasive devices-embedded controls.- smart sensors and actuators -Context communication and access services.

MODULE V OPEN PROTOCOLS **10**

Open protocols- Service discovery technologies- SDP, Jini, SLP, UpnP protocols-data synchronization- SyncML framework - Context aware mobile services -Context aware sensor networks, addressing and communications. Context aware security.

Total Hours: 45

REFERENCES:

1. Seng Loke, “Context-Aware Computing Pervasive Systems”, Auerbach Pub., New York, 2007.
2. Asoke K Taukder, Roopa R Yavagal, “Mobile Computing”, Tata McGraw Hill Pub Co., New Delhi, 2005.
3. Ivan Stojmenovic, “Handbook of Wireless Networks and Mobile computing”, John Wiley & sons Inc, Canada, 2002.
4. Uwe Hansmann etl, “Pervasive Computing”, Springer, New York, 2001.

OUTCOME:

The course will give the convenient access to relevant information stored on powerful networks, allowing them to easily take action anywhere, anytime.

ITBY06 **BIO INFORMATICS** **L T P C**
3 0 0 3

OBJECTIVES:

- To emphasize how to use the computer as a tool for biomedical research.
- To understand the use of Databases and Data mining concepts in the field of Biology.
- To study and understand the various modeling techniques used for modeling biological data.
- To explore visualization techniques for DNA and RNA molecules.
- To be aware of the microarray technology for genome expression study.

MODULE I INTRODUCTORY CONCEPTS **9**

The Central Dogma - The Killer Application - Parallel Universes - Watson's Definition - Top Down Versus Bottom up - Information Flow - Convergence - Databases - Data Management - Data Life Cycle - Database Technology - Interfaces - Implementation - Networks - Geographical Scope - Communication Models - Transmissions Technology - Protocols - Bandwidth - Topology - Hardware - Contents - Security - Ownership - Implementation - Management.

MODULE II SEARCH ENGINES AND DATA VISUALIZATION **9**

The search process - Search Engine Technology - Searching and Information Theory - Computational methods-Search Engines and Knowledge Management - Data Visualization - sequence visualization - structure visualization - user Interface - Animation Versus simulation - General Purpose Technologies.

MODULE III STATISTICS AND DATA MINING **9**

Statistical concepts - Microarrays - Imperfect Data - Randomness - Variability - Approximation - Interface Noise - Assumptions - Sampling and Distributions - Hypothesis Testing - Quantifying Randomness - Data Analysis - Tool selection statistics of Alignment - Clustering and Classification - Data Mining - Methods - Selection and Sampling - Preprocessing and Cleaning - Transformation and Reduction - Data Mining Methods - Evaluation - Visualization - Designing new queries - Pattern Recognition and Discovery - Machine Learning - Text Mining Tools.

MODULE IV PATTERN MATCHING **9**

Pairwise sequence alignment - Local versus global alignment - Multiple sequence alignment - Computational methods - Dot Matrix analysis - Substitution matrices - Dynamic Programming - Word methods - Bayesian methods - Multiple sequence alignment - Dynamic Programming - Progressive strategies - Iterative strategies - Tools - Nucleotide Pattern Matching - Polypeptide pattern matching - Utilities - Sequence Databases.

MODULE V MODELING AND SIMULATION **9**

Drug Discovery - components - process - Perspectives - Numeric considerations - Algorithms - Hardware - Issues - Protein structure - AbInitio Methods - Heuristic methods - Systems Biology - Tools - Collaboration and Communications - standards - Issues - Security - Intellectual property.

Total Hours:45

REFERENCES:

1. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2003.
2. T.K.Attwood and D.J. Perry Smith, “Introduction to Bio Informatics”, Longman Essen, 1999.

OUTCOMES:

At the end of the course, the students would have learnt about

- The various search engine technologies and data visualizations.
- Sequencing Alignment and sequence databases.
- Various Data Mining methods.

ITBY07 CLOUD COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- To gain understanding of the basic concepts of cloud computing.
- To learn various types of cloud service development and service providers.
- To learn technology underlying the applications of cloud computing collaborative technologies.
- To learn concepts such as collaborating on event management, contact management & project managements.
- To know about advanced concepts such as web mail services, web tools in cloud computing.
- To develop the various cloud services using different types of collaborative technologies.

MODULE I CLOUD COMPUTING BASICS 8

Introduction to Cloud Computing - Essential Characteristics - Architectural Overview – Cloud Delivery Models - Service Models – Deployment models – Cloud computing vendors – Benefits of cloud computing – Limitations - Study of Hypervisors – Virtualization technology management –Types of Virtualization- Multi-tenancy.

MODULE II CLOUD COMPUTING TECHNOLOGY 8

Client- thin, thick, mobile clients- Cloud Providers and Consumers-Various Cloud Services- Accessing the Cloud- Frameworks- AJAX, Python- Web Hosting Services- Web Applications- Web API's and Web Browsers.

MODULE III CLOUD STORAGE AND STANDARDS 9

Storage as a Service – Cloud Storage Providers - Cloud File Systems - GFS and HDFS – Big Table, HBase and Dynamo DB – Cloud Data Store – Simple Storage Service – Map Reduce - Map reduce and extensions - Relational operations – Parallel Efficiency of Map Reduce.

MODULE IV CLOUD MONITORING AND SECURITY 10

Architecture for Federated Cloud Computing – SLA Management in cloud –

Service provider perspective - Performance Prediction for HPC on Clouds - Cloud security fundamentals- Privacy and Security in cloud-Cloud computing security architecture - Trusted Cloud computing- Secure Execution Environments - Identity Management and Access control.

MODULE V CLOUD CHALLENGES AND TOOLS 10

Issues in cloud computing-Implementing real time application over cloud platform- QoS Issues in Cloud – Load Balancing-cloud tools-Cloudsim-Eucalyptus- Open Nebula- Aneka.

Total Hours: 45

REFERENCES:

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach McGraw-Hill, 2010.
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, “Cloud Computing Principles and Paradigms” John Wiley & Sons, Inc Publications, 2011
3. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition), 2010.
4. Google Apps Deciphered: Compute in the cloud to streamline your desktop by Scott Granneman,Pearson Education 2009.
5. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD, O’REILLY 2009).

OUTCOMES:

Upon completion of the course students able to

- Implement cloud environment.
- Use cloud technologies.
- Provide solutions for issues in cloud computing.
- Setup private cloud environment.

ITBY08 SUPPLY CHAIN MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To explore the key issues associated with the design and management of industrial Supply Chains (SC).
- To cover the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time.
- To minimize the total supply chain cost subject to various service requirements.

MODULE I FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT 9

Supply chain networks, integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

MODULE II SCM STRATEGIES, PERFORMANCE 9

Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

MODULE III PLANNING AND MANAGING INVENTORIES 9

Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

MODULE IV DISTRIBUTION MANAGEMENT 9

Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet

size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning,

MODULE V STRATEGIC COST MANAGEMENT IN SUPPLYCHAIN 9

The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

Total Hours:45

REFERENCES:

1. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, "Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies", Second Edition, McGraw-Hill/Irwin, New York, 2003.
2. Sunil Chopra and Peter Meindel. "Supply Chain Management: Strategy, Planning, and Operation", Prentice Hall of India, 2002.
3. Sunil Chopra & Peter Meindl, "Supply Chain Management", Prentice Hall Publisher, 2001.
4. Robert Handfield & Ernest Nichols, "Introduction to Supply Chain Management", Prentice hall Publishers, 1999.

OUTCOMES:

- Students will be able to describe and explain fundamentals of SC and to derive and compute optimal policies/variables, performance measures such as costs/profits, and be aware of SC practices.
- Understand the basics of supply chain management and strategies.
- Plan and manage inventories.
- Design effective distribution management.
- Efficient handling of cost management.

ITBY09	WIRELESS NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide in-depth coverage of advances in wireless networks.
- To learn fundamentals of wireless communication.
- To understand the various components of wireless Internet.
- To learn the issues of Adhoc wireless network and wireless sensor networks.
- To understand the applications of sensor networks.
- To study an awareness of trends and developments in wireless networks.
- To develop a wireless LAN.
- To develop a wireless networks which provides quality of services to the end user.

MODULE I WIRELESS LANS, PANS AND MANS **9**

Introduction, fundamentals of WLAN -technical issues, network architecture, IEEE 802.11- physical layer, Mac layer mechanism, CSMA/CA, Bluetooth-specification, transport layer, middleware protocol group, Bluetooth profiles, WLL -generic WLL architecture, technologies, broadband wireless access, IEEE 802.16 -differences between IEEE 802.11 and 802.16,physical layer, data link layer.

MODULE II WIRELESS INTERNET **9**

Introduction -wireless internet, address mobility, inefficiency of transport layer and application layer protocol, mobile IP - simultaneous binding, route optimization, mobile IP variations, handoffs, IPv6 advancements, IP for wireless domain, security in mobile IP, TCP in wireless domain - TCP over wireless, TCPs - traditional, snoop, indirect, mobile, transaction- oriented, impact of mobility.

MODULE III AD-HOC WIRELESS NETWORK & WIRELESS SENSOR NETWORK **9**

Introduction, issues -medium access scheme, routing, multicasting, transport layer protocol, pricing scheme, QoS provisioning, self-organization, security,

addressing, service discovery, energy management, deployment consideration, ad-hoc wireless internet.

MODULE IV WIRELESS SENSOR NETWORK 9

Introduction - applications of sensor network, comparisons with MANET, issues and design challenges, architecture - layered and clustered, data dissemination, data gathering, Mac protocols, location discovery, quality of sensor network - coverage and exposure, zigbee standard.

MODULE V RECENT ADVANCES IN WIRELESS NETWORK 9

UWB radio communication- operation of UWB systems, comparisons with other technologies, major issues, advantages and disadvantages, Wi-Fi systems- service provider models, issues, interoperability of Wi-Fi and WWAN, multimode 802.11 - IEEE 802.11a/b/g - software radio-based multimode system, meghadoot architecture -802.11 phone, fundamentals of UMTS.

Total Hours:45

REFERENCES:

1. Clint Smith and Daniel Collins, “3G wireless networks”, Tata McGraw Hill, 2nd edition, 2007.
2. Kaveh Pahlavan and Prashant Krishnamurthy, “Principle of Wireless network-A unified approach”, Prentice Hall, 2006.
3. C.Siva Ram Murthy and B.S. Manoj, “Ad-hoc wireless networks-architecture and protocols”, Pearson education, 2nd, 2005.
4. Jochen Schiller, “Mobile Communication”, Pearson education, 2nd edition 2005.
5. Wlliam Stallings, “Wireless Communication and Networks”, Prentice Hall, 2nd edition, 2005.

OUTCOMES:

- Design, deploy and manage wireless local area networks.
- Identify and fix the vulnerabilities in different types of wireless networks as MANETS and WSN.
- A broad knowledge of design considerations used in wide area wireless networks.

ITBY10 ENTERPRISE RESOURCE PLANNING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the basics of ERP.
- To understand the key implementation issues of ERP.
- To know the business modules of ERP.
- To be aware of some popular products in the area of ERP.
- To appreciate the current and future trends in ERP.

MODULE I INTRODUCTION TO ERP **9**

Overview - Benefits of ERP - ERP and Related Technologies – Business Process Reengineering - Data Warehousing - Data Mining - On-line Analytical Processing - Supply Chain Management.

MODULE II ERP IMPLEMENTATION **9**

Implementation Life Cycle - Implementation Methodology - Hidden Costs - Organizing Implementation - Vendors, Consultants and Users - Contracts - IT91 Project Management and Monitoring.

MODULE III BUSINESS MODULES **9**

Business Modules in an ERP Package - Finance - Manufacturing – Human Resource - Plant Maintanance - Materials Management - Quality Management - Sales and Distribution.

MODULE IV ERP MARKET **9**

ERP Market Place - SAP AG - PeopleSoft - Baan Company - JD Edwards World Solutions Company - Oracle Corporation - QAD - System Software Associates.

MODULE V ERP - PRESENT AND FUTURE **9**

Turbo Charge the ERP System - EIA - ERP and E-Commerce - ERP and Internet - Future Directions in ERP.

Total Hours: 45

REFERENCES:

1. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, 'Concepts in Enterprise Resource Planning', Thomson Learning, 2001.
2. Alexis Leon, 'ERP Demystified', Tata McGraw Hill, 1999.
3. Vinod Kumar Garg and N.K .Venkata Krishnan, 'Enterprise Resource Planning - concepts and Planning', Prentice Hall, 1998.
4. Jose Antonio Fernandz, ' The SAP R /3 Hand book', Tata McGraw Hill,1998.

OUTCOMES:

The student should be able to:

- Describe the concept of entrepreneurship and the entrepreneurial perspective.
- Describe and analyze the entrepreneurial process, its drivers, characteristics and context.
- Apply theories about entrepreneurship to real life situations.
- Take initiatives and independently develop a business idea.
- Use the main information resources in the entrepreneurship field.
- Plan and perform a presentation within a theme about entrepreneurship as well as argue for and sell a business idea.
- Show competence regarding what business processes support systems that are available for business development.

ITBY11	SOFT COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To have the basic idea of artificial intelligence with the use of heuristics based search algorithms.
- To become familiar with neural networks that can learn from available and generalize to form appropriate rules for inference systems.
- To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy based systems.
- To familiarize with basics of genetic algorithms.
- To be able to develop an application using the various soft computing techniques.

MODULE I INTRODUCTION TO SOFT COMPUTING & NEURAL NETWORKS **10**

Evolution of Computing - Soft Computing Constituents - From Conventional AI to Computational Intelligence - Machine Learning Basics - Supervised Learning Neural Networks - Unsupervised Learning - Competitive Learning Networks - Kohonen Self - Organizing Networks - Learning Vector Quantization - Hebbian Learning.

MODULE II FUZZY SYSTEMS **9**

Fuzzy sets and Fuzzy reasoning - Fuzzy Matrices - Fuzzy functions- Decomposition - Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

MODULE III GENETIC ALGORITHMS **9**

Introduction to Genetic Algorithms (GA) - Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

MODULE IV NEURO - FUZZY MODELING **9**

Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro- Fuzzy controls - simulated annealing - Evolutionary computation.

MODULE V APPLICATION OF COMPUTATIONAL INTELLIGENCE 8

Printed Character Recognition - Inverse Kinematics Problems - Automobile Fuel Efficiency prediction - Soft Computing for Color Recipe Prediction.

Total Hours: 45

REFERENCES:

1. Jyh-shing Roger Jang, Chuen - Tsai Sun, Eiji Mizutani, “Neuro- Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.
3. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Application”, Prentice Hall, 1995.
4. Davis E. Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addision Wesley, N.Y., 1989.

OUTCOMES:

- Identify and describe soft computing techniques and their roles in building intelligent Machines.
- Recognize the feasibility of applying a soft computing methodology for a particular problem.
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- Apply genetic algorithms to combinatorial optimization problems.
- Apply neural networks to pattern classification and regression problems.
- Evaluate and compare solutions by various soft computing approaches for a given problem.

ITBY12 COMPONENT BASED TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

- Introduces in depth JAVA, CORBA and .Net Components.
- To deal with fundamental properties of components, technology and architecture and middleware.
- To cover Component Frameworks and Development in depth.

MODULE I INTRODUCTION 9

Software Components - Objects - fundamental properties of Component technology - Modules - interfaces - callbacks - directory services - component architecture - components and middleware.

MODULE II COM TECHNIQUES 9

COM - Distributed COM - COM Facilities and Services - Applying COM Objects - Interface Objects - Class - Factory Components - Servers - Clients – Object Orientation Infrastructures - Memory Transparency - Concurrency - Security.

MODULE III JAVA BASED COMPONENT TECHNOLOGIES 9

Threads - Java Beans - Events and connections - properties - introspection - JAR files - reflection - Object serialization - Enterprise Java Beans - Distributed Object models - RMI and RMI-IIOP.

MODULE IV CORBA COMPONENT TECHNOLOGIES 9

Java and CORBA - Interface Definition language- Object Request Broker - system object model - portable object adapter - CORBA services - CORBA component model - containers - application server - model driven architecture.

MODULE V NET BASED COMPONENT TECHNOLOGIES 9

COM - Distributed COM - Object reuse - interfaces and versioning - dispatch interfaces - connectable objects - OLE containers and servers - Active X controls - .NET components - assemblies - appdomains - contexts- reflection-remoting.

Total Hours:45

REFERENCES:

1. Clemens Szyperski, 'Component Software: Beyond Object-Oriented Programming', Pearson Education publishers, 2003.
2. Mowbray, 'Inside CORBA', Pearson Education, 2003.
3. Hortsamann, Cornell, 'CORE JAVA Vol-II Sun Press, 2002.
4. Feeze, 'Visual Basic Development guide for COM & COM+', BPB Publication, 2001.
5. 'Inside COM', Microsoft press, 2000.
6. Ed Roman, 'Mastering Enterprise Java Beans', John Wiley & sons Inc., 1999.

OUTCOMES:

- Can create and reuse software components for different applications.
- Familiar in using distributed computing system standards such as CORBA, Java RMI and EJB, and Microsoft's COM/DCOM.
- Learn to use the component technology in enterprise applications.
- Gain extensive information about distributed object systems and component technology.

ITBY13	WEB DESIGN AND MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand and effectively use the most current versions of HTML, XHTML, and CSS languages in order to produce basic Web pages.
- To understand and effectively use structure tags, format tags, hypertext links, graphics, image maps, tables, forms, and other concepts in the creation of Web pages.
- To evaluate the design and effectiveness of Web pages.
- To design attractive, dynamic, and effective Web sites.
- To announce and promote their Web sites efficiently.

MODULE I WEB PAGE AUTHORING FUNDAMENTALS 9

Introduction to Web Site Development -Markup Language and Site Development Essentials-XHTML Coding - Elements -Hyperlinks -Tables -Web Forms -Image Techniques -Frames -GUI HTML Editors- Introduction to Networking -TCP/IP Suite and Internet Addressing.

MODULE II WEB LANGUAGES 9

JavaScript Introduction -Functions, Methods and Events -Program Flow -Object Model - Browser Objects -Language Objects -Interactive Forms -Cookies and JavaScript Security -Client-Side JavaScript Getting Started with Perl- Intro-Arrays - Matching and Substitution -Subroutines -References-Packages - Modules.

MODULE III SERVICES, SERVERS, INTEGRITY 9

Windows 2000 DNS Server -Configuring DNS in Windows NT -NetBIOS - Managing WINS -Introduction to FTP -Virtual FTP Servers -FTP Access - Telnet -Xinetd -Web Applications -Perl and E-Commerce Web Servers -Web Servers and Gateways Web Server and Gateway Overview -Streaming Media Servers -Configuring a News Server -Optimizing Servers-Introduction to Security -SSL -Proxy Servers -Introduction to Fault Tolerance -Disaster Assessment and Recovery

MODULE IV DESIGN METHODOLOGY 9

Overview of Web Design Concepts -Web Project Management Fundamentals -Web Page Layout and Elements -Web Site Usability and Accessibility -Navigation Concepts -Web Graphics -Multimedia and The Web -Ethical and Legal Issues in Web Development -XML and XHTML -Web Page Structure -Tables and Framesets -Cascading Style Sheets -Site Content and Metadata -Site.

MODULE V DESIGN TECHNOLOGY 9

Development with Macromedia Dream weaver 8 - Advanced Features -Image Editing with Macromedia Fireworks 8-Multimedia with Macromedia Flash 8 - Timeline, Layers, Symbols and Buttons - Tweens - Movie Clips - Action script, Masks and Practical Uses -JavaScript and DHTML Fundamentals -Plus-ins and Java Applets -HTTP Servers and Web Applications -Databases -Web Site Publishing and Maintenance.

Total Hours:45

REFERENCES:

1. William Stallings, 'Data and Computer Communications', Pearson, 2007.
2. Anders Miller, Michael Schwartzbach, 'An Introduction to XML and Web Technologies', Addison Wesley, 2006.
3. L.Mohler, Flash 8 Graphics, 'Animation and Interactivity by James', Onword Press, Thomson Learning, 2006.
4. Chris Bates, 'Web Programming, building internet applications', 2nd edition, WILEY Dreamtech, 2004.
5. H. M. Deitel, P. J. Deitel and T. R. Nieto, ‘How to program’, PHI/Pearson Education Asia, 2000.
6. Jason Hunter and William Crawford, 'Java Servlet Programming', O'Reilly Pub1999.

OUTCOMES:

After completion of the course the student will be able to do the following.

- Demonstrate the ability to design, develop and implement a simple website using HTML5.

- Demonstrate knowledge of key principles and technologies in basic website design, such as the purpose and application of HTML and CSS.
- Demonstrate knowledge and understanding of current development in web design and web standards.
- Understand Server Configurations and Services.

ITBY14	DESIGN PATTERNS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn how to apply design patterns and the methodologies in it.
- To learn how to apply advanced techniques using Design Patterns.
- To obtain a general reusable solution to a commonly occurring problem within a given context in software design.
- To design a template for how to solve a problem that can be used in many different situations.
- To develop a structural design patterns addressing concerns related to high-level structures of applications being developed.

MODULE I INTRODUCTION **9**

History and origin of patterns - Applying Design Patterns - Prototyping - Testing.

MODULE II DESIGN PATTERNS **9**

Kinds of pattern - Quality and elements - patterns and rules - Creativity and patterns - Creational patterns - Structural Patterns - Behavioral Patterns, Factory Patterns.

MODULE III FRAMEWORKS **9**

State and Strategy of Patterns, Singleton, Composite, Functions and the Command Patterns, Adaptor, Proxy Patterns, Decorator Pattern - Pattern Frameworks and Algorithms.

MODULE IV CATALOGS **9**

Pattern catalogs and writing patterns, Patterns and Case Study.

MODULE V ADVANCED PATTERNS **9**

Anti-patterns - Case studies in UML and CORBA, Pattern Community.

Total Hours: 45

REFERENCES:

1. Craig Larman, "Applying UML and Patterns: "An Introduction to Object-Oriented Analysis and Design", and the Unified Process", 2nd edition, Prentice Hall, 2001.
2. James W-Cooper, "Java Design Patterns - A Tutorial", Addison Wesley 2000.
3. Eric Gamma, Richard Helm, Ralph Johnson, John Vissides, Grady Booch, "Design Patterns", 2002.
4. William J Brown et al. "Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998.
5. Thomas Mowbray and Raphel Malveaux, "CORBA and Design Patterns", John Wiley, 1997.
6. Elements of Reusable "Object-Oriented Software", Addison Wesley, 1995.

OUTCOMES:

- Apply the knowledge of design patterns in creating an object oriented application design.
- Develop new patterns for applications.
- Providing solutions for problems in software design.
- Comprehend the nature of design patterns by understanding a small number of examples from different pattern categories.

ITBY15 WAREHOUSING AND DATA MINING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concepts of data warehousing and Architecture.
- To understand the data mining concepts and techniques.
- To be able to efficiently design and manage data storages using data warehousing, and data mining techniques.
- To understand the concept of Fuzzy logic and Genetic algorithm.
- To select and apply appropriate data mining techniques for different applications.

MODULE I INTRODUCTION **9**

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining.

MODULE II PREPROCESSING TECHNIQUES **9**

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

MODULE III ASSOCIATION MINING RULES **9**

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases.

MODULE IV CLASSIFICATION AND PREDICITION **9**

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods-Neural Networks, Genetic Algorithms, and Fuzzy Systems., Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorisation of methods, Partitioning methods, Outlier Analysis.

MODULE V MULTIDIMENSIONAL ANALYSIS 9

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining.

Total Hours: 45

REFERENCES:

1. J. Han, M. Kamber, 'Data Mining: Concepts and Techniques', Harcourt India / Morgan Kauffman, 2001.
2. Margaret H.Dunham, 'Data Mining: Introductory and Advanced Topics', Pearson Education 2004.
3. David Hand, Heikki Manila, Padhraic Smyth, 'Principles of Data Mining', PHI 2004.
4. Sam Anahory, Dennis Murry, 'Data Warehousing in the real world', Pearson Education 2003.
5. W.H.Inmon, 'Building the Data Warehouse', 3rd Edition, Wiley, 2003.
6. Paulraj Ponniah, 'Data Warehousing Fundamentals', Wiley-Interscience Publication, 2003.
7. Inmon W.H., 'Building the Data Warehouse', USA: John Wiley & Sons Inc. Third Edition, 2002.
8. Alex Bezon, Stephen J.Smith, 'Data Warehousing, Data Mining & OLAP', McGraw-Hill Edition, 2001.

OUTCOMES:

- To understand the concepts of data warehousing and its architecture.
- To understand the data mining principles and techniques.
- To describe and demonstrate basic data mining algorithms, methods and tools.
- To understand the concept of Fuzzy logic and Genetic algorithm.
- To select and apply appropriate data mining techniques for different applications.

ITBY16 WIRELESS MOBILE COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the concepts of wireless / mobile communication using cellular environment.
- To make the students to know about the various modulation techniques, propagation methods, coding and multi access techniques used in the wireless communication.

MODULE I THE WIRELESS CHANNEL **10**

Overview of wireless systems - Physical modeling for wireless channels - Time and Frequency coherence - Statistical channel models - Capacity of wireless Channel- Capacity of Flat Fading Channel -- Channel Distribution Information known - Channel Side Information at Receiver - Channel Side Information at Transmitter and Receiver - Capacity with Receiver diversity - Capacity comparisons - Capacity of Frequency Selective Fading channels.

MODULE II PERFORMANCE OF DIGITAL MODULATION OVER WIRELESS CHANNELS **7**

Fading- Outage Probability- Average Probability of Error – Combined Outage and Average Error Probability – Doppler Spread – Intersymbol Interface.

MODULE III DIVERSITY **9**

Realization of Independent Fading Paths - Receiver Diversity – Selection Combing Threshold Combing - Maximal-Ratio Combing - Equal - Gain Combing - Transmitter Diversity - Channel known at Transmitter - Channel unknown at Transmitter - The Alamouti Scheme.

MODULE IV MULTICARRIER MODULATION **10**

Data Transmission using Multiple Carriers - Multicarrier Modulation with Overlapping Sub channels - Mitigation of Subcarrier Fading - Discrete Implementation of Multicarrier Modulation - Peak to average Power Ratio- Frequency and Timing offset - Case study IEEE 802.11a

MODULE V SPREAD SPECTRUM **9**

Spread Spectrum Principles - Direct Sequence Spread Spectrum - Spreading

Codes- Synchronization- RAKE receivers- Frequency Hopping Spread Spectrum - Multi-user DSSS Systems - Multi-user FHSS Systems.

Total Hours: 45

REFERENCES:

1. Andrea Goldsmith, 'Wireless Communications', Cambridge University Press, 2005
2. David Tse and Pramod Viswanath, 'Fundamentals of Wireless Communication', Cambridge University Press, 2005.
3. A.Paulraj, R.Nabar, D.Gore, 'Introduction to Space-Time Wireless Communication', Cambridge University Press, 2003.
4. T.S. Rappaport, 'Wireless Communications', Pearson Education, 2003.
5. W.C.Y.Lee, 'Mobile Communication Engineering', Mc Graw Hill, 2000.

OUTCOMES:

Upon completion of the course, students will be able to

- Apply the concepts of mobile and wireless communications in project development.
- Utilize the concepts of wireless networking standards.
- Use the concepts of wireless security and management for secure communication.
- Implement some practical mobile applications.

ITBY17 APPLIED CRYPTOGRAPHY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the classical cryptographic techniques and its security.
- To know the symmetric and public key cryptographic algorithms.
- To understand Authentication and various key distribution techniques.

MODULE I INTRODUCTION **9**

Classical Cryptography-The Shift Cipher, The Substitution Cipher, The Affine Cipher Cryptanalysis-Cryptanalysis of the Affine Cipher, Cryptanalysis of the Substitution Cipher, Cryptanalysis of the Viennese Cipher, Shannon's Theory.

MODULE II SYMMETRIC CRYPTOGRAPHY **9**

Block Cipher and the Advanced Encryption Standard-Substitution -Permutation Networks, Linear Cryptanalysis, Differential Cryptoanalysis, The Data Encryption Standard, The Advanced Encryption Standard, Modes of Operation, Cryptography Hash Function-Hash Function and Data Integrity, Security of Hash Function, Iterated Hash Functions, Message Authentication Codes.

MODULE III PUBLIC KEY CRYPTOGRAPHY **9**

The RSA Cryptosystem and Factoring Integer- Introduction to Public -key Cryptography, Number theory, The RSA Cryptosystem, Other Attacks on RSA, The ELGamal Cryptosystem, Shanks' Algorithm, Finite Fields, Elliptic Curves over the Real, Elliptical Curves Modulo a Prime, Signature Scheme -Digital Signature Algorithm.

MODULE IV AUTHENTICATION AND HASH FUNCTION **9**

Identification Scheme and Entity Attenuation-Challenge - and - Response in the Secret-key Setting, Challenge - and - Response in the Public key Setting, The SchnorrIdentificataon Scheme, Key distribution-Diffie-Hellman Key, Predustribution, Unconditionaly Secure key Predistribution, Key Agreement Scheme-Diffie-Hellman Key agreement, Public key infrastructure-PKI, Certificates, Trust Models.

MODULE V SECURITY **9**

Secret Sharing Schemes-The Shamir Threshold Scheme, Access Structure and General Secret key sharing, Information Rate and Construction of Efficient Schemes, Multicast Security and Copyright production-Multicast Security, Broadcast Encryption, Multicast Re-keying, Copyright Protection, Tracing Illegally Redistribution keys.

Total Hours: 45

REFERENCES:

1. Douglas R. Stinson, 'Cryptography Theory and Practice', Third Edition, Chapman & Hall/CRC, 2006.
2. William Stallings, 'Cryptography and Network Security: Principles and Practices', Third Edition, Pearson Education, 2006.
3. Wenbo Mao, 'Modern Cryptography - Theory and Practice', Pearson Education, First Edition, 2006.
4. Menges A. J ,Oorschot P, Vanstone S.A,'Handbollk of Appliled Cryptography' CRC Press,1997.

OUTCOMES:

- Students will understand the basic principles of modern cryptography.
- Will be able to use security technologies effectively in order to achieve elementary information security goals, such as integrity, confidentiality, and authentication.
- Be able to implement some cryptographic primitives using a standard programming language.

ITBY18 DIGITAL IMAGE PROCESSESING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To give the student experience in modeling, solving and analyzing problems using linear programming.
- To study the theory, applications, and computer usage.

MODULE I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction - Elements of visual perception, Steps in Image Processing Systems - Image Acquisition - Sampling and Quantization - Pixel Relationships - Colour Fundamentals and Models, File Formats. Introduction to the Mathematical tools.

MODULE II IMAGE ENHANCEMENT AND RESTORATION 9

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering - Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain - DFT, FFT, DCT, Smoothing and Sharpening filters - Homomorphic Filtering., Noise models, Constrained and Unconstrained restoration models.

MODULE III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

Detection of Discontinuities - Edge Operators - Edge Linking and Boundary Detection - Thresholding - Region Based Segmentation - Motion Segmentation, Feature Analysis and Extraction.

MODULE IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9

Multi Resolution Analysis: Image Pyramids - Multi resolution expansion - Wavelet Transforms, Fast Wavelet transforms, Wavelet Packets. Image Compression: Fundamentals - Models - Elements of Information Theory - Error Free Compression - Lossy Compression - Compression Standards - JPEG/ MPEG.

MODULE V APPLICATIONS OF IMAGE PROCESSING 9

Representation and Description, Image Recognition- Image Understanding - Image Classification - Video Motion Analysis - Image Fusion - Steganography - Colour Image Processing.

Total Hours: 45

REFERENCES:

1. Rafael C.Gonzalez and Richard E.Woods, 'Digital Image Processing', Third Edition, Pearson Education, 2008.

2. Milan Sonka, Vaclav Hlavac and Roger Boyle, 'Image Processing, Analysis and Machine Vision', Third Edition, Third Edition, Brooks Cole, 2008.

3. Anil K.Jain, 'Fundamentals of Digital Image Processing', Prentice-Hall India, 2007.

4. Madhuri A. Joshi, 'Digital Image Processing: An Algorithmic Approach', Prentice-Hall India, 2006.

5. Rafael C.Gonzalez, Richard E.Woods and Steven L. Eddins, 'Digital Image Processing Using MATLAB', First Edition, Pearson Education, 2004.

OUTCOMES:

By the end of the course the student should have developed the skills to consider real-world problems and determine whether or not linear programming is an appropriate modeling framework;

- Develop linear programming models that consider the key elements of the real world problem.
- Solve the models for their optimal solutions.
- Interpret the models' solutions and infer solutions to the real-world problems.

ITBY19	SOFTWARE METRICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To be aware of Core metrics for product, quality, process.
- To familiarize with the concepts of Software quality and tools for quality metrics.
- To learn more about software reliability.
- To understand important concepts of complexity metrics and OO metrics.
- Students will be able to analyze and identify metrics for software project.

MODULE I MEASUREMENTS THEORY 9

Fundamentals of measurement - Measurements in Software Engineering - Scope of Software metrics - measurements theory - Goal based framework - Software Measurement validation.

MODULE II DATA COLLECTION AND ANALYSIS 9

Empirical investigation - Planning experiments - Software metrics data Collection - Analysis methods - statistical methods.

MODULE III PRODUCTS METRICS 9

Measurement of internet product attributes - size and structure - External product attributes - measurement of quality.

MODULE IV QUALITY METRICS 9

Software quality metrics - Product quality - Process quality - metrics for software maintenance - Case studies of Metrics program - Motorola - Hp and IBM.

MODULE V MANAGEMENT METRICS 9

Quality management models - Rayleigh Model - Problem Tracking report (PTR) model - Reliability growth model - model evaluation - Orthogonal classification.

Total Hours: 45

REFERENCES:

1. Norman E - Fentar and Share Lawrence Pflieger, 'Software metrics', International Thomson Computer Press, 1997.

2. Norman E - Fentar and Share Lawrence Pflieger, 'Software metrics', International Thomson Computer Press, 1997. Stephen H.Kin, 'Metric and models in software quality engineering', Addison Wesley 1995.

3. William A. Florac and Areitor D. Carletow, 'Measuring Software Process', Addison - Wesley, 1995.

OUTCOMES:

- Students will be able to collect software product and process data for analysis
- Students will have capability to identify metrics.

ITBY20 SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES:

- To gain understanding of the key components of SOA.
- To learn service oriented analysis and design techniques.
- To learn technology underlying the service design development and implementation.
- To learn advanced concepts such as XML signature, security and WS-* specifications.
- To know about various research issues and transaction processing.
- To develop a Service Oriented Architecture (SOA) for any applications using web services.

MODULE I SOA FUNDAMENTALS 9

Software Architecture - Types of IT Architecture - SOA - Evolution - Key components - perspective of SOA - Enterprise-wide SOA - Architecture - Enterprise Applications - Solution Architecture for enterprise application - Software platforms for enterprise Applications - Patterns for SOA - SOA programming models.

MODULE II SERVICE ORIENTED ANALYSIS & DESIGN 9

Service-oriented Analysis and Design - Design of Activity, Data, Client and business process services - Technologies of SOA - SOAP - WSDL - JAX - WS - XML WS for .NET - Service integration with ESB - Scenario - Business case for SOA - stakeholder objectives - benefits of SPA - Cost Savings.

MODULE III SOA TECHNOLOGY & DESIGN 9

SOA implementation and Governance - strategy - SOA development - SOA governance - trends in SOA - event-driven architecture - software as a service - SOA technologies - proof-of-concept - process orchestration - SOA best practices.

MODULE IV XML AND WEB SERVICES SECURITY 9

Meta data management - XML security - XML signature - XML Encryption -

SAML - XACML - XKMS - WS-Security - Security in web service framework - advanced messaging.

MODULE V SOA PROTOCOL COORDINATION 9

Transaction processing - paradigm - protocols and coordination - transaction specifications - SOA in mobile - research issues

Total Hours: 45

REFERENCES:

1. Shankar Kambhampaly, "Service -Oriented Architecture for Enterprise Applications", Wiley India Pvt Ltd, 2008.
2. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2007.
3. Mark O' Neill, et al., "Web Services Security", Tata McGraw-Hill Edition, 2003.

OUTCOMES:

Upon successful completion of this subject students should be able to:

- Design modern SOA and apply SOA-specific methodologies, technologies and standards.
- Understand and describe the standards and technologies of modern web services implementations.
- Identify and select the appropriate framework components in the creation of web service solutions.
- Convert logical designs into specifications to drive any development environment.
- Orchestrate services to create new applications by leveraging SOA.

ITBY21	INFORMATION SECURITY IN SCALABLE WEB APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce security problem in computing and cryptography, Uses of Encryption.
- To know about Program Security, Non Malicious Code and control against program threats.
- To understand the XML Encryption and security, and Semantic Web.
- To study about security challenges in cloud computing and the various policies and guidelines to meet the challenges for securing data, application and infrastructure of cloud.
- To discuss the means used to manage and secure the infrastructure for cloud computing.

MODULE I CRYPTOGRAPHY **7**

Security problem in computing- Elementary Cryptography-Symmetric Key Encryption –Public Key Encryption-Uses of Encryption.

MODULE II PROGRAM SECURITY **9**

Security Programs-Non-Malicious program errors-Virus and other Malicious Code- Targeted Malicious Code-Control against program threats.

MODULE III XML SECURITY AND SEMANTIC WEB **9**

Security Overview – Canonicalization-XML security framework- XML encryption-XML Digital Signature-Semantic Web-Role of Meta data in web content-Resource description framework-Architecture of Semantic Web-Content Management Workflow.

MODULE IV CLOUD COMPUTING SECURITY **10**

Cloud Computing Security Challenges – Federation- Presence- Identity – Privacy in Cloud – SaaS Security – Secure Architecture Design – Risk Assessment – Policies- Standards and Guidelines- Secure Software Development Life Cycle- Data Security- Physical Security-Application Security.

MODULE V SECURE CLOUD INFRASTRUCTURE AND MANAGEMENT 10

Infrastructure security- Network level- host level- Application level- Security Management in the Cloud – Security Management Standards – Availability Management – SaaS Availability Management- PaaS Availability Management – Access Control- Security Vulnerability, Patch and Configuration Management – Audit and Compliance.

Total Hours: 45

REFERENCES:

1. Charles B, Pfleeger, Shari LawerencePfleeger, Third Edition, “Security in Computing”, Pearson Education, 2003.
2. Frank P.Coyle, “XML, Web Services and the Data Reveloution”, Pearson Education, 2002.
3. Tim Mather, SubraKumaraswamy, and ShahedLatif “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance”, O’Reilly Media Inc, 2009.
4. John W. Rittinghouse, James F.Ransome “Cloud Computing Implementation”, Management and Security”, CRC Press, 2010.
5. Toby Segaran, Colin Evans, & Jamie Taylor, “Programming the Semantic Web”, Orielly Press, July 2009.

OUTCOMES:

At the end of the course, the students would be exposed to ,

- Basic understanding of Security problems in web applications.
- XML Security and its advantages.
- Semantic Web Architecture.
- Security challenges in cloud computing and the standards used to meet the challenges.

ITBY22 VIDEO PROCESSESING

L	T	P	C
3	0	0	3

OBJECTIVES:

- Implement video processing techniques in new applications.
- Demonstrate an understanding of both theoretical and applications-related problems of the video processing systems.
- Know basic features of MPEG-2, MPEG-4, and H.264 video compression standards.

MODULE I VIDEO ACQUISITION AND REPRESENTATION 9

Spatial Temporal Sampling –Sampling Structure Conversion – Interpolation – Colour spaces – video formats.

MODULE II MOTION ANALYSIS 9

2D and 3D Motion Estimation and Compensation –Optical Flow methods – Block based – Point correspondences Gradient based – Intensity matching – Feature matching – Frequency domain Motion estimation.

MODULE III MOTION ANALYSIS APPLICATIONS VIDEO OBJECTRACKING AND SEGMENTATION 9

Video Summarization, Video Surveillance, Video Watermarking, Video Mosaicing.– 2D and 3D motion tracking –blob tracking – kernel based – Control tracking – Feature matching– Video Segmentation – Mean Shift based –Video shot boundary detection.

MODULE IV VIDEO FILTERING 9

Motion Compensation – Noise Filtering – Enhancement and Restoration – Video Stabilization and Super Resolution.

MODULE V VIDEO CODING REPRESENTATION AND VIDEO STANDARDS 9

MPEG 1, MPEG 2, MPEG 4, MPEG7, H.261, H.263, H.264. Video compression – Interframe Compression – 3D Waveform based – Motion Compensation.

Total Hours: 45

REFERENCES:

1. Handbook of Image and Video processing – Al Bovik (Alan C Bovik),Academic Press, Second Edition, 2005.
2. Digital Image Sequence Processing, Compression, and Analysis –Todd R. Reed, CRC Press, 2004.
3. H.264 and MPEG4 Video Compression: Video Coding for Next Generation Multimedia – Iain E. G. Richardson, Wiley, 2003
4. Digital Video Processing – A Murat Takalp, Prentice Hall, 1995.
5. IEEE Transactions of Circuits and Systems for Video Technology.

OUTCOMES:

- Sets forth practical solutions for current signal, image, and video processing problems in engineering and science.
- Apply advanced video processing solutions to problems in research or industrial environments.
- Implement a real-time application or simulation using video processing systems.

ITBY23 USER INTERFACE DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the basic characteristics of graphics and web interfaces.
- To study the basics of Human Computer Interaction.
- To study the basics of WIMP interfaces.
- To study the multimedia interfaces for the web.
- To study the principles of evaluating interfaces.
- Students will be able to design and evaluate user interface screen.

MODULE I INTRODUCTION **8**

Human-Computer Interface - Characteristics of Graphics Interface –Direct Manipulation Graphical System - Web User Interface -Popularity – Characteristic & Principles.

MODULE II HUMAN COMPUTER INTERACTION **7**

User Interface Design Process - Obstacles -Usability -Human Characteristics In Design - Human Interaction Speed -Business Functions –Requirement Analysis - Direct - Indirect Methods - Basic Business Functions – Design Standards - General Design Principles - Conceptual Model Design – Conceptual Model Mock-Ups.

MODULE III WINDOWS **12**

Characteristics- Components- Presentation Styles- Types- Managements- Organizations- Operations- Web Systems- System Timings - Device- Based Controls Characteristics- Screen - Based Controls -- Human Consideration In Screen Design - Structures Of Menus - Functions Of Menus- Contents Of Menu- Formatting - Phrasing The Menu - Selecting Menu Choice- Navigating Menus- Graphical Menus. Operate Control - Text Boxes- Selection Control- Combination Control- Custom Control- Presentation Control.

MODULE IV MULTIMEDIA **9**

Text For Web Pages - Effective Feedback- Guidance & Assistance- Internationalization - Accessibility- Icons- Image- Multimedia - Coloring.

MODULE V EVALUATION **9**

Conceptual Model Evaluation - Design Standards Evaluation - Detailed User Interface Design Evaluation.

Total Hours: 45

REFERENCES:

1. Alan Cooper, “The Essential Of User Interface Design”, Wiley - Dream Tech Ltd., 2002.
2. Sharp, Rogers, Preece, “Interaction Design”, Wiley India Edition, 2007.
3. Wilbent. O. Galitz, “The Essential Guide to User Interface Design”, John Wiley& Sons, 2001.
4. Deborah Mayhew, “The Usability Engineering Lifecycle”, Morgan Kaufmann, 1999
5. Ben Shneiderman, “Design the User Interface”, Pearson Education, 1998.

OUTCOMES:

Students will have:

- An understanding of principles and practice of creating effective human-computer interfaces.
- An ability to use a variety of interface building tools to construct application interfaces and web pages.
- Ability to perform user evaluations and usability testing of user interfaces.
- Ability to use design patterns and standard interactive components to create effective user interfaces.

ITBY24 HIGH SPEED NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- To get an introduction about ATM and Frame relay.
- To provide an up-to-date survey of developments in High Speed Networks.
- To enable the students to know techniques involved to support real-time traffic and congestion control.
- To provide the different levels of Quality of Service (QoS) to different applications.
- Students will be able to design high speed networks with Quality of Services.

MODULE I HIGH SPEED NETWORKS 8

Frame Relay Networks - Asynchronous transfer mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories - AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel - Wireless LAN's: applications, requirements - Architecture of 802.11

MODULE II CONGESTION AND TRAFFIC MANAGEMENT 8

Queuing Analysis- Queuing Models - Single Server Queues - Effects of Congestion - Congestion Control - Traffic Management - Congestion Control in Packet Switching Networks - Frame Relay Congestion Control.

MODULE III TCP AND ATM CONGESTION CONTROL 12

TCP Flow control - TCP Congestion Control - Retransmission - Timer Management -Exponential RTO backoff - KARN's Algorithm - Window management - Performance of TCP over ATM. Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic Control - ABR traffic Management - ABR rate control, RM cell formats, ABR Capacity allocations - GFR traffic management.

MODULE IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture - Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ - Random Early Detection, Differentiated Services.

MODULE V PROTOCOLS FOR QOS SUPPORT 8

RSVP - Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms - Multiprotocol Label Switching - Operations, Label Stacking, Protocol details - RTP - Protocol Architecture, Data Transfer Protocol, RTCP.

Total Hours: 45

REFERENCES:

1. IrvanPepelnjk, Jim Guichard and Jeff Apcar, 'MPLS and VPN architecture', Cisco Press, Volume 1 and 2, 2003.
2. William Stallings, 'High Speed Networks And Internet', Pearson Education, Second Edition, 2002.
3. Warland&PravinVaraiya, 'High Performance Communication Networks', Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.

OUTCOMES:

Upon completion of the course, students are able to

- Define the various high-speed networking technologies and their design issues.
- Manage projects involving any of the high-speed networking technologies.
- Design high speed networks with quality of service (QoS).
- Apply techniques involved to support real-time traffic and congestion control.

ITBY25 SOFTWARE REQUIREMENTS MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To overview about the requirements engineering.
- To learn requirements elicitation technique.
- To know about analyzing the requirements.
- To learn requirement validation technique.

MODULE I REQUIREMENTS ENGINEERING OVERVIEW 9

Software Requirement Overview - Software Development Roles -Software Development Process Kernels - Commercial Life Cycle Model - Vision Development - Stakeholders Needs and Analysis - Stakeholder needs - Stakeholder activities.

MODULE II REQUIREMENTS ELICITATION 9

The Process of Requirements Elicitation - Requirements Elicitation Problems -Problems of Scope - Problems of Understanding - Problems of Volatility - Current Elicitation Techniques - Information Gathering - Requirements Expression and Analysis - Validation - An Elicitation Methodology Framework - A Requirements Elicitation Process Model - Methodology over Method - Integration of Techniques - Fact-Finding - Requirements Gathering - Evaluation and Rationalization - Prioritization - Integration and Validation.

MODULE III REQUIREMENTS ANALYSIS 9

Identification of Functional and Non Functional Requirements - Identification of Performance Requirements - Identification of safety Requirements - Analysis - Feasibility & Internal Compatibility of System Requirements - Definition of Human Requirements Baseline.

MODULE IV REQUIREMENTS DEVELOPMENT 9

Requirements Analysis - Requirements Documentation - Requirements Development Workflow - Fundamentals of Requirements Development - Requirements Attributes Guidelines Document - Supplementary Specification Document - Use Case Specification Document - Methods for Software Prototyping - Evolutionary Prototyping -Throwaway Prototyping.

MODULE V REQUIREMENTS VALIDATION **9**

Validation Objectives - Analysis of Requirements Validation - Activities - Properties - Requirement Reviews - Requirements Testing - Case Tools For Requirements Engineering.

Total Hours: 45

REFERENCES:

1. Dean Leffingwell, Don Widrig, “Managing Software Requirements, Second Addition: A Use Case Approach”, Addison Wesley, 2003.
2. Ian Sommerville, Pete Sawyer, “Requirements Engineering: A Good Practice Guide”, John Wiley and sons, 2000.
3. Karl Eugene Wiegers, “Software Requirements”, Microsoft Press, 1999.
4. Ian Graham, “Requirements Engineering and Rapid Development”, Addison Wesley, 1998.

OUTCOME:

Students will be able to elicit the requirement and to prepare the requirement specification documents.

SSB7181 SOCIETY, TECHNOLOGY AND SUSTAINABILITY **L T P C**
3 0 0 3

OBJECTIVES:

- Aware of new technologies through advances in Science and Engineering.
- To make them realise the profound impact on society.
- Understand the ethical issues raised by technological changes and its effect on society.
- To introduce students a broad range of perspectives on the adoption and use of technologies.
- To make them realize the need of sustainability in the context of emerging technologies.

MODULE I TECHNOLOGY AND ITS IMPACTS **9**

Origin and evolution of technologies – Nature of technology- Innovation – Historical Perspective of technology – Sources of technological change - Co-evolution of technology and economy – Scientific knowledge and technological advance – Science and Engineering aspects of Technology – Impact on the Society – Social and Ethical Issues associated with technological change – Social and environmental consequences - Impact of technological change on human life –Technology and responsibility – Technology and social justice.

MODULE II TECHNOLOGY AND ITS ADVANCEMENT **9**

Sociological aspects of technology – Ethics and technology – Technology and responsibility – International Economics, Globalisation and Human Rights – Sustainability and Technology – Population and environment - Technology, Energy and Environment – Organisations and technological change.

MODULE III SOCIETY AND TECHNOLOGY **9**

Impact of technologies on contemporary society – Role of society in fostering the development of technology – Response to the adaption and use of technology – Impact of technology on developer and consumers – Technological change and globalisation.

MODULE IV IMPACT OF A SPECIFIC TECHNOLOGY ON HUMAN WELFARE 9

Impact of the following technologies on Human life – Medical and Biomedical – Genetics Technology – Electronics and Communications – Electronic media Technology – Information Systems Technology – Nanotechnology – Space Technology and Energy Technology.

MODULE V THE IMPORTANCE OF SUSTAINABILITY 9

Sustainability – A brief history – Concepts and contexts for sustainability – Ecological imbalance and biodiversity loss – Climate change – Population explosion. Industrial ecology – systems approach to sustainability – Green engineering and technology- sustainable design- sustainable manufacturing- Green consumer movements – Environmental ethics – Sustainability of the planet Earth – Future planning for sustainability.

Total Hours : 45

REFERENCES:

1. Volti Rudi, “Society and Technology Change”, 6th Edition, Worth publishers Inc, USA, 2009.
2. Arthur W.A, “The nature of Technology: What it is and how it evolves”, Free Press, NY, USA, 2009.
3. Winston M and Edelbach R, “Society, Ethics and Technology”, 3rd Edition, San Francisco, USA, 2005.
4. Martin A.A Abraham, “Sustainability Science and Engineering: Defining Principles”, Elsevier Inc, USA, 2006.
5. R.V.G.Menon, “Technology and Society”, Pearson Education, India, 2011.

OUTCOMES:

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

- understand the benefits of modern technology for the well-being of human life.
- connect sustainability concepts and technology to the real world challenges.
- find pathway for sustainable society.