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
B.Tech. (Information Technology)

PROGRAMME EDUCATIONAL OBJECTIVES

- To provide the necessary fundamental knowledge of mathematics, science and engineering concepts essential for the information technologists.
- To impart knowledge in the areas of computer architecture, algorithms & programming, communication & networking, data processing and security issues.
- To train in the use of tools and techniques for software development in different application domains and to develop as an entrepreneur.
- To provide necessary soft skills to be an effective information technology professional.
- To provide opportunities for taking up real life projects.

PROGRAMME OUTCOMES

On completion of the programme the graduate will

- Apply the knowledge of science and mathematics in solving problems related to information technology.
- Design, develop and test software as per industry requirement.
- Use appropriate tools and techniques learnt for developing software either as a self sustained entrepreneur or application developer in different domains.
- Use the knowledge and skills acquired to establish a network of systems ensuring uninterrupted and secure communication.
- Possess necessary soft skills to be an effective professional and practice ethics in the profession.

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
B.TECH. DEGREE PROGRAMMES

(WITH AMENDMENTS INCORPORATED TILL JUNE 2014)

REGULATIONS - 2013 FOR
B.TECH. DEGREE PROGRAMMES

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) **"Programme"** means B.Tech. Degree Programme.

ii) **"Branch"** means specialization or discipline of B.Tech Degree Programme like Civil Engineering, Mechanical Engineering, etc.,

iii) **"Course"** means a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics, Computer Practice, etc.,

iv) **"University"** means B.S.Abdur Rahman University.

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

vi) **"Dean (Student Affairs)"** means the Dean (Students Affairs) of B.S.Abdur Rahman University.

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

2.0 ADMISSION

2.1a) Candidates for admission to the first semester of the eight semester B.Tech. degree programme shall be required to have passed the Higher Secondary Examination of the (10+2) curriculum (Academic stream) prescribed by the appropriate authority or any other examination of any university or authority accepted by the University as equivalent thereto.

2.1b) Candidates for admission to the third semester of the eight semester B.Tech. programme under lateral entry scheme shall be required to have passed the Diploma examination in Engineering / Technology of the Department of Technical Education, Government of Tamil Nadu or any other examination of any other authority accepted by the University as equivalent thereto.

2.2 Notwithstanding the qualifying examination the candidate might have passed, the candidate shall also write an entrance examination prescribed by the University for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics and Chemistry on the standards prescribed for plus two academic stream.

2.3 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the University from time to time.

3.0 BRANCHES OF STUDY

3.1 Regulations are applicable to the following B.Tech. degree programmes in various branches of Engineering and Technology, each distributed over eight semesters with two semesters per academic year.

B.TECH. DEGREE PROGRAMMES:

1. Aeronautical Engineering
2. Automobile Engineering
3. Civil Engineering
4. Computer Science and Engineering
5. Electrical and Electronics Engineering
6. Electronics and Communication Engineering
7. Electronics and Instrumentation Engineering
8. Information Technology
9. Manufacturing Engineering
10. Mechanical Engineering
11. Polymer Engineering
12. Biotechnology
13. Cancer Biotechnology
14. Food Biotechnology

4.0 STRUCTURE OF THE PROGRAMME

4.1 Every Programme will have a curriculum with syllabi consisting of theory and practical courses such as,

i) Basic Sciences (BS)

ii) Humanities & Social Sciences (HS)

iii) Management Sciences (MS)

iv) Engineering Sciences Fundamentals (ESF)

v) Engineering Core Courses (EC)

vi) Professional Electives (PE)

vii) General Electives (GE)

viii) Workshop practice, laboratory work, industrial training, seminar presentation, project work, etc.

4.2 Each course is normally assigned certain number of credits :

one credit per lecture period per week

one credit per tutorial period per week

one credit for two to three periods and two credits for four periods of laboratory or practical courses

one credit for two periods of seminar / project work per week

one credit for two weeks of industrial training

4.3 Each semester curriculum shall normally have a blend of lecture courses not exceeding seven and practical courses not exceeding four.

4.4 For the award of the degree, a student has to earn a minimum total credits specified in the curriculum of the relevant branch of study. This minimum will be between 175 and 185 credits, depending on the program.

4.5 The medium of instruction, examinations and project report shall be English, except for courses on languages other than English.

5.0 DURATION OF THE PROGRAMME

5.1 A student is ordinarily expected to complete the B.Tech. programme in eight semesters (six semesters in the case of a lateral entry scheme), but in any case not more than 14 continuous semesters reckoned from the date of first admission (12 semesters in the case of lateral entry student).

5.2 Each semester shall consist of a minimum of 90 working days or 450 periods.

5.3 Semester end examination will normally follow immediately after the last working day of the semester.

6.0 CLASS ADVISOR AND FACULTY ADVISOR

6.1 CLASS ADVISOR

A faculty member will be nominated by the HOD as Class Advisor for the whole class (2^{nd} to 8^{th} semester).

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

However, for the first semester alone the class advisors and faculty advisors will be nominated by first year coordinator.

6.2 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.

7.0 COURSE COMMITTEE

Common course offered to more than one discipline or group, shall have a "Course Committee", comprising all the faculty members 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 on whether all the faculty members teaching the common course belong to the same department / different departments.

8.0 CLASS COMMITTEE

For the first semester, a common Class Committee will be constituted for all branches by the Dean (Academic Affairs). During other semesters, separate Class Committees will be constituted by the respective Head of the Department of the students

8.1 The first semester Class Committee composition will be as follows:

i) The first semester Coordinator shall be the Chairman of the class committee

ii) Course coordinators of all common courses.

iii) Faculty members of all individual courses.

iv) One male and one female first semester student of each class of B.Tech, program to be nominated by the first semester coordinator

v) All first semester class advisors and faculty advisors

8.2 The composition of the class committee for each branch of B.Tech, from 2nd to 8th semester, will be as follows:

i) One senior faculty member preferably not teaching to the concerned class, appointed as Chairman by the Head of the Department

ii) Faculty members of individual courses

iii) Two students, (preferably one male and one female) of the class per group of 30 students or part thereof, to be nominated by the Head of the Department, in consultation with the faculty advisors.

iv) All faculty advisors and the class advisor of the class

v) Head of the Department

8.3 The class committee shall meet at least thrice during the semester. The first meeting will be held within two weeks from the date of commencement of classes, in which the nature of continuous assessment for various courses and the weightages for each component of assessment will be decided for the first, second and third assessments. The second meeting will be held within a week after the date of first assessment report, to review the students' performance and for follow up action. The third meeting will be held within a week after the second assessment report, to review the students' performance and for follow up action.

8.4 During these three meetings the student members representing the entire class, shall meaningfully interact and express opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

8.5 The class committee, excluding the student members, shall meet within 10 days from the last day of the semester end examination to analyze the performance of the students in all the components of assessments and decide the grades for students in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the concerned course coordinator.

9.0 REGISTRATION AND ENROLMENT

9.1 Except for the first semester, every student shall register for the ensuing semester during a specified week before the semester end examination of the current semester. Every student shall submit a completed Registration form indicating the list of courses intended to be enrolled during the ensuing semester. Late registration along with a late fee will be permitted up to the last working day of the current semester.

9.2 From the second year onwards, all students shall pay the prescribed fees for the year on a specific day at the beginning of the semester confirming the registered courses. Late enrolment along with a late fee will be permitted up to two weeks from the date of commencement of classes. If a student does not enroll, his/her name will be removed from rolls.

9.3 The students of first semester shall register and enroll at the time of admission by paying the prescribed fees.

9.4 A student should have registered for all preceding semesters before registering for a particular semester.

10.1 CHANGE OF A COURSE

A student can change an enrolled course within 15 days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

10.2 WITHDRAWAL FROM A COURSE

A student can withdraw from an enrolled course at any time before the second assessment for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

11.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

A student can avail a onetime temporary break of study covering the current semester and/or next semester period with the approval of the Head of the Institution at any time before the start of third assessment of current semester, within the maximum period of 14 or 12 semesters as the case may be. If any student is debarred for want of attendance or suspended due to any act of indiscipline it will not be considered as break of study.

A student availed break of study has to rejoin only in the same semester from where he left.

12.0 CREDIT LIMIT FOR ENROLMENT & MOVEMENT TO HIGHER SEMESTER

12.1 A student can enroll for a maximum of 30 credits during a semester including redo courses.

12.2 The minimum credit requirement to move to the higher semester is

- Not less than a total of 20 credits, to move to the 3rd semester
- Not less than a total of 40 credits, (20 for lateral entry) to move to the 5th semester
- Not less than a total of 60 credits, (40 for lateral entry) to move to the 7th semester

13.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

13.1 Every theory course shall have a total of four assessments during a semester as given below:

Assessment No.	Course Coverage in Weeks	Duration	Weightage of Marks
Assessment 1	1 to 4	1.5 hours	15%
Assessment 2	5 to 8	1.5 hours	15%
Assessment 3	9 to 12	1.5 hours	15%
Attendance #	-	-	5%
Semester End Exam	Full course	3 hours	50 %

\# 76-80% - 1 Mark ; 81-85 – 2 Marks ; 86-90 – 3 Marks ; 91-95 – 4 Marks and 96 – 100 – 5 Marks

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

13.3 Every practical course will have 60% weightage for continuous assessment and 40% for semester end examination. However, a student should have secured a minimum of 50% marks in the semester end practical examination.

13.4 In the case of Industrial training, the student shall submit a report, which will be evaluated along with an oral examination by a committee of faculty members, constituted by the Head of the department. A progress report from the industry will also be taken into account for evaluation.

13.5 In the case of project work, a committee of faculty members constituted by the Head of the Department will carry out three periodic reviews. Based on the project report submitted by the student(s), an oral examination (viva-voce) will be conducted as the semester end examination, for which one external examiner, approved by the Controller of Examinations, will be included. The weightage for periodic review will be 50% and remaining 50% for the project report and Viva Voce examination.

13.6 Assessment of seminars and comprehension will be carried out by a committee of faculty members constituted by the Head of the Department.

13.7 The continuous assessment marks earned for a course during his/her first appearance will be used for grading along with the marks earned in the semester-end examination / arrear examination for that course until he/she completes.

14.0 SUBSTITUTE EXAMINATIONS

14.1 A student who has missed, for genuine reasons, a maximum of one of the four assessments 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, admission 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 Head of the department / Dean 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 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

15.1 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.

15.2 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.

15.3 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 end-semester (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.

15.4 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.

16.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

16.1 All assessments of a course will be made on absolute marks basis. However, the Class Committee without the student members shall meet within 10 days after the semester-end examination and analyze the performance of students in all assessments of a course and award letter grade. The letter grades and the corresponding grade points are as follows:

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

"W" denotes withdrawal from the course.

"U" denotes unsuccessful performance in the course.

"AB" denotes absence for the semester end examination.

16.2 A student who earns a minimum of five grade points ('E' grade) in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student.

16.3 The results, after awarding of grades, shall be signed by the Chairman of the Class Committee and Head of the Department and declared by the Controller of Examinations.

16.4 Within one week from the date of declaration of result, a student can apply for revaluation of his / her semester-end theory examination answer scripts of courses, on payment of prescribed fee, through proper application to Controller of Examinations. HOD/Dean shall constitute a revaluation committee consisting of Chairman of the class committee as convener, the faculty member of the course and a senior member of faculty knowledgeable in that course. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

16.5 After results are declared, grade sheets shall be issued to each student, which will contain the following details. The list of courses enrolled during the semester including Redo courses, if any, and the grade scored, the Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of

all courses enrolled from first semester onwards. GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

If Ci, is the number of credits assigned for the ith course and GPi is the Grade Point in the ith course

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

The Cumulative Grade Point Average CGPA shall be calculated in a similar manner, considering all the courses enrolled from first semester.

"W" grades will be excluded for calculating GPA .

"U", "AB" and **"W"** grades will be excluded for calculating CGPA

16.6 After successful completion of the programme, the Degree will be awarded with the following classifications based on CGPA.

Classification	**CGPA**
First Class with Distinction	8.50 and above and passing all the courses in first appearance and completing the programme within the normal 8 or 6 (for lateral entry) semesters
First Class	6.50 and above and completing the programme within a maximum of 10 or 8 (for lateral entry) semesters.
Second Class	All others

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 U.G. programme within a minimum period covered by the minimum duration plus authorized break of study, if any (clause 11). 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.

17.0 ELECTIVE CHOICE: OPTION TO DO PROJECT ALONE IN FINAL SEMESTER

17.1 Apart from the various elective courses listed in the curriculum for each branch of specialization, the student can choose a maximum of two electives from any other specialization under any department, during the entire period of study, with the approval of the Head of the parent department and the Head of the other department offering the course.

17.2 In the curriculum of eighth Semester, along with the project work, if two elective courses alone are listed, then the Dean (Academic Affairs) may permit a student, as per approved guidelines, on the recommendation of the Head of the department, to do a full semester major industrial project work. In such a case, the above two elective courses or any other two elective courses in lieu thereof have to be enrolled during any semester preceding or succeeding the project work, if offered.

18.0 PERSONALITY AND CHARACTER DEVELOPMENT

18.1 All students shall enroll, on admission, in any of the personality and character development programmes, NCC / NSS / NSO / YRC / Rotaract and undergo practical training.

- **National Cadet Corps (NCC)** will have to undergo specified number of parades.
- **National Service Scheme (NSS)** will have social service activities in and around Chennai.
- **National Sports Organization (NSO)** will have sports, games, drills and physical exercises.
- **Youth Red Cross (YRC)** will have social service activities in and around Chennai.
- **Rotaract** will have social service activities in and around Chennai.

19.0 DISCIPLINE

19.1 Every student is required to observe disciplined 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 University.

19.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the HOD / Dean will be referred to a Discipline and Welfare Committee, nominated by the Vice-Chancellor, for taking appropriate action.

20.0 ELIGIBILITY FOR THE AWARD OF DEGREE

20.1 A student shall be declared to be eligible for the award of B.Tech. degree provided the student has:

i) successfully completed all the required courses specified in the programme curriculum and earned the number of credits prescribed for the specialization, within a maximum period of 14 semester (12 semesters for lateral entry) from the date of admission, including break of study.

ii) no dues to the Institution, Library, Hostels

iii) no disciplinary action pending against him/her.

20.2 The award of the degree must have been approved by the University.

21.0 POWER TO MODIFY

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

CURRICULUM AND SYLLABI FOR B.TECH. INFORMATION TECHNOLOGY (Eight Semesters / Full Time)

CURRICULUM

SEMESTER I

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB1181	Algebra, Geometry and Calculus	3	1	0	4
2	HS	ENB1181 FRB1181 ISB1181	English* French* Arabic*	3	0	0	3
3	BS	PHB1181	Physics	3	0	0	3
4	BS	CHB1181	Chemistry	3	0	0	3
5	ESF	GEB1101	Engineering Graphics	2	0	3	3
6	HS	SSB1181	Introduction to Economics	3	0	0	3
7	BS	PHB1182	Physics Lab	0	0	2	1
8	BS	CHB1182	Chemistry Lab	0	0	2	1
9	ESF	GEB1102	Basic Engineering Practices Laboratory	0	0	2	1
10	ESF	GEB1103	Computer Programming & Applications	2	0	2	3
							25

* Any one language

SEMESTER II

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB1282	Advanced Calculus	3	1	0	4
2	BS	PHB1283	Physics of Engineering Materials	3	0	0	3
3	HS	SSB1182	Sociology, Ethics & Human values	3	0	0	3
4	ESF	GEB1211	Basic Engineering Mechanics	3	1	0	4
5	EC	ITB1211	Digital Systems	3	0	0	3

6	ESF	EEB1281	Introduction to Electrical and Electronics Engineering	3	0	0	3
7	HS	ENB1282	Written Communication	0	0	2	1
8	EC	ITB1212	Digital Systems Lab	0	0	3	1
9	BS	PHB1284	Physics of Engineering Materials Lab	0	0	2	1
10	ESF	EEB1282	Electrical and Electronics Engineering Lab	0	0	3	1
							24

SEMESTER III

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB2181	Transforms and Applications	3	1	0	4
2	HS	SSB2181	Law for Engineers	3	0	0	3
3	EC	ITB2101	Data Structures	3	0	0	3
4	EC	ITB2102	Programming Paradigms	3	0	0	3
5	EC	ITB2103	System Software	3	0	0	3
6	EC	ITB2104	Computer Networks	3	0	0	3
7	HS	ENB2181	Oral Communication	0	0	2	1
8	EC	ITB2105	Data Structures Lab	0	0	3	1
9	EC	ITB2106	Advanced Programming Lab	0	0	3	1
10	EC	ITB2107	System Software Lab	0	0	3	1
							23

SEMESTER IV

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	BS	MAB2286	Operations Research	3	1	0	4
2	EC	ITB2211	Computer Architecture	3	0	0	3

3	EC	ITB2212	Network Programming & Management	3	0	0	3
4	EC	ITB2213	Software Engineering	3	0	0	3
5	ESF	ITB2214	Microprocessor and Microcontrollers	3	0	0	3
6	BS	LSB2181	Biology for Engineers	3	0	0	3
7	HS	ENB2282	Confidence Building and Behavioral Skill	0	0	2	1
8	EC	ITB2215	Web Technology Lab	1	0	3	2
9	EC	ITB2216	Networking Lab	0	0	3	1
10	EC	ITB2217	Microprocessor and Microcontrollers Lab	0	0	3	1
							24

SEMESTER V

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	EC	ITB3101	Mobile Computing	3	0	0	3
2	EC	ITB3102	Object Oriented Analysis and Design	3	0	0	3
3	EC	ITB3103	Database Management systems	3	0	0	3
4	EC	ITB3104	Operating Systems	3	0	0	3
5	BS	GEB3201	Environmental Science & Engineering	3	0	0	3
6	PE		Professional Elective I	3	0	0	3
7	HS	ENB3181	Career Building & People Skills	0	0	2	1
8	EC	ITB3105	Case tools Lab	0	0	3	1
9	EC	ITB3106	DBMS Lab	0	0	3	1
10	EC	ITB3107	Operating System Lab	0	0	3	1
							22

SEMESTER VI

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	EC	ECB4102	Embedded Systems	3	0	0	3
2	EC	ITB3211	Information Security	3	0	0	3
3	EC	ITB3212	Graphics & Multimedia	3	0	0	3
4	MS	MSB3181	Management of Business Organization	3	0	0	3
5	PE		Professional Elective II	3	0	0	3
6	PE		Professional Elective III	3	0	0	3
7	EC	ITB3213	Mobile Application Development Lab	0	0	3	1
8	EC	ITB3214	Software Development Lab (Elective based)	0	0	3	1
9	EC	ITB3215	Graphics & Multimedia lab	0	0	3	1
							21

SEMESTER VII

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	EC	ITB4101	Software Testing	3	0	0	3
2	EC	ITB4102	Wireless Networks	3	0	0	3
3	EC	ITB4103	Virtualization Techniques	3	0	0	3
4	PE		Professional Elective IV	3	0	0	3
5	PE		Professional Elective V	3	0	0	3
6	GE		General Elective I	3	0	0	3
7	EC	ITB4104	Mini Project	0	0	3	1
8	EC	ITB4105	Software Testing Lab	0	0	3	1
9	EC	ITB4106	Virtualization Lab	0	0	3	1
10	EC	ITB4107	Wireless Networks Lab	0	0	3	1
							22

SEMESTER VIII

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1	PE		Professional Elective VI	3	0	0	3
2	GE		General Elective II	3	0	0	3
3	EC	ITB4211	Project	0	0	18	9
							15

Total Credits:176

PROFESSIONAL ELECTIVES

Sl. No.	Course Group	Course Code	Course Title
1.	PE	ITBX01	Principles of Communication
2.	PE	ITBX02	Distributed Computing
3.	PE	ITBX03	Grid Computing
4.	PE	ITBX04	Cloud Computing
5.	PE	ITBX05	Service Oriented Architecture
6.	PE	ITBX06	Principles of Digital Signal Processing
7.	PE	ITBX07	Pervasive Computing
8.	PE	ITBX08	Data Warehousing and Data Mining
9.	PE	ITBX09	Theory of Computation
10.	PE	ITBX10	Information System Design
11.	PE	ITBX11	Software Quality Management
12.	PE	ITBX12	Adhoc Networks
13.	PE	ITBX13	Digital Image Processing
14.	PE	ITBX14	Satellite Communication
15.	PE	ITBX15	Natural Language Processing

16.	PE	ITBX16	Principles of Compiler Design
17.	PE	ITBX17	Bio Informatics
18.	PE	ITBX18	Enterprise Resource Planning
19.	PE	ITBX19	Knowledge Based Decision Support System
20.	PE	ITBX20	Electronics Commerce
21.	PE	ITBX21	Web Collaboration and Technology
22.	PE	ITBX22	XML and Web Services
23.	PE	ITBX23	User Interface Design
24.	PE	ITBX24	Graph Theory
25.	PE	ITBX25	Telecommunication Systems
26.	PE	ITBX26	Soft Computing
27.	PE	ITBX27	Cyber Security
28.	PE	ITBX28	C# and .NET Framework

GENERAL ELECTIVES

Sl. No.	Course Group	Course Code	Course Title	Offering Department
1.	GE	GEBX01	Disaster Management	Civil
2.	GE	GEBX02	Nano Technology	Physics
3.	GE	GEBX03	Control Systems	EEE
4.	GE	GEBX04	Green Design and Sustainability	Civil
5.	GE	GEBX05	Knowledge Management	CSE
6.	GE	GEBX06	Appropriate Technology	Civil / Mechanical
7.	GE	GEBX07	System Analysis and Design	Mechanical
8.	GE	GEBX08	Value Analysis and Engineering	Mechanical
9.	GE	GEBX09	Optimization Techniques	Mathematics
10.	GE	GEBX10	Engineering System Modeling and Simulation	Mechanical
11.	GE	GEBX11	Supply Chain Management	CBS
12.	GE	GEBX12	Total Quality Management	Mechanical
13.	GE	GEBX13	Energy Studies	Mechanical
14.	GE	GEBX14	Robotics	Mechanical
15.	GE	GEBX15	Cyber security	IT
16.	GE	GEBX16	Usability Engineering	CSE
17.	GE	GEBX17	Industrial Safety	Mechanical

SEMESTER I

MAB1181 ALGEBRA, GEOMETRY AND CALCULUS

L	T	P	C
3	1	0	4

OBJECTIVES:

The course is aimed at

- developing the skills of engineering students in the basics of chosen topics of Mathematics that are imperative for effective understanding of engineering subjects.
- laying the foundation for learning further topics of Mathematics in higher semesters in a graded manner.
- enabling the learners to appreciate the important role of mathematical concepts in engineering applications.

MODULE I MATRICES **8**

Eigenvalue Problems – Eigenvalues and Eigenvectors of a real matrix, Engineering Applications –Properties of Eigenvalues and Eigenvectors – Cayley Hamilton Theorem (without proof) – Orthogonal matrices – orthogonal transformations of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE II VECTOR ALGEBRA **6**

Operations on vectors – Scalar Product, Vector Product, Projection of Vectors - Angle between two vectors - Gradient, divergence and curl.

MODULE III THREE DIMENSIONAL ANALYTICAL GEOMETRY **8**

Direction cosines & ratios – angle between two lines – equations of a plane – equations of a straight line - coplanar lines - shortest distance between skew lines – sphere – tangent plane – plane section of a sphere – orthogonal spheres.

MODULE IV DIFFERENTIAL GEOMETRY **7**

Curvature – Cartesian and polar coordinates – centre and radius of curvature – circle of curvature – involutes & evolutes – envelopes – properties of envelopes and evolutes.

MODULE V MULTI-VARIATE FUNCTIONS 8

Functions of two variables – partial derivatives – total differential – Implicit Functions – Jacobians - Taylor's series expansion – maxima and minima – Lagrange's multiplier method.

MODULE VI ORDINARY DIFFERENTIAL EQUATIONS 8

Linear equations of second order with constant and variable coefficients – Simultaneous first order linear equations with constant coefficients – homogeneous equations of Euler's type – method of undetermined co-efficients, method of variation of parameters.

L – 45; T – 15; Total Hours– 60

TEXT BOOKS:

1. Veerarajan.T., "Engineering Mathematics" (5th edition) Tata Mc Graw Hill Publishing Co. New Delhi, 2012.
2. Grewal B.S., "Higher Engineering Mathematics" (42nd edition), Khanna Publishers, New Delhi, 2012.

REFERENCES:

1. Kreyszig, E., "Advanced Engineering Mathematics", 10th edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
2. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th edition, Cengage Learning, 2011.
3. Dennis G. Zill, Warren S. Wright, "Advanced Engineering Mathematics", 4th edition, Jones and Bartlett publishers, Sudbury, 2011.
4. Alan Jeffrey, "Advanced Engineering Mathematics", Academic Press, USA, 2002.
5. Ramana, B.V, "Higher Engineering Mathematics" Tata Mc Graw Hill Publishing Co. New Delhi, 2006.
6. Venkataraman, M.K., "Engineering Mathematics", Volume I, 2nd edition, National Publishing Co., Chennai, 2003.

OUTCOMES:

On completion of the course the students will be able to

- solve Eigenvalue and Eigenvector problems
- solve three dimensional geometry problems
- use differential calculus for solving problems pertaining to engineering applications

ENB1181	ENGLISH	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To enable students to use language appropriately and effectively
- To help learners improve their vocabulary and to enable them speak fluently and appropriately in different contexts.
- To help students develop listening skills for academic and professional purposes
- To develop reading comprehension skills and enhance their ability to read official documents.
- To develop their creative thinking and practice creative writing.

MODULE I BASIC LANGUAGE SKILLS AND GRAMMAR 4

Conducting a language proficiency test in the language laboratory to assess the use of various parts of speech, vocabulary, phrasal verbs and idiomatic expressions of students.

MODULE II LISTENING 8

Listening to BBC radio plays and VOA special lessons to teach Phonetics, accent and intonation of spoken English

Appreciation and critical review of popular movies like 'My Fair Lady', 'Sound of Music'. (Excerpts from the movies) - Historical/popular speeches made by Winston Churchill, Abraham Lincoln (Gettysberg's Address), Swami Vivekananda.

MODULE III SPEAKING 8

(a) Self introduction – pair work – introducing one another – short conversations – exchanging opinions – agreement /disagreement

(b) Short presentation (extempore speech) based on visuals – Personal narrations

MODULE IV READING 8

Newspaper articles, circular, notices – Note making – vocabulary extension – Critical review of newspaper articles.

(a) Science fiction- Issac Asimov's "The Dead Past"(Abridged version) - Wings of Fire – Creative thinking – retelling a story with different ending; critical appreciation of plot and characters

MODULE V CREATIVE WRITING 8

(a) Writing slogans for Advertisements

(b) Writing descriptive paragraphs based on visuals

MODULE VI ENGLISH FOR ACADEMIC AND BUSINESS PURPOSES 9

(a) English for academic purpose: letters to the editor, letter seeking permission for industrial visit, letter inviting a dignitary for technical symposium

(b) English for Business purpose: Telephone etiquette – telephone conversations – taking and leaving phone messages.

Total Hours: 45

REFERENCES:

1. Mohan, Krishna, Meera Bannerjee, 'Developing Communication Skills', Macmillan India Ltd. Chennai (2001).
2. Sen , Leena 'Communication Skills' Prentice Hall, New Delhi (2004).
3. Rutherford , Andrea J. 'Basic Communication Skills For Technology' Pearson Education Asia (2002).
4. Grant Taylor, ' English Conversation Practice' Tata Mcgraw Hill , New Delhi (2001)
5. P.K.Dutt, G. Rajeevan and C.L.N. Prakash, 'A Course in Communication Skills', Cambridge University Press, India (2007).

OUTCOME:

- After completion of the course, students will have the ability to communicate correctly and effectively in academic and professional contexts through exposure and practice in LSRW skills.

FRB1181	FRENCH	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To improve their proficiency in French language.
- To empower them for successful communication in their professional contexts.

DOSSIER 0 FENÊTRE SUR… 7

Contenus –l'alphabet - se présenter – les langues – les nationalités – les nombres de 0 à 60 – les adjectifs de nationalités – les verbes : s'appeler, être.

L'acte de parole

DOSSIER 1 LES UNS, LES AUTRES…. 12

Contenus - Les salutations (formelles et informelles) - les jours de la semaine – Les articles définis – les adjectifs possessifs – la négation (ne…..pas) – les verbes : avoir.

Demander quelque chose – les mois de l'année – les nombres de 70 à 99 – les articles indéfinis – l'adjectif interrogatif (quel, quelle)

Quelques événements culturels – donner des informations personnelles – indiquer ses gouts – l'expression des gouts – les prépositions (les noms de pays).

L'acte de parole

DOSSIER 2 ICI /AILLEURS 12

Contenus – Parler de sa ville – Donner/ Demander des explications – les prépositions de lieu – articles contractés – pourquoi / parce que

Auberges de jeunesse et hôtels – s'informer sur un hébérgement- quelques verbes et indications de direction – quelques formules de politesse.

Le code postal et les départements le libellé d'une adresse en France – Ecrire une carte postale – Dire le temps qu'il fait – les adjectifs démonstratifs - Formules pour commencer / terminer.

L'acte de parole

DOSSIER 3 SOLO OU DUO **14**

Contenus – Les animaux de compagnie les animaux préférés des Français - parler de sa profession – les professions - les activités sportifs - les noms animaux – les verbes : aimer , adorer, détester, faire, aller.

Nouveaux mode de rencontres – caractériser une personne (physique et psychologique) – les adjectifs qualificatifs – les pronoms toniques.

Les sorties – proposer, refuser, accepter une sortie – fixer un rendez-vous – inviter – Donner des instructions – L'impératif : 2^{e} personne – Le pronom on=nous – Les verbes : Pouvoir, vouloir, devoir.

L'acte de parole

L'examen oral

Total Hours: 45

TEXT BOOK:

1. Alter EGO I – Goyal – Langers (0 – 5 Lessons)

OUTCOMES:

On completion of the course,

- The students will be able to deal with their clients effectively at global level.
- Their proficiency in French Language will have improved.

ISB1181	ARABIC	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To read and write in Arabic language.
- To learn vocabulary of different fields
- To develop situational communication skills.

MODULE I PREPARATORY ARABIC **7**

Introducing Arabic Alphabets.

Listening and Reading.

Audio & Video aided listening, Tajweed listening,

Writing Arabic Alphabets (connected & unconnected).

Introducing words.

Reading simple sentences.

Learning names of the things in and around the class room.

Exercises.

MODULE II FUNCTIONAL ARABIC **7**

Listening Arabic texts, stories and action verbs

Communicating Simple sentences.

Jumla' Ismiyya and Jumla' Fi'liyya

Situational Conversation:

Greetings, Introduction.

Classroom, College, Picnic.

Dining and Kitchen.

Reading skills.

Exercises

MODULE III FUNCTIONAL ARABIC **8**

Implication of effective listening.

Audio aids.

Writing Simple sentences.

Communicating ordinal and cardinal numbers.

Situational communication:

Playground, library.

Forms of plural – Sample sentences.

Introduction to tenses.

Exercises.

MODULE IV FUNCTIONAL ARABIC **8**

Communication:

Family, travel

Market, Prayer hall

Writing skills:

Note making.

Sequencing of sentences.

Developing answers from the questions.

Exercises.

MODULE V TECHNICAL ARABIC **8**

Importance of technical communication.

Reading and writing skills.

Audio & Video aided listening.

Introduction to Arabic terms related to administration.

Situation communication:

Air travel, Office administration,

passport, visa.

Exercises.

MODULE VI TECHNICAL ARABIC **7**

Situation communication:

Contractual work, machineries and equipments..

Computer, internet browsing.

Banking,

Exercises.

Total Hours: 45

TEXT BOOK:

1. Arabic for professionals and employees, Kilakarai Bukhari Aalim Arabic College, Chennai, India, 2013.

REFERENCES:

1. Arabic Reader for Non Arabs (Ummul Qura University, Makkah), Kilakarai Bukhari Aalim Arabic College, 2005.

OUTCOMES:

On successful completion of the course, the student will be able to:

- Write correct sentences in Arabic.
- Communicate in Arabic at primary level in working situations in the fields of engineering and administration.

PHB1181	PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce basic physics concepts relevant to Engineering and Technology students.
- To get familiarize with solving problems in basic physics.
- To acquaint applications of physics for Engineering issues.

MODULE I PROPERTIES OF MATTER **7**

Elasticity – Stress strain diagram – Factors affecting elasticity – Twisting couple on a wire – Shaft – Torsion pendulum – Depression on a cantilever – Young's modulus by cantilever – Uniform and non-uniform bending – Viscosity.

MODULE II CRYSTAL PHYSICS **6**

Introduction – Space lattice – unit cell – Bravais lattices – Miller Indices for cubic crystals – Inter planar spacing in cubic lattice – Simple crystal structures – SC, BCC, FCC and HCP structures – Atomic radius, coordination number, Packing factor calculation – Crystal imperfections.

MODULE III QUANTUM PHYSICS **7**

Black body radiation – Planck's theory of radiation – Deduction of Wien's displacement law and Rayleigh – Jeans law from Planck's theory – Compton effect – Theory and experimental verification – Dual nature of matter – de Broglie's wavelength- Physical significance of wave function – Schroedinger wave equation – Time independent and time dependent wave equation – Particle in one dimensional box.

MODULE IV WAVE OPTICS **9**

Interference theory – Air wedge – Michelson interferometer – Diffraction – Fresnel and Fraunhofer diffraction - Polarization – Double refraction – Theory of plane polarized, circularly polarized and elliptically polarized light – Quarter wave plate, Half wave plate – Production and detection of plane, circularly and elliptically polarized lights – Photoelasticity – Photo elastic effect – Stress optic law – Effect of stressed model in a plane polariscope (qualitative) –Photo elastic bench.

MODULE V LASER & FIBRE OPTICS **9**

Principle of spontaneous emission and stimulated emission - Characteristics of laser light -Einstein's A & B coefficients (derivation) – Population inversion - pumping - Nd:YAG laser – CO2 laser – Applications – Material processing and holography (construction and reconstruction of hologram)- Optical fibre – Principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – Types of optical fibers - applications – Fibre optic communication system (block diagram only)- Fibre optic sensors (displacement and pressure sensors (qualitative), Medical endoscope.

MODULE VI ULTROSONICS AND NDT **7**

Ultrasonics – Production – Magnetostriction and piezo electric methods – Properties of ultrasonic waves – Detection of ultrasonic waves – Applications –Ultrasonic interferometer- Acoustical grating – SONAR – Depth of sea – Measurement of velocity of blood flow – Non Destructive Testing (NDT) methods – Ultrasonic flaw detector – A,B & C scanning methods.

Total Hours: 45

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
2. Palanisamy P.K., Physics for Engineers, Vol1 & Vol2, 2nd Edition, Scitech Publications, 2003.

REFERENCES:

1. Uma Mukherji, "Engineering Physics", Narosa Publishing House, New Delhi, 2007.
2. Charles Kittel, "Introduction to solid state physics", 7th Edition, John Wiley & sons (ASIA) Pvt. Ltd, 2008.
3. Avadhanulu M.N., "Engineering Physics", 1st Edition, S.Chand & Company Ltd., New Delhi, 2007.
4. Schiff, "Quantum Mechanics", 3rd Edition, Tata McGraw-Hill Education, 2010.
5. Rajendran V. and Marikani A., "Applied Physics for Engineers", 3rd Edition, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 2003.

6. William T. Silfvast, “Laser Fundamentals”, 2nd edition, Cambridge University Press, 2004.

7. Arumugam M., “Engineering Physics”, 5th Edition, Anuradha Agencies, 2003.

OUTCOMES:

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

- Apply the knowledge of properties of matter in Engineering Mechanics and Fluid Dynamics.
- Characterize Engineering materials
- Use Lasers for Fiber Optics Technology and Material Processing
- Do non-destrictive testing using Ultrasonic Techniques

CHB1181	CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To make students conversant with the

- Water quality for potable and industrial purposes.
- Different engineering materials, their physico-chemical properties and specific applications.
- Concept of electrochemistry, corrosion and theories of corrosion.
- Principles of spectroscopy and applications.
- Basic principles of green chemistry and the need for green processes in industries.

MODULE I WATER TECHNOLOGY 8

Introduction – Impurities present in water – Hardness, Types of Hardness, Estimation of Hardness (EDTA method) (Problems) – Alkalinity, Estimation of Alkalinity – Disadvantages of hard water in industries – Conditioning methods: external treatment method: Ion exchange method – internal treatment: colloidal, phosphate, calgon, carbonate methods – drinking water standards (BIS) – treatment of domestic water: screening, sedimentation, coagulation, filtration, disinfection: by chlorination, UV treatment, ozonization – desalination and reverse osmosis (principle only).

MODULE II ENGINEERING MATERIALS 8

Abrasives: Moh's scale of hardness – natural abrasives: diamond, corundum, emery, garnets and quartz – artificial abrasives: silicon carbide, boron carbide.

Refractories: characteristics, classification – acidic, basic and neutral refractories, properties – refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling – general method of manufacture of refractories, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Nanomaterials: Definition – types of Nanomaterials; nanofilms, nanowires, carbon nanotubes, quantum dots and fullerenes (C_{60}) – Size and shape

dependent optical, electrical, thermal and mechanical properties; Synthesis of nanomaterials – Top down and bottom up approach; Applications of nanomaterials – Catalysis, Electronics and Telecommunication, Medicines, Composites and Energy.

MODULE III ELECTROCHEMISTRY AND CORROSION 9

Construction of a cell – Standard and single electrode potential – electrochemical series – EMF and its measurement – Nernst equation, application and problems – Types of electrodes: standard hydrogen electrode, calomel electrode, ion selective electrode - glass electrode and determination of pH using glass electrode – polarization, overvoltage, decomposition potential (statements only) – Conductometric and potentiometric titrations.

Corrosion: Definition – Dry corrosion and Wet corrosion with mechanisms – Factors influencing corrosion.

MODULE IV CHEMISTRY OF POLYMERS 6

Monomers – functionality – polymer – degree of polymerization – classification – Polymerization techniques: addition, condensation and co-polymerization with example – mechanism of polymerization: free radical, cationic and anionic mechanism – thermoplastics and thermosetting plastics with examples – compounding and moulding of plastics: injection moulding and compression moulding.

MODULE V SPECTROSCOPY 9

Electromagnetic spectrum – absorption of radiation – electronic, vibrational, translational and rotational – intensities of spectral lines – Beer-Lambert's Law (Problems) – Colorimetric analysis: estimation of concentration of a solution – Flame photometry: theory, instrumentation (block diagram only) and application – UV-Visible spectroscopy: Principles, instrumentation (block diagram only) and simple applications – IR spectroscopy – simple applications only.

MODULE VI GREEN CHEMISTRY 5

Introduction – Significance – Industrial applications of green chemistry; Green technology – Latest green laboratory technique for saving experimental resources and infrastructural framework; Principles of green chemistry – R4M4

model (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking, Multi-tracking) – Life cycle analysis technique (cradle to grave approach)

Total Hours: 45

TEXT BOOKS:

1. Jain P.C and Renuka Jain, 'Physical Chemistry for Engineers', Dhanpat Rai and Sons, New Delhi. (2001).
2. Paul T. Anastas, John C. Warner, 'Green Chemistry: Theory and Practice', Oxford University Press, (1998).

REFERENCES:

1. Bahl B.S., Tuli and Arun Bahl, 'Essentials of Physical Chemistry', S. Chand and Company Ltd., New Delhi, (2004).
2. Kuriacose J.C. and Rajaram J, 'Chemistry in Engineering and Technology', Volume1, Tata McGraw- Hill publishing company, New Delhi, (1996).
3. Puri B.R., Sharma L.R. and Madan S. Pathania, 'Principles of Physical Chemistry', Shoban Lal Nagin Chand and Co., Jalandhar, (2000).

OUTCOMES:

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

- estimate the degree of hardness in water; solve related problems and treatment methods for potable water.
- select materials for specific engineering applications.
- use electrochemistry principles to understand the mechanism of corrosion.
- analyze trace quantity of metals using instrumental methods.
- realise the need of green practices in industries.

GEB1101	ENGINEERING GRAPHICS	L	T	P	C
		2	0	3	3

OBJECTIVES:

- To introduce the students of all engineering programs, the basic concepts of engineering drawing, which is the basic communication medium for all engineers
- To provide an exposure to the appropriate standards for technical drawings
- To provide practical exposure on important aspects like drawing analytic curves, orthographic projections, section of solids, development of surfaces, pictorial views and free hand drawing
- To introduce computerized drafting

MODULE I BASICS AND ENGINEERING CURVES 10

Drawing instruments, dimensioning, BIS conventions, types of lines, simple geometric constructions.

Conic sections: ellipse, parabola, hyperbola

Special curves: Cycloid, epicycloid, hypocycloid, involutes, helix

MODULE II ORTHOGRAPHIC PROJECTION 8

Orthographic projection – first angle, third angle projection methods, free hand sketching of orthographic views of simple machine parts as per first angle projection. Projection of points. Commands and demonstration of drafting packages.

MODULE III PROJECTION OF STRAIGHT LINES AND PLANES 10

Straight lines in first quadrant – true length and true inclinations, traces – rotating line and trapezoidal methods. Projection of plane lamina in first quadrant – trace of plane.

MODULE IV PROJECTION OF SOLIDS 10

Projection of solids: Axis inclined to one reference plane only - prism, pyramid, cone, cylinder – change of position and auxiliary projection methods.

MODULE V SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **10**

Section of solids: prism, pyramid, cone, cylinder, and sphere – sectional views – true shape of sections - solids in simple position and cutting plane inclined to one reference plane only.

Development of surfaces: truncated solids - prism, pyramid, cone, cylinder, frustum of cone and pyramid.

MODULE VI PICTORIAL PROJECTIONS **12**

Isometric projection: isometric scale - isometric projection and view of prism, pyramid, cylinder, cone, frustums and truncated solids.

Perspective projection: prism, pyramid, cylinder, frustums – visual ray and vanishing point methods.

Total Hours: 60

TEXT BOOK:

1. N.D. Bhatt, 'Engineering Drawing' Charotar Publishing house, 46th Edition, (2003)

REFERENCES:

1. K.V. Natarajan, 'A text book of Engineering Graphics', Dhanalakshmi publishers, Chennai. (2006)
2. Venugopal. K, and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd., Publication, Chennai. (2011)

OUTCOMES:

Students who complete this course will be able to:

- draw various views of engineering components
- graphically communicate their concepts and ideas on new designs

SSB1181 INTRODUCTION TO ECONOMICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- Primarily to give an overview of fundamentals of economics to the engineering students
- In particular
  - To introduce the basic concepts of demand, supply and equilibrium.
  - To familiarize on National Income concepts
  - To provide fundamental concepts of money, banking and exchange.
  - To give an idea on industrial sector, markets and trade.
  - To give an overview on five year plans, budget, policies and taxation.
  - To provide an overview of Indian economy and the role of engineers in economic development.

MODULE I INTRODUCTION **8**

Classification of economy – open and closed economy – sectors of economy – Basic principles of micro economics – supply ,demand and equilibrium, elasticity of demand- pricing models.

MODULE II NATIONAL INCOME DETERMINATION **7**

National Income concepts – GNP, GDP, disposable Income; Aggregate demand and Aggregate supply, macroeconomic equilibrium - concepts of MPS, APS, MPC APC, Inflation – prices indices WPI, CPI and Inflation control.

MODULE III MONEY AND BANKING **7**

Monetary system - Role of Central Bank – Monetary policy – Commercial banks, Development banks; Money market – the role of money.

MODULE IV INDUSTRY, MARKET AND TRADE **7**

Public and private sectors – Contribution to the national economy, Industrial policy. Markets – labor, capital and debt market. Trade: domestic and International trade.

MODULE V BUDGET, POLICIES AND INDICATORS 8

Economic development – Five year plans, Macro-economic indicators; Central budget: Government revenue-tax and non-tax revenue, government expenditures-plan and non-plan expenditures – Fiscal policy – The impact of the budget on the economy.

MODULE VI ECONOMIC GROWTH AND THE ROLE OF ENGINEERS 8

India Economy – the role of market in the Indian economy – Development in the post independence era – Growth of the economy, Globalization and liberalization – reforms made and their effects, challenges and opportunities, Engineers – Engineers' contributions to the economic growth.

Total Hours : 45

REFERENCES:

1. Vanitha Agarwal, 'Macroeconomics: Theory and Practice', Pearson, (2010).
2. Dwivedi D.N, 'Macroeconomics: Theory and Policies', 3rd edn; McGraw Hill, (2010).
3. Samuelson,Paul A., 'Macroeconomics', 19th edn., TMH, (2009).
4. Gupta G.S, 'Macroeconomics: Theory and Applications', 3rd edn; TMH, (2007).

OUTCOMES:

- Students will have an exposure to the basic concepts of microeconomics and macroeconomics.
- Students will have gained knowledge in government budget, economic planning and its implementation, money, banking and trade.
- They will have learnt about the economic reforms introduced in Indian economy and the role of engineers towards the economic growth and development of the country.

PHB1182	PHYSICS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To understand the basic concepts of properties of matter, wave optics
- To understand the properties of ultrasonic and Laser.
- To understand the crystal growth technique.
- To correlate the experimental results with the theoretical values.

LIST OF EXPERIMENTS:

1. Torsional Pendulum- Determination of rigidity modulus of a given wire.
2. Determination of coefficient of viscosity of a liquid by Poiseuille's method .
3. Determination of Young's modulus of a beam using non – uniform bending method.
4. Determination of a thickness of a given wire – Air wedge.
5. Spectrometer- determination of wavelength of given source by using grating.
6. Determination of velocity of ultra sonic waves – Ultrasonic Interferometer.
7. Determination of numerical aperture and acceptance angle of an optical fiber.
8. Determination of particle size using Laser.
9. Growth of crystal by slow evaporation technique.
10. Determination of angle of divergence of Laser beam.
11. Photo electric effect experiment.

OUTCOMES:

On completion of this course, the student will know

- Properties of matter, wave optics and quantum physics
- Properties and application of Ultrasonic and Laser
- Principle and concept of crystal growth technique.

CHB1182	CHEMISTRY LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

To make students conversant with the

- estimation of hardness and TDS in water samples.
- Construction of cell and determination of EMF.
- Estimation of pH of solutions.
- Verification of Beer Lambert's law.

LIST OF EXPERIMENTS:

1. Estimation of hardness in domestic water.
2. Estimation of total dissolved solids (TDS) in domestic water
3. Construction and determination of emf of a cell.
4. Determination of single electrode potential.
5. Estimation of strong acid in the industrial effluents
6. Estimation of Fe^{2+} present in unknown sample – by Potentiometry
7. Verification of Beer-Lambert's law and estimation of Cu^{2+} present in unknown sample.
8. Estimation of Na and K present in the agricultural field – by flame photometry.
9. Study of effect of inhibitors in free radical polymerization (Demo)

OUTCOMES:

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

- estimate the degree of hardness and TDS in water samples.
- construct and calculate EMF of cell.
- apply the concept of Beer lamberts law.

GEB1102	BASIC ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To provide a practical exposure to basic engineering practices like carpentry, fitting, plumbing, welding and making of simple electrical and electronic circuits
- To have an understanding on the use of various tools, instruments and methods
- To enable the students to appreciate the practical difficulties and safety issues

CIVIL ENGINEERING PRACTICE

1. Study of plumbing in general household and industrial systems
2. Making a small window frame with Lap and Mortise & Tenon Joints

MECHANICAL ENGINEERING PRACTICE

1. Fabrication of a small Table frame with Butt, Lap and Fillet Joints
2. Machining of a simple component like a table weight using lathe
3. Mould preparation for simple component

ELECTRICAL ENGINEERING PRACTICE

1. Comparison of incandescent, Fluorescent, CFL and LED lamps.
2. Study of Protection Circuits (small relay, fuse, MCB, HRC,MCCB,ECCB).
3. Familiarization of households Electrical Gadgets (Iron Box, Wet Grinder).
4. Understanding of Domestic and Industrial wiring.
5. Earthing and its significance.
6. Troubleshooting in Electrical Circuits.
7. Study of inverter fed UPS/Emergency lamp.

ELECTRONIC ENGINEERING PRACTICE

1. Identifications symbolic representation of active and passive electronic components
2. Solderingand tracing of electronic circuits and checking its continuity
3. Assembling of A.C. to D.C, D.C to A.C. Circuits in bread Board and Mini project

OUTCOMES:

Students who complete this course

- Should be able to appreciate the practical skills needed even in making of simple objects, assemblies and circuits
- Should be able to attend minor defects especially in items used in day to day life
- Should be aware of the safety aspects involved in using tools and instruments

GEB1103	COMPUTER PROGRAMMING & APPLICATIONS	L	T	P	C
		2	0	2	3

OBJECTIVES:

- Expose fundamental concepts and techniques in programming
- Give coverage on application logic in programming
- Focus on solving practical problems based on analyzing, designing, and implementing computer programs

MODULE I FUNDAMENTALS OF COMPUTERS **5**

Evolution – Generations - Classifications – Applications – Computer organization –Hardware in a typical computer Identification - Booting – Booting error messages - Number system - Number system conversions

MODULE II BASIC PROGRAMMING AND DEBUGGING **5**

Software types – Types of Operating systems - Software development steps – Information technology and internet - The programming tool - Structure of a basic program - Hello world program – Debugging it – Character set – Delimiters – Keywords, identifiers – Constants – Variables –- Tools and help features – Comments in a program

MODULE III INPUT AND OUTPUT **5**

Data types - Type conversions - Input/Output: Formatted functions – Unformatted functions – Library functions – Debugging the code – Systems software: Compiler – interpreter- linker – loader - Finding the correct answer given a code snippet and justifying it

MODULE IV PROBLEM SOLVING **5**

Problem solving techniques: Algorithm, flowchart – Pseudo-code – Examples of simple problems in algorithms and flowcharts – Sorting and Searching - Characteristics of a good program – Generations of programming language

MODULE V OPERATORS AND DECISION STATEMENTS **5**

Properties of operators – Priority of operators – Arithmetic relational logical and bitwise operators – If –if else- nested if else- goto- switch case – nested switch case – for loops – nested for loops – while loop – do-while loop – break and continue statement

MODULE VI ARRAYS AND LOOP CONTROL STATEMENTS 5

Arrays – Initialization – Definition – Characteristics – One dimensional array – Two dimensional arrays - Multi dimensional arrays – Predefined streams - Operation with arrays – Sorting and searching – Structures – Operations on structures

LIST OF EXPERIMENTS: 30

1. Computer organization –Hardware in a typical computer Identification – Booting - error messages and what it means
2. Types of Operating systems – Windows and Linux
3. Structure of a basic program - Hello world program – Debugging it
4. Data types Type conversions
5. Input/Output: Formatted functions – Unformatted functions – Library functions
6. Properties of operators – Priority of operators – Arithmetic relational logical and bitwise operators
7. If – if else- nested if else- goto- switch case – nested switch case – for loops – nested for loops – while loop – do-while loop – break and continue statement
8. Arrays – Operation with arrays
9. Sorting and searching

Total Hours: 60

TEXTBOOKS:

1. Ashok N Kamthane, “Computer Programming”, 2nd Edition, Pearson Education, 2012.
2. Paul J. Deitel, Deitel & Associates, “C How to Program”, 7th Edition, Pearson, Education, 2012.

OUTCOMES:

Students who complete this course will be able to:

- Understand Modular design, logic flow, data abstraction
- Describe basic programming constructs, functions, and I/O.
- Write down programs for sorting and searching algorithms
- Write down programmes developing cycle for different applications
- The students will be able to debug the programs while solving some practical problems in programming

SEMESTER II

MAB1282	ADVANCED CALCULUS	L	T	P	C
		3	1	0	4

OBJECTIVE:

The aim of the course is to

- train the students in additional areas of Engineering Mathematics, necessary for grooming them into successful engineers. The topics will serve as basic tools for specialized studies in many engineering fields, significantly in fluid mechanics, field theory and communication engineering.

MODULE I DOUBLE INTEGRALS **7**

Double integration – Cartesian and Polar coordinates – change of order of integration – area as a double integral — change of variables between Cartesian and polar coordinates.

MODULE II TRIPLE INTEGRALS AND SPECIAL FUNCTIONS **7**

Triple integration in Cartesian coordinates - change of variables between cartesian, cylindrical and spherical polar coordinates - Beta and Gamma functions.

MODULE III VECTOR INTEGRATION **7**

Line, surface and volume integrals – Green's, Gauss Divergence and Stoke's theorems (without proof) – verification and evaluation of integrals using them.

MODULE IV ANALYTIC FUNCTION **8**

Analytic function - Necessary and Sufficient condition (Proof not included) – Cauchy-Riemann equations in polar coordinates - properties of analytic function – determination of analytic function – conformal mapping (w = z+a, az and 1/z) and bilinear transformation.

MODULE V COMPLEX INTEGRATION **8**

Statement and application of Cauchy's integral theorem – Cauchy's integral formula – Taylor's series and Laurent's series expansion – singularities - classification – residues - Cauchy's residue theorem – contour integration – Unit circle and semi circular contours (excluding poles on the real axis).

MODULE VI PARTIAL DIFFERENTIAL EQUATIONS 8

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

1. Veerarajan.T., "Engineering Mathematics "(5th edition) Tata Mc Graw Hill Publishing Co. New Delhi, 2012.
2. Grewal B.S., "Higher Engineering Mathematics" (42nd edition), Khanna Publishers, New Delhi, 2012.

REFERENCES:

1. Kreyszig, E., "Advanced Engineering Mathematics", 10th edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
2. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th edition, Cengage Learning, 2011.
3. Dennis G. Zill, Warren S. Wright, "Advanced Engineering Mathematics", 4th edition, Jones and Bartlett publishers, Sudbury, 2011.
4. Alan Jeffrey, "Advanced Engineering Mathematics", Academic Press, USA, 2002.
5. Ramana, B.V., "Higher Engineering Mathematics" Tata Mc Graw Hill Publishing Co. New Delhi, 2006.
6. Venkataraman, M.K., "Engineering Mathematics", Volume 2, 2nd edition, National Publishing Co., Chennai, 2003.

OUTCOMES:

On completion of the course the students will be able to

- solve integrals of higher orders.
- apply vector calculus for solving engineering problems.
- solve complex differentiation and integration problems related to engineering.
- formulate practical problems in terms of partial differential equations, solve them and physically interpret the results.

PHB1283 PHYSICS OF ENGINEERING MATERIALS L T P C
(Common to ECE, EEE, AERO, CSE & IT Branches) 3 0 0 3

OBJECTIVE:

- To familiarize the physical, chemical, electrical and mechanical properties of different Engineering materials.

MODULE I CONDUCTING MATERIALS 10

Electron ballistics : charged particle, force on charged particles in an electric field, force on charged particles in Magnetic field - Parallel electric and magnetic field - Perpendicular electric and magnetic field - Classical free electron theory of metals – Derivation for electrical conductivity – Merits and drawbacks of classical theory – Quantum free electron theory of metals and its importance (qualitative) – Energy distribution of electrons in metals – Fermi distribution function – Density of energy states and carrier concentration in metals (derivation) – Fermi energy – Classification of solids into conductors, semiconductors and insulators on the basis of band theory.

MODULE II SEMICONDUCTING MATERIALS 9

Elemental and compound semiconductors – Drift and diffusion current - Intrinsic semiconductors –Carrier concentration (derivation) – Fermi energy – Variation of Fermi energy level with temperature – Mobility and electrical conductivity – Band gap determination – Extrinsic semiconductors – Carrier concentration in n-type and p-type semiconductor (derivation) – Variation of Fermi level with temperature and impurity concentration – Variation of Electrical conductivity with temperature – Hall effect – Experiment and applications of Hall effect.

MODULE III DIELECTRIC MATERIALS 7

Dielectric constant – Electric Susceptibility – Types of dielectric polarization – Frequency and temperature dependence of polarization – Internal field and deduction of Clausius-Mosotti's equation(derivation) – Dielectric loss – Types of dielectric breakdown – Uses of dielectric materials (capacitor & transformer).

MODULE IV MAGNETIC MATERIALS 6

Origin of magnetic moment –Types of magnetic materials and their properties –Ferromagnetism – Domain theory of ferromagnetism, hysteresis, soft and

hard magnetic materials – Anti ferromagnetic materials (qualitative) – Ferrites – Applications-Magnetic memory – Tapes & magnetic disk drives.

MODULE V SUPERCONDUCTING MATERIALS 6

Superconductivity - BCS theory - Meissner effect - Critical magnetic field - Type I and Type II superconductors - High temperature superconductors - Applications of superconductors: SQUID and magnetic levitation.

MODULE VI OPTICAL AND NEW ENGINEERING MATERIALS 7

Optical properties of semiconductors – Direct and indirect bandgap semiconductors – Color centers, exciton – Luminescence – Fluorescence – Phosphorescence – Liquid crystal display, Solar cell – Electro optic effect-Pockel's effect - Kerr effect – Faraday effect. Metallic glasses – Preparation, properties and applications - Shape Memory Alloys – Preparation, properties and applications, Nano phase materials – Synthesis, properties and applications.

Total Hours: 45

TEXT BOOKS:

1. Palanisamy P.K., Physics II, Material Science for ECE, Scitech Publications (India) Pvt Ltd., 2006.
2. Safa O. Kasap, Principles of Electronic materials and devices, McGraw Hill Publishers, 3rd Edition, 2006.

REFERENCES:

1. Arumugam.M, Physics II, Material Science for ECE, Anuradha Publishers, 5th Edition, 2005.
2. Jacob Millman, Christos C.Halkais, Electronic Devices and Circuits, Tata McGraw-Hill, New Delhi, 1991.
3. Charles Kittel, Introduction to solid state physics, 7th Edition, John Wiley & sons (ASIA) Pvt. Ltd.
4. Sze. S.M., Semiconductor Devices – Physics and Technology, 2nd edn. John Wiley, 2002.

5. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices – Modelling and Technology, Prentice Hall of India, 2004.

6. Donald A. Neamen, “Semiconductor Physics and Devices” 3rd Ed., Tata McGraw Hill, 2002.

OUTCOMES:

On completion of this course, the student will be able to

- choose the correct semi-conductors for electronic devices and display.
- use dielectric materials for transformers and capacitors
- use ferromagnetic materials for solid state devices
- apply the concept of super conductivity for Engineering applications.

SSB1182	SOCIOLOGY, ETHICS AND HUMAN VALUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give an overview of the fundamental of sociology.
- To expose how society developed in India, classes and impact.
- To introduce sociological aspects relating to industry
- To provide some basic concepts on ethics and human rights.
- To stress the role of engineer to the society, environment and sustainability.

MODULE I FUNDAMENTALS OF SOCIOLOGY 7

Sociology - definition, evolution – scope – basic concepts – social process, sociological theories, social institutions, culture and social stratification – family – economic – politics – religion – education, state and civil society – social control.

MODULE II SOCIOLOGY IN INDIAN CONTEXT 7

Development – Institutions, classes – women and society – impact of social laws, social change in contemporary India – secularism and communalism – social exclusion and inclusion.

MODULE III INDUSTRIAL SOCIOLOGY 7

Definition and perspectives – industry in India – social groups in industry, behaviour pattern – group dynamics – focus groups – team – enhancing group behaviour.

MODULE IV INDUSTRIAL – SOCIETY INTERFACE 8

Perspectives – social responsibilities – sociological effect on industrialization – urbanization, child labour, psychological impact, Impact of technology, modernization – globalization – challenges – role of engineers.

MODULE V ETHICS AND HUMAN VALUES 8

Ethics and values – organizational values – personal worth, ethical behavior, professional ethics, whistle blowing, international ethics, corruption.

MODULE VI ENGINEERS AND SOCIETY **8**

Quality of life and society – engineer in economic development, technology development – invention, innovation and diffusion – appropriate technology – engineer's contribution, ecology and environment – sustainability – role of engineers.

Total Hours: 45

REFERENCES:

1. Samir Das Gupta and Paulomi Saha, An Introduction to Sociology, Pearson, Delhi, 2012.
2. Narender Singh, Industrial Sociology, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.
3. Vidya Bhushan and D.R. Sachdeva, Fundamental of Sociology, Pearson, Delhi, 2012.
4. Deshpande, Satish, Contemporary India : A Sociological view, Viking (2002)
5. Thopar, Romila, Early India, Penguin (2003).
6. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York, 1996.

OUTCOMES:

- Students will have an exposure to the fundamentals and basic concepts of Sociology.
- Students will gain knowledge in Industrial Sociology.
- Students will have gained knowledge about the impact of technology, modernization, globalization and their contribution towards society.

GEB1211 BASIC ENGINEERING MECHANICS **L T P C**
3 1 0 4

OBJECTIVES:

- To impart knowledge about the basic laws of statics and dynamics and their applications in problem solving
- To acquaint with scalar and vector approaches for representing forces and moments acting on particles and rigid bodies and their equilibrium
- To give an exposure on inertial properties of surfaces and solids
- To provide an understanding on the concept of work energy principle, friction, kinematics of motion and their relationship

MODULE I VECTOR APPROACH TO MECHANICS **7**

Introduction - Units and Dimensions - Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments –Vector Algebra and its Physical relevance in Mechanics -Coplanar Forces – Resolution and Composition of forces- Equilibrium of a particle

MODULE II EQUILIBRIUM OF PARTICLE **6**

Forces in space - Equilibrium of a particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force

MODULE III EQUILIBRIUM OF RIGID BODY **6**

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis –Vectorial representation of moments and couples – Scalar components of a moment –Varignon's theorem - Equilibrium of Rigid bodies in two dimensions –Examples

MODULE IV PROPERTIES OF SURFACES **8**

Determination of Areas – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second and product moments of plane area – Physical relevance - Rectangle, triangle, circle from integration -

T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.

MODULE V LAWS OF MOTION 10

Review of laws of motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

MODULE VI FRICTION 8

Introduction to friction- types of friction- Laws of Coloumb friction- Frictional force – simple contact friction – Rolling resistance –ladder friction

Total Hours: 45

REFERENCES:

1. Beer, F.P and Johnston Jr. E.R, "Vector Mechanics for Engineers, Dynamics & Statics", Third SI Metric Edition, Tata McGraw-Hill International Edition, 2001.
2. Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.
3. Irving H. Shames, Engineering Mechanics – Statics and Dynamics, IV Edition Pearson Education Asia Pvt. Ltd., 2003.

OUTCOMES:

On completion of this course students:

- should be able to resolve forces, moments and solve problems using various principles and laws
- should be able to understand the concept of equilibrium, kinetics and kinematics and capable of formulating the governing equations to practical problems and provide solutions for those equations

ITB1211	DIGITAL SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the methods for simplification of Boolean Algebra
- To design and implement combinational circuits.
- To design and implement synchronous sequential circuits.
- To design and implement asynchronous sequential circuits.
- To study the fundamentals of HDL.

MODULE I BOOLEAN ALGEBRA AND LOGIC GATES 8

Binary systems – Boolean Algebra and Logic Gates : Basic theorems and properties of Boolean Algebra, Boolean functions, Digital logic gates – Simplification of Boolean Functions: The Map Method, The Tabulation Method.

MODULE II COMBINATIONAL LOGIC 7

Combinational circuits – Design Procedure -Adders – Subtractors – Code conversions – Analysis procedure – Multilevel NAND circuits – Multilevel NOR circuits – Exclusive –OR –Functions.

MODULE III MSI AND PLD COMPONENTS 7

Binary adder and subtractor – Decimal adder – Magnitude comparator – Decoders and Encoders – Multiplexers – Read Only Memory – Programmable Logic Array – Programmable Array Logic.

MODULE IV SYNCHRONOUS SEQUENTIAL LOGIC 8

Synchronous sequential circuits – Flip-flops – Triggering of Flip-flops – Analysis of clocked sequential circuits – State reduction and assignment – Flip-flop Excitation Tables – Design Procedures – Design of counters.

MODULE V REGISTERS, COUNTERS AND THE MEMORY UNIT 7

Registers – Shift Registers – Ripple Counters – Synchronous Counters – Timing Sequences – Random Access Memory –Memory Decoding – Error-correcting-codes.

MODULE VI ASYNCHRONOUS SEQUENTIAL LOGIC **8**

Asynchronous sequential circuits – Analysis Procedure – Circuits with Latches – Design Procedure – Reduction of State and Flow-Tables –Race-Free State Assignment – Hazards.

Total Hours : 45

TEXT BOOK:

1. M.Morris Mano, 'Digital Design', Third edition, Pearson Education, 2007.

REFERENCES:

1. Charles H.Roth, Jr. 'Fundamentals of Logic Design', 4th Edition, Jaico Publishing House, 2000.

2. Donald D.Givone, 'Digital Principles and Design', Tata McGraw-Hill, 2003.

OUTCOME:

- At the end of the course the student will be able to analyze, design and evaluate digital circuits of medium complexity, that are based on SSIs, MSIs and programmable logic devices.

EEB1281	INTRODUCTION TO ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on

- Basic concepts of electrical circuits and their solutions
- Performance of Electrical machines,speed control and their use as drives.
- Basic knowledge on power system and various methods of power generation through renewable energy sources.
- To understand the concepts of quantum theory of solids and semiconductor materials.
- To provide a basis for understanding the characteristics, operation and limitations of semiconductor devices.

MODULE I DC AND AC CIRCUITS **9**

Circuit Parameters-Sources- Kirchhoff's laws-Solution of simple circuits.

AC quantities – Phasor representation – Power-Real, Reactive and Apparent Power – Solution of Simple circuits.

Superposition,Thevenin's,Norton's and Maximum power transfer theorem-Network solution by Mesh current and Node Voltage method.

MODULE II ELECTRICAL MACHINES AND DRIVES **8**

DC generator and Motor – Working Principle and Operating Characteristics – Starters for DC motors and speed control – applications. Transformers - Single phase and three phase transformers- Working Principle – EMF equation - equivalent circuit and performance calculations. Three phase and single phase induction motors - Working Principle -Torque-Slip characteristics-Starting and speed control – use of induction motor as industrial drives.

MODULE III ELECTRIC POWER SYSTEMS **6**

Structure of Power system - Transmission and Distribution schemes - Power Quality – Indian Electricity Rules and Regulations.

MODULE IV SEMICONDUCTORS **8**

Energy band theory – intrinsic semiconductors- extrinsic semiconductors - Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors – N and P type semiconductors- Mobility, drift current and conductivity – Diffusion current – Continuity equation - Hall effect - Calculation of electron and hole densities.

MODULE V PN JUNCTION AND SPECIAL DIODES **7**

Band structure of PN Junction – Current Component in a PN Junction – Derivation of diode equation - switching characteristics of diode- Mechanism of avalanche and Zener breakdown - Zener diode & its applications –Diode as Clipper & Clamper- Varactor diode – Backward diode – Tunneling effect in thin barriers - Tunnel diode – Photo diode - Schottky diodes.

MODULE VI TRANSISTORS AND AMPLIFIERS **7**

Bipolar junction transistor- CB, CE, CC configuration and characteristics-Comparision-Field effect transistor-Configuration and characteristic-SCR, DIAC, TRIAC, UJT-Characteristics and simple applications-MOSFET: PMOS. NMOS- Structure and characteristics

Total Hours : 45

REFERENCES:

1. William H. Hayt Jr, Jack E. Kemmerly, and Steven M. Durbin, ‘Engineering Circuit Analysis’, Tata McGraw Hill Publishing Co Ltd, New Delhi, 200.2
2. Vedam Subrahmanyam, "Electric Drives", McGraw-Hill Education (India) Pvt Limited, 2010.
3. Edward Hughes, “Electrical and Electronics Technology”, Pearson India, 9th Edition, 2007.
4. D.P.Kothari and I.J.Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill Publishing Co Ltd, 2nd Edition, 2002.
5. I.J. Nagrath and D.P.Kothari, ‘Power System Engineering’, Tata McGraw Hill Publishing Co Ltd, 2nd Edition, 2007.
6. Ewald F.Fuchs and Mohammed A.S.Masoum, Elsevier Academic Press, 2008.
7. Indian Electricity Rules,1956.

8. Jacob Millman & Christos C.Halkias, “Electronic Devices and Circuits” Tata McGraw–Hill, 1991.

9. Floyd, “Electronic Devices: Conventional Current Version, 7/E” Pearson Education India, 2008

10. S.Salivahanan, N.Sureshkumar and A.Vallavaraj, Electronic Devices and Circuits, TMH, 1998.

OUTCOMES:

Students who complete this course will be able to:

- Demonstrate the basics of Electrical circuits and their solution methods.
- Understand the working of machines and their drives.
- Explain the structure of power system and importance of power quality.
- Analyse various methods of Power generation from renewable energy sources.
- Demonstrate working of PN junction diodes and special purpose diodes.
- Explain the characteristics of Transistors both in ideal and non-ideal cases.

ENB1282	WRITTEN COMMUNICATION	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To develop their creative thinking skills and write reviews
- To train them with the nuances of corporate correspondence
- To train them in writing official letters, technical reports and proposals
- To expose them to the writing of Statement of Purpose

MODULE I WRITTEN COMMUNICATION 4

Introduction - process of writing – ABC of academic and professional writing – Writing an article.

MODULE II CREATIVE WRITING 5

Writing stories based on visuals - Preparing an outline for a story - Writing critical reviews on an article / a paper

MODULE III CORPORATE CORRESPONDENCE 3

Tone in formal writing – e-mail writing, memo, fax, agenda and minutes writing.

Lab: viewing e-mail etiquette, format and conventions of writing memo.

MODULE IV OFFICIAL LETTERS 6

Writing Statement of purpose, Letter of Application and Resume – Assessing one's strengths and weaknesses – peer evaluation.

Lab: Resume writing – Viewing different types – Functional, Chronological - Writing one's resume using wiki, Letter calling for interview and seeking promotion.

MODULE V TECHNICAL WRITING I 6

Describing an experiment, writing instructions and recommendations, Feasibility report and progress report, Synopsis – Group assignment – case study.

MODULE VI TECHNICAL WRITING II **6**

Writing a technical proposal – Format – cover page, executive summary, timeline chart, budget estimate, drafting, conclusion,.

Total Hours: 30

REFERENCES:

1. Riordan & Pauley. 'Report Writing Today'. 9th Edition. Wadsworth Cengage Learning, USA. 2005.
2. Gerson, Sharon & Steven M. Gerson, 'Technical Writing: Process and Product' Pearson Education, New Delhi. 2004.
3. M Ashraf Rizvi 'Effective Technical Communication'. Tata McGraw-Hill Education, 2005.
4. Sharma, R.C. & Krishna Mohan, "Business Correspondence and Report Writing". Tata MacGraw – Hill Publishing Company Limited, New Delhi. 2002.
5. Anderson, Durston & Pool. "Thesis and Assignment Writing". 4th Edition. John Wiley & Sons. Australia. 2002.

OUTCOME:

- On completion of the course, the students will have the ability to write all kinds of formal correspondence like letters, reports and proposals.

ITB1212	DIGITAL SYSTEMS LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To study the basic logic gates – AND, OR, INVERT, NAND and NOR
- To verify the Boolean theorems by using logic gates
- To design and implement various combinational logic circuits
- To design and implement various synchronous and asynchronous sequential circuits
- To study the function of various combinational and sequential circuits using hardware description language

LIST OF EXERCISES:

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.
4. Design and implementation of parity generator / checker using basic gates and MSI devices.
5. Design and implementation of magnitude comparator
6. Design and implementation of application using multiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters
9. Coding combinational circuits using Hardware Description Language (HDL software required)
10. Coding sequential circuits using HDL (HDL software required)

OUTCOME:

On completion of this lab course,

- The students will be able to design and implement any type of combinational and sequential logical circuits

PHB1284	PHYSICS OF ENGINEERING MATERIALS LABORATORY (Common to ECE, EEE, AERO, CSE & IT Branches)	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To study the characteristics of conducting, semiconducting, dielectric, magnetic and optical materials.

LIST OF EXPERIMENTS:

1. Determination of magnetic field along the axis of a circular coil – Stewart and Gees experiment.
2. Determination of electrical conductivity of a given metal by four point probe method.
3. Determination of Hall coefficient of a given semiconductor material.
4. Determination of band gap of a semiconductor diode.
5. Determination of dielectric loss of a dielectric material using LCR bridge method.
6. Determination of time constant of an RC circuit by charging and discharging of a capacitor.
7. Determination of magnetic susceptibility of a paramagnetic material using Quincke's method.
8. Determination of energy loss of a given transformer coil using Hysteresis – B-H curve.
9. Determination of Verdet constant of a material using Faraday Effect.
10. Determination of Kerr constant using electro optic modulators.

OUTCOMES:

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

- Know the properties of conducting, semiconducting, dielectric and magnetic materials.
- Know the principle and working of Kerr modulator and Faraday rotator.

EEB1282	ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To understand,simulate and verify Thevenin's and Norton's theorem.
- To understand and verify the characteristics of various Electrical Machines
- To understand the three phase Power Measurement in AC circuits.
- To verify practically, the fundamental characteristics of Electron Devices.

LIST OF EXPERIMENTS:

1. Verification of Thevenin's theorem and Norton's theorem using MATLAB
2. Open circuit characteristics and Load Characteristics of Self Excited DC Generator
3. Load Test on DC Shunt and DC Series Motor
4. Load Test on Single Phase Transformer
5. Load Test on Three Phase Induction Motor
6. Measurement of 3 phase power using 2 wattmeter method
7. PN Junction Diode characteristics.
8. Zener Diode characteristics.
9. Input and Output characteristics of BJT in CE configuration.
10. Characteristics of JFET.
11. SCR Characteristics.

OUTCOMES:

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

- Construct and simulate any given simple electric circuits and verify theorems using MATLAB
- Study and understand the performance of Electrical Machines
- Measure the three phase power.
- Experimentally understand the characteristics of diodes, BJT's and FET's and SCR

SEMESTER III

MAB 2181	TRANSFORMS AND APPLICATIONS (Common to all B.Tech Programmes)	L T P C 3 1 0 4

OBJECTIVES:

The course aims to

- develop the skills of the students in the areas of boundary value problems and transform techniques. .
- acquire knowledge on different transforms like Laplace Transform, Fourier Transform and Z Transform.

MODULE I LAPLACE TRANSFORM **8**

Laplace transform - Sufficient condition - Transforms of elementary functions - Properties - Transforms of Derivatives and Integrals - Initial and Final Value Theorem - Transform of Periodic functions - Inverse transforms - Convolution Theorem.

MODULE II FOURIER SERIES **7**

Dirichlet's conditions - General Fourier series - Odd and even functions - Half-range sine series - Half-range cosine series - Complex form of Fourier Series - Parseval's identity - Harmonic Analysis.

MODULE III BOUNDARY VALUE PROBLEMS **8**

Classification of second order quasi linear partial differential equations - Solutions of one dimensional wave equation - One dimensional heat equation - Steady state solution of two-dimensional heat equation (Insulated edges excluded) - Fourier series solutions in Cartesian coordinates.

MODULE IV FOURIER TRANSFORM **7**

Fourier integral theorem (without proof) - Fourier transform pair - Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

MODULE V Z -TRANSFORM AND DIFFERENCE EQUATIONS **7**

Z-transform - Properties - Inverse Z-transform - Convolution theorem - Formation of difference equations.

MODULE VI APPLICATIONS OF TRANSFORMS **8**

Applications of Laplace Transform in solving linear ordinary differential equations - Second order with constant coefficients, Simultaneous First order equations - Applications of Z-transform in solving difference equations using Z-transform.

L - 45; T - 15; Total Hours - 60

TEXT BOOKS:

1. Veerarajan.T, "Engineering Mathematics", 5th edition, Tata Mc Graw Hill Publishing Co. New Delhi, 2012.
2. Grewal B.S., "Higher Engineering Mathematics", 42nd edition, Khanna Publishers, New Delhi, 2012.

REFERENCES:

1. Kreyszig .E, "Advanced Engineering Mathematics", 10th edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
2. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th edition, Cengage Learning, 2011.
3. Dennis G. Zill, Warren S. Wright, "Advanced Engineering Mathematics", 4th edition, Jones and Bartlett publishers, Sudbury, 2011.
4. Alan Jeffrey, "Advanced Engineering Mathematics", 1st Edition, Academic Press, USA, 2002.
5. Ramana B.V, "Higher Engineering Mathematics",1st Edition, Tata McGraw Hill Publishing Co. New Delhi, 2006.

OUTCOMES:

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

- solve engineering problems in the area of heat conduction, communication systems, electro-optics and electromagnetic theory using different transforms.
- solve boundary value problems encountered in engineering practices.

SSB2181	LAW FOR ENGINEERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To familiarize with Indian Constitution and Governance of our country.
- To apprise on human rights, local and International and redressal mechanism.
- To provide important aspect of corporate laws.
- To give an introduction of important industrial and labour laws of our country.
- To provide an exposure on laws on contracting and arbitration.
- To give an overview on intellectual property related laws.

MODULE I INDIAN CONSTITUTION **7**

Constitution - Meaning and history - Making of constitution - Salient features, preamble, Citizenship, Fundamental rights, Fundamental duties, Equality and social justice, Directive principles, Constitutional amendments.

MODULE II GOVERNANCE AND POWERS VESTED **7**

Union executive, Legislature - Union - State and union territories, Union and state relations, powers vested with parliament and state legislature, emergency provisions - People's Representations Act - Election Commission - Election for parliament and state legislature, Judiciary.

MODULE III HUMAN RIGHTS **7**

Human rights - meaning and significance, International law on human rights, Covenant on civil and political rights; Covenant on Economic, social and cultural rights - protocol, UN mechanism and agencies, watch on human rights and enforcement - role of judiciary and commission, Right to information Act 2005 - evolution - concept - practice.

MODULE IV CORPORATE AND LABOUR LAWS **7**

Corporate laws - Meaning and scope - Laws relating to companies, Companies Act 1956 - Collaboration agreement for Technology transfer, Corporate liability - Civil and criminal - Industrial employment (standing orders) Act 1946, Industrial Disputes Act, 1947, Workmen's Compensation Act 1923, The Factories Act, 1948 - Industry related other specific laws.

MODULE V CONTRACTS AND ARBITRATION **9**

Types of contract - Standard form of contracts - General principles under Indian Contract Act, 1872 - Protection against exploitation - Judicial approach to contracts, Arbitration and conciliation - Meaning, scope and types, model law, judicial intervention, international commercial arbitration - Arbitration agreement, arbitration tribunal - Powers and jurisdiction, enforcement and revision, Geneva Convention, Awards, Confidentiality.

MODULE VI LAWS RELATED TO IPR **8**

IPR - Meaning and scope, International Convention - Berne and Parrys Conventions, International organization - WIPO - TRIPS, Major Indian IPR Acts - Copyright laws, Patent and Design Act, Trademarks Act, Trade Secret Act, Geographical Indicator, Securing of International patents.

Total Hours: 45

REFERENCES :

1. Jain M.P, "Indian Constitutional Law", Wadhwa & Co., 2005.
2. Subhash G. & Kashyap, "Our Constitution : An introduction to India's Constitution and Constitutional Law, National Book Trust", 3rd Edition, India ,2001.
3. Agarwal H.D., "International Law and Human Rights", Central Law Publications, 2008.
4. Meena Rao, "Fundamental Concepts in Law of Contract", 3rd Edition, Professional offset, 2006.
5. Ramappa," Intellectual Property Rights Law in India", Asia Law House, 2010.
6. Avtar Singh," Company Law", Eastern Book Co., 2007.
7. Rustamji R.F., "Introduction to the Law of Industrial Disputes", Asia Publishing House.
8. Acts : Right to Information Act, Industrial Employees (standing order) Act, Factories Act, Workmen Compensate Act.

OUTCOMES:

Students will be

- Familiar with Indian Constitution and Governance of our country, local and International redressal mechanism.
- Familiar with intellectual property related laws.
- Able to apply corporate laws, important industrial and labour laws of our country.
- Able to take up managerial, professional, ethical, social and economic responsibilities.

ITB2101 DATA STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To describe about problem solving techniques
- describe the usage of various data structures
- explain the various operations for maintaining common data structures
- recognize the associated algorithm operations and complexity.

MODULE I PROBLEM SOLVING & ABSTRACT DATA TYPES 7

Problem solving - Top-down Design - Implementation - Verification - Efficiency- Analysis - Sample algorithms .

MODULE II ADT 8

Introduction to datastructures, Arrays, Sparse matrices, Strings. Abstract Data Type (ADT) - The List ADT - The Stack ADT - The Queue ADT.

MODULE III TREES 8

Preliminaries - Binary Trees - The Search Tree ADT - Binary Search Trees - AVL Trees - Tree Traversals - Hashing - General Idea - Hash Function - Separate Chaining - Open Addressing - Linear Probing - Model - Simple implementations- Binary Heap.

MODULE IV SORTING 7

Preliminaries - Insertion Sort -selection sort- Shell sort - Heap sort - Merge sort - Quick sort - External Sorting.

MODULE V GRAPHS 8

Definitions - Topological Sort - Shortest-Path Algorithms - Unweighted Shortest Paths - Dijkstra"s Algorithm - Minimum Spanning Tree - Prim"s Algorithm - Applications of Depth-First Search - Undirected Graphs - Biconnectivity.

MODULE VI APPLICATIONS 7

Linked List - Maintaining an inventory -- Stack - conversion of infix to postfix expression, evaluation of arithmetic expression - Queue - scheduler in OS - Tree - Priority queue - Graph - Traveling Salesman Problem.

Total Hours: 45

TEXT BOOKS:

1. R. G. Dromey, "How to Solve it by Computer", Prentice-Hall of India, 2009.

2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 3rd Edition, Pearson Education Asia, 2007.

REFERENCES:

1. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", 1st Edition Pearson Education, 2003.

2. Y. Langasam, M.J Augenstein and A.M. Tenenbaum, "Data Structures using C and C++", 2nd Edition, Prentice - Hall of India, 2000.

OUTCOMES:

At the completion of the course students are able to,

- Design and apply appropriate data structures for solving computing problems.
- Develop computer programs to implement different data structures and related algorithms.
- Possess the ability to design simple algorithms for solving computing problems.

ITB2102 PROGRAMMING PARADIGMS L T P C
3 0 0 3

OBJECTIVES:

- To understand the basic concepts of java programming using OOPs concepts.
- To acquire knowledge and skills in Graphical User Interface (GUI) using Java fundamentals.
- To explore Object based concepts and Scripting Paradigms.

MODULE I OBJECT ORIENTED PARADIGM 7

Object Oriented Programming Concepts - Objects - Classes - Methods and Messages - Abstraction and Encapsulation - Inheritance - Abstract Classes.

MODULE II OBJECTS, CLASSES AND CONSTRUCTORS 7

C++ Fundamentals - I/O Operations - Constructors - Destructors - Pointers - String Handling - Function Overloading - Operator Overloading.

MODULE III INHERITANCE AND POLYMORPHISM 8

Inheritance, Public, Private and Protected Derivations, Multiple Inheritance, Abstract Class, Virtual Functions - Pure Virtual Functions - Templates and Exception.

MODULE IV JAVA FUNDAMENTALS 8

Java Virtual Machine - Reflection - I/O Console - Filter and Pipe Streams - Byte Codes - Byte Code Interpretation - Dynamic Reflexive Classes - Operators - Expression - Arrays - Control Structures.

MODULE V MULTITHREADING AND APPLET PROGRAMMING 8

Threads - Thread Life cycle - Multi threading advantages and issues - Thread program and thread synchronization - Applet class - Applet Life Cycle - Passing Parameters embedding in HTML - Introduction to AWT Programming & Java Swing.

MODULE VI SCRIPTING PARADIGMS 7

HTML, CSS, DHTML, Java Script, Functions, Events, DOM, Web Application Development.

Total Hours: 45

TEXT BOOKS:

1. Bjarne Stroustrup, "The C++ Programming Language", Special 3rd Edition, Pearson Education, 2000.
2. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I - Fundamentals", 8th Edition, Sun Microsystems Press, 2008.
3. P.J. Deitel and H.M. Deitel, "Internet & World Wide Web: How to Program", 4th Edition, Pearson Education, 2009.

REFERENCES:

1. K. Arnold and J. Gosling, "The JAVA programming language", 3rd Edition, Pearson Education, 2000.
2. Herbert Schildt, "The complete reference JAVA2", 5th Edition, Tata McGraw-Hill Publishing Company.
3. C. Thomas Wu, "An introduction to Object-oriented programming with Java", 4th Edition, Tata McGraw-Hill Publishing company Ltd., 2006.

OUTCOMES:

Upon completion of the course the students will be able to:

- experience the basic concepts of C++ and Java programming.
- know practical knowledge in java concepts like objects, classes, streams, multi-threading & GUI.
- design a small-scale application oriented java program.

ITB2103 SYSTEM SOFTWARE L T P C
3 0 0 3

OBJECTIVES:

- To have an understanding of fundamentals of design of assemblers, loaders, linkers and macro processors.
- To know the design and implementation of linkers and loaders.
- To have an understanding of macro processors.

MODULE I INTRODUCTION 8

System software and machine architecture - The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

MODULE II ASSEMBLERS 8

Basic assembler functions - A simple SIC assembler - Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes - Program relocation - Machine independent assembler features - Literals - Symbol-defining statements - Expressions - One pass assemblers and Multi pass assemblers - Implementation example-MASM assembler.

MODULE III LOADERS AND LINKERS 8

Basic loader functions - Design of an Absolute Loader - A Simple Bootstrap Loader - Machine dependent loader features - Relocation - Program Linking - Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search - Loader Options - Loader design options-Linkage Editors - Dynamic Linking - Bootstrap Loaders - Implementation example - MSDOS linker.

MODULE IV MACRO PROCESSORS 8

Basic macro processor functions - Macro Definition and Expansion - Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters - Generation of Unique Labels - Conditional Macro Expansion - Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor - ANSI C Macro language.

MODULE V COMPILER AND INTERPRETERS **8**

Basic concepts of Compiler-Phases of Compiler -Interpreters-Benefits of Interpreters- Overview of Interpretation-A Toy Interpreter-Pure and Impure Interpreters-Java language Environment-Java Virtual Machine.

MODULE VI SYSTEM SOFTWARE TOOLS **5**

Text editors - Overview of the Editing Process - User Interface - Editor Structure. Interactive debugging systems - Debugging functions and capabilities - Relationship with other parts of the system -User-Interface Criteria.

Total Hours: 45

TEXT BOOKS:

1. Leland L. Beck, "System Software - An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2000.

REFERENCES:

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", 2nd Revised Edition, Tata McGraw-Hill, 1999.
2. John J. Donovan, "Systems Programming", Tata McGraw-Hill, 1972.

OUTCOMES:

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

- design and implement Assemblers, Loaders, Linkers and Macro processors.
- have an understanding of system software tools.
- know the design of Loaders and Linkers.

ITB2104 COMPUTER NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the layering concepts in computer networks.
- To understand the various functions of each layer.
- To analyze different applications that use computer networks.

MODULE I DATA COMMUNICATIONS **8**

Components - Direction of Data flow - networks - Components and Categories- types of Connections - Topologies -Protocols and Standards - ISO / OSI model- Transmission Media - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing sequences.

MODULE II DATA LINK LAYER **8**

Error - detection and correction - Parity - LRC - CRC - Hamming code - low Control and Error control - stop and wait - go back-N ARQ - selective repeat ARQ- sliding window - HDLC - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 - FDDI - SONET - Bridges.

MODULE III NETWORK LAYER **8**

Internetworks - Packet Switching and Datagram approach - IP addressing methods - Sub netting - Routing - Distance Vector Routing - Link State Routing- Routers.

MODULE IV TRANSPORT LAYER **7**

Duties of transport layer - Multiplexing - Demultiplexing - Sockets - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) - Congestion Control - Quality of services (QOS) - Integrated Services.

MODULE V APPLICATION LAYER **7**

Domain Name Space (DNS) - SMTP - FTP - HTTP - WWW - Network Simulation Tools - NS2 / Glomosim.

MODULE VI CRYPTOGRAPHY **7**

OSI Security Architecture - Classical Encryption techniques - Data Encryption

Standard - Block Cipher Design Principles and Modes of Operation - Principles of Public key Cryptosystems - RSA algorithm.

Total Hours: 45

TEXT BOOK:

1. Behrouz A. Forouzan, "Data Communication and Networking", Tata McGraw-Hill, 2004.

REFERENCES:

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 5th Edition, Pearson Education, 2003.
2. Larry L.Peterson and Peter S. Davie, "Computer Networks", 2nd Edition, Harcourt Asia Pvt. Ltd., Pearson education Asia, 2000.
3. Andrew S. Tanenbaum, "Computer Networks", 4th Edition, PHI, 2003.
4. William Stallings, "Data and Computer Communication", 6th Edition, Pearson Education, 2000.
5. William Stallings, "Cryptography and Network Security - Principles and Practices", 3rd Edition, Prentice Hall of India, 2003.

OUTCOMES:

Students should be able to:

- master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
- brief the concepts of protocols, network interfaces and design/performance issues in local area networks and wide area networks.
- be familiar with contemporary issues in networking technologies.
- be familiar with network tools and network programming.

ENB1281	ORAL COMMUNICATION	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To help the students acquire efficiency in Spoken English with due importance to Stress, accent and Pronunciation.
- To hone the listening skills and understand native accent.
- To enable them to make presentations effectively.
- To develop their ability to persuade and convince people to accept a point of view.
- To prepare them for Placement Interviews, Group discussions etc.

MODULE I **8**

(i) Oral Communication - Implications in real life and work place situations

(ii) One-minute Presentations (JAM) on concrete and abstract topics that test their creative thinking

(iii) Prepared presentations and extempore presentations

(iv) Group project - presentation on any social issue. The group will have to research on the history of the problem, its cause, impact and outcome hoped for and then makes a presentation

(v) Recording presentations and feedback - Peer and faculty evaluation

MODULE II **2**

Listening to ESL Podcast - Viewing Multimedia - Listening to BBC News - Received Pronunciation (RP)/ VOA/ NDTV - exposure to paralinguistic features.

MODULE III **4**

Developing persuasive skills - Selling a product - marketing skills - the topics will be on advertising, convincing someone on social issues such as preservation of water, fuel, protection of environment, gender discrimination.

MODULE IV **4**

Debates on pros and cons on topics of relevance like Nuclear Energy, Appropriate Technology, Internet, Social Media. This will be followed by Peer

and Faculty feedback

MODULE V **6**

Brainstorming - Think pair and share activity - Discussion etiquette - Assigning different roles in a GD (Note-taker, Manager, Leader and Reporter) Peer and faculty feedback

MODULE VI **6**

Interview Skills - Assessing one"s strengths and weaknesses, SWOC Analysis, Mock interview - Verbal and Non-verbal Communication - Types of Job Interview- Telephone Interview, Stress Interview.

REFERENCES:

1. Hancock,Mark., "English Pronunciation in Use". Cambridge University Press, UK. 2005.
2. Anderson, Kenneth & et.al. "Study Speaking: A Course in Spoken English for Academic Purposes" 2nd Edition, Cambridge University Press, UK. 2004.
3. Hurlock, B. Elizabeth. "Personality Development", Tata McGraw Hill, New York. 2004.

OUTCOME:

- On completion of the course, the students will have the ability to speak confidently and effectively in Presentations and Group Discussions.

ITB2105	DATA STRUCTURES LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To develop skills to design and analyze simple linear and non linear data structures.
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- To Gain knowledge in practical applications of data structures.

LIST OF EXERCISES:

1. Array implementation of List ADT, Stack ADT, Queue ADT.
2. Implementation of Singly linked list (addition, deletion, insertion in all positions).
3. Implementation of Doubly linked list (addition, deletion, insertion in all positions).
4. Implementation of Stack and Queues using linked list.
5. Implementation of binary search technique.
6. Program for tree traversal (inorder, postorder, preorder).
7. Implementation of Quick sort, Merge sort, Shell sort.
8. Implementation of Dijkstra"s algorithm.
9. Implementation of Depth First Search.
10. Applications of Linked List, Stack and Queue in real world.

OUTCOMES:

Upon completion of the subject, students will be able to

- analyze and compare the efficiency of algorithms.
- solve problems independently.
- think critically for improvement in solutions.

ITB2106	ADVANCED PROGRAMMING LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To develop software development skills in java programming.
- To develop the ability to write computer programs for specific problems.

LIST OF EXERCISES:

1. Create simple C++ programs with I/O operations.
2. Illustrate working of classes , objects and constructors using C++ Programs
3. Implementation of Inheritance and Polymorphism using C++.
4. Create simple Java programs with multiple classes using object creation
5. Implementation of constructors and destructors using Java
6. Implementation of Method Overloading concept using Java
7. Program to illustrate the Inheritance concepts using Java
8. Programs using IO streams using Java
9. Implementation of Multithreading concepts using Java.
10. Develop simple applications using Applet & AWT concepts
11. Implementation of Layout Managers.
12. Develop a simple application using Java Swing.
13. Design a Dynamic web page using JavaScript and DHTML.

OUTCOME:

- Student will have the proficiency to develop projects in java programming.

ITB2107	SYSTEM SOFTWARE LAB (Using C or C++)	L T P C 0 0 3 1

OBJECTIVES:

- To understand the basic design of different types of assemblers and loaders.
- To understand the basic design of macro processor , lexical analyzer and text editor.

LIST OF EXERCISES:

1. Implement a symbol table with functions to create, insert, modify, search, and display.
2. Implement pass one of a two pass assembler.
3. Implement pass two of a two-pass assembler.
4. Implement a single pass assembler.
5. Implement a macro processor.
6. Implement an absolute loader.
7. Implement a relocating loader.
8. Implement pass one of a direct-linking loader.
9. Implement a simple Lexical Analyzer.
10. Implement a simple text editor with features like insertion / deletion of a character, word,sentence.
11. Implement an Interactive Debugger.

OUTCOMES:

On completing this course students will

- have an understanding of foundation to design of assemblers.
- have an understanding of foundation to design of loaders.
- have an understanding of foundation to design of linkers.
- have an understanding of foundation to design of macro processors.

SEMESTER IV

MAB2286	OPERATIONS RESEARCH	L	T	P	C
		3	1	0	4

OBJECTIVE:

This course aims at providing the concepts in optimization of resources for industries, to create awareness about the optimization of resources and to understand and apply the operations research techniques in industrial operations.

MODULE I LINEAR PROGRAMMING 8

Linear Programming - Definition - formulation - solutions: Graphical- simplex method, Duality in LPP - Dual simplex method - Two Phase simplex method.

MODULE II TRANSPORTATION AND ASSIGNMENT MODELS 6

Formation and Solutions of Transportation problems, Assignment problems and Travelling salesman problems.

MODULE III NETWORK MODELS 8

Project Management: Network logic - Fulkerson"s rule - AON diagram - CPM and PERT techniques, sequencing models.

MODULE IV INVENTORY CONTROL 7

Types of inventory- Inventory cost - EOQ - Deterministic inventory problems - EOQ with price breaks - Stochastic inventory problems - Multi product problems- Systems of inventory control - Selective inventory control techniques.

MODULE V QUEUING THEORY 8

Queuing system - Characteristics - symbols - Poisson process and exponential distribution - Single server queuing models - Multiserver queuing models.

MODULE VI GAME THEORY 8

Two person zero sum games - pure strategies - Mixed strategies Principle of dominance - Graphical solutions - Algebraic solutions.

L - 45; T - 15; Total Hours - 60

REFERENCES:

1. Wayne.L.Winston, "Operations Research applications and algorithms", 4th edition, Thomson learning, 2007.
2. Hamdy ATaha, "Operations Research an Introduction", 8th edition, Phil Pearson, 2007.
3. Winston.W.L. "Operations Research", 4th edition, Thompson-Brooks/Cole, 2003.
4. Frederick. S. Hiller and Gerald.J.Lieberman, Operations Research concepts and cases, 8th edition (SIE), Tata McGraw - Hill Pub. Co. Ltd., New Delhi, 2006.
5. A. Ravindran, D. T. Phillips and J. J. Solberg, "Operations Research: Principles and Practice", 2nd edition, John Wiley & Sons, New York, 1992.
6. Robertazzi. T.G., "Computer networks and systems-Queuing theory and performance evaluation", 3rd edition, Springer, 2002.

OUTCOMES:

At the end of the course, the students would

- Have a fundamental knowledge of concepts in optimization of resources for industries.
- Have a well - sounded knowledge of transportation and assignment problems.
- Be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Acquire skills in handling situations involving decision models.

ITB2211 COMPUTER ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES:

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study in detail the different types of control and the concept of pipelining.
- To study the hierarchical memory system including cache memories and virtual memory.
- To explore the different ways of communicating with I/O devices and standard I/O interfaces.

MODULE I BASIC STRUCTURE OF COMPUTERS 7

Functional units - Basic operational concepts - Bus structures - Software performance - Memory locations and addresses - Memory operations - Instruction and instruction sequencing.

MODULE II ARITHMETIC UNIT 7

Addressing modes - Assembly language - Basic I/O operations - Stacks and queues - Addition and subtraction of signed numbers - Design of fast adders

MODULE III BASIC PROCESSING UNIT 7

Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division - Floating point numbers and operations.Fundamental concepts - Execution of a complete instruction - Multiple bus organization

MODULE IV CONTROL UNIT 7

Hardwired control - Microprogrammed control - Pipelining - Basic concepts - Data hazards - Instruction hazards - Influence on Instruction sets - Data path and control consideration - Superscalar operation.

MODULE V MEMORY SYSTEM **9**

Basic concepts - Semiconductor RAMs - ROMs - Speed - size and cost - Cache memories - Performance consideration - Virtual memory- Memory Management requirements - Secondary storage.

MODULE VI I/O ORGANIZATION **8**

Accessing I/O devices - Interrupts - Direct Memory Access - Buses - Interface circuits - Standard I/O Interfaces (PCI, SCSI, and USB).

Total Hours: 45

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, McGraw-Hill, 2002.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture - Designing for Performance", 6th Edition, Pearson Education, 2003.
2. David A.Patterson and John L.Hennessy, Morgan Kaufmann, "Computer Organization and Design: The hardware / software interface", 2nd Edition, 2002.
3. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw-Hill, 1998.

OUTCOMES:

At the end of the course the students will understand

- How computer hardware has evolved to meet the needs of multi processing systems.
- The major components of a computer including CPU, memory, I/O and storage.
- The uses of cache memory.
- A wide variety of memory technologies both internal and external.
- The role of the operating system in interfacing with the computer hardware.
- The basic components of the CPU including the ALU and control unit.
- A basic understanding of assembly programming.
- Design principles in instruction set design including RISC architectures.
- Parallelism both in terms of a single processor and multiple processors.

ITB2212 NETWORK PROGRAMMING AND MANAGEMENT **L T P C**
3 0 0 3

OBJECTIVES:

- To learn the basics of socket programming using TCP Sockets.
- To learn basics of UDP sockets.
- To develop knowledge of threads for developing high performance scalable applications.
- To learn about raw sockets.
- To understand simple network management protocols & practical issues.

MODULE I INTRODUCTION **7**

Introduction to Socket Programming - Overview of TCP/IP Protocols - Introduction to Sockets - Socket address Structures - Byte ordering functions- address conversion functions.

MODULE II ELEMENTARY TCP SOCKETS, TCP CLIENT SERVER **8**

Elementary TCP Sockets - socket, connect, bind, listen, accept, read, write, close functions - Iterative Server - Concurrent Server. TCP Echo Server - TCP Echo Client - Posix Signal handling - Server with multiple clients - boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown

MODULE III I/O MULTIPLEXING, SOCKET OPTIONS **8**

I/O multiplexing - I/O Models - select function - shutdown function - TCP echo Server (with multiplexing) - poll function - TCP echo Client (with Multiplexing). Socket options - getsocket and setsocket functions - generic socket options - IP socket options - ICMP socket options - TCP socket options.

MODULE IV ELEMENTRY UDP SOCKETS **7**

Elementary UDP sockets - UDP echo Server - UDP echo Client - Multiplexing TCP and UDP sockets - Domain name system - gethostbyname function - Ipv6 support in DNS - gethostbyadr function - getservbyname and getservbyport functions.

MODULE V ADVANCED SOCKETS **7**

Ipv4 and Ipv6 interoperability - Threads - thread creation and termination - TCP echo server using threads - Mutexes - condition variables - raw sockets- raw socket creation - raw socket output - raw socket input - ping program - trace route program.

MODULE VI SIMPLE NETWORK MANAGEMENT **8**

SNMP network management concepts - SNMP management information - standard MIB"s - SNMPv1 protocol and Practical issues - introduction to RMON, SNMPv2 and SNMPv3.

Total Hours: 45

TEXT BOOKS:

1. W. Richard Stevens, "UNIX Network Programming Vol-I" , 2nd Edition, PHI / Pearson Education, 1998.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", 3rd Edition, Addison Wesley, 1999.

REFERENCE:

1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), 2nd Edition, PHI, 2003.

OUTCOMES:

After completion of the course, the students will be able to

- Know the fundamentals of network programming.
- Develop network applications using socket programming.
- Understand simple network management protocols & practical issues.

ITB2213 SOFTWARE ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To learn software life cycle models.
- To gain knowledge on software requirements engineering.
- To know software design concepts
- To be able to understand software testing techniques
- To gain knowledge on software quality assurance.

MODULE I SOFTWARE PROCESS 8

Introduction - Generic Process Model - Process assessment and improvement- perspective process models - Specialized Process Models - The Unified Process - PSP - TSP - Process Technology - Agile Development

MODULE II SOFTWARE REQUIREMENTS 8

Understanding Requirements - Requirements Modeling - Requirements Analysis - Scenario Based Modeling - UML Models - Data Modeling - Class Based Modeling - Requirements Modeling - Strategies - Flow Oriented Modeling- Creating a Behavioral Modeling - Requirements Modeling for Web Applications.

MODULE III SOFTWARE DESIGN - I 7

Design Process - Design Concepts - Design Model - Software Architecture - Architectural Genres - Architectural Styles - Architectural Design - Architectural Mapping Using Data Flow.

MODULE IV SOFTWARE DESIGN - II 6

Component Level Design - Pattern Based Design - User Interface Design - Web Application Design.

MODULE V SOFTWARE TESTING 8

A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software - Test Strategies for Object Oriented Software - Test Strategies for Web Applications - Validation Testing - System Testing - The Art of Debugging - Internal and External Views of Testing - White Box

Testing Techniques - Black Box Testing Techniques - Testing Object Oriented Applications-Testing Web Applications.

MODULE VI MANAGING SOFTWARE PROJECTS 8

Project Management Concepts - the Management Spectrum - People - Product-Process - Project - W5HH Principles - Critical Practices - Process and Project Metrics - Estimation for Software Projects - Software Project Estimation - Decomposition Techniques - Empirical Estimation Models - Estimation for Object Oriented Projects - Specialized Estimation Techniques.

Total Hours: 45

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering - A Practitioners Approach", 7th Edition, McGraw Hill Publication, 2010.
2. Sommerville, "Software Engineering", 9th Edition, Addison-Wesley, 2011.

REFERENCE:

1. William E. Perry, "Effective methods for Software Testing", 2nd Edition, Willey, 2000.

OUTCOMES:

- Students will be able to choose the suitable software process model for their work.
- They will have capability to gather requirements and design for software.
- Students will gain software testing knowledge.

ITB2214 MICROPROCESSORS AND MICROCONTROLLER **L T P C**
3 0 0 3

OBJECTIVES:

- To study the architecture and Instruction set of 8086
- To develop assembly language programs in 8086.
- To design and understand multiprocessor configurations.
- To study different peripheral devices and their interfacing to 8086.
- To study the architecture and programming of 8051 microcontroller.

MODULE I 8086 ARCHITECTURE **8**

Introduction to 8085 Microprocessor, 8086 Architecture-Functional diagram. Register Organization, Memory Segmentation. Programming Mode!. Memory addresses. Physical memory organization. Architecture of 8086, signal descriptions of 8086- common function signals. Minimum and Maximum mode signals. Timing diagrams. Interrupts of 8086.

MODULE II INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086 **8**

Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

MODULE III I/O INTERFACE **7**

8255 PPI various modes of operation and interfacing to 8086.Interfacing keyboard and display ,Serial communication standards, Serial data transfer schemes. 8251 USART architecture and interfacing.

MODULE IV INTERFACING WITH ADVANCED DEVICES **7**

Memory interfacing to 8086, Interrupt structure of 8086, Vector interrupt table, Interrupt service routine. Introduction to DOS and BIOS interrupts, Interfacing Interrupt Controller 8259, DMA Controller 8257 to 8086.

MODULE V INTRODUCTION TO MICROCONTROLLERS **7**

Overview of 8051 microcontroller Architecture I/O Ports. Memory organization, addressing modes and instruction set of 8051, simple program.

MODULE VI 8051 REAL TIME CONTROL **8**

Interrupts, timer/ Counter and serial communication, programming Timer Interrupts, programming external hardware interrupts, programming the serial communication interrupts, programming 8051 timers and counters

Total Hours: 45

TEXT BOOKS:

1. D. V. Hall. "Micro processors and Interfacing",1st edition, 2006.
2. Kenneth. J. Ayala "The 8051 microcontroller", 3rd edition, Cengage learning, 2010.

REFERENCES:

1. A. K. Ray and K.M. Bhurchandani, "Advanced Microprocessors and Peripherals- TMH", 2nd edition, 2006.
2. K.Uma Rao, Andhe Pallavi, "The 8051 Microcontrollers, Architecture and programming and Applications", Pearson Education, 2009.
3. Liu and GA Gibson, "Micro Computer System 8086/8088 Family Architecture. Programming and Design", 2nd Edition.
4. Ajay. V. Deshmukh , "Microcontrollers and application", TMGH, 2005

OUTCOMES:

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

- Understand the internal architecture of 8085 & 8086 Microprocessor.
- Develop programs using 8085 & 8086 instructions.
- Explain Architecture of 8051 Microcontroller.
- Understand the interfacing concepts and programming techniques.

LSB2181 BIOLOGY FOR ENGINEERS

L	T	P	C
3	0	0	3

OBJECTIVES:

The aim of the course is to introduce basic biological concepts to the engineering students to promote cross-breeding of ideas. In particular,

- To provide an overview of cell structure and function.
- To give basic idea on biochemistry related to biological aspects.
- To introduce genes, their structure, inheritance and about living organisms.
- To give an understanding on metabolism, respiration, etc.
- To inform students of engineering about the interface of biology and engineering.

MODULE I BASICS OF CELL STRUCTURE AND FUNCTION 7

Cells as unit of life - basic chemistry of cell - physical and chemical principles involved in maintenance of life processes, cell structure and functions - Prokaryotic and Eukaryotic cells, cell wall, plasma membrane, endoplasmic reticulum, nucleus, chromosomes- cell division - mitosis, meiosis - molecules controlling cell cycle.

MODULE II BIOCHEMISTRY 8

Biomolecules - introduction - basic principles of organic chemistry, types of functional groups, chemical nature, pH and biological buffers - carbohydrates- mono, di, oligo and polysaccharides, lipids- phospholipids, glycolipids, sphinglipids, cholesterol, steroids, prostaglandms - aminoacids, peptides, proteins - structures- primary, secondary, tertiary and quaternary, glycoproteins, lipoproteins - Nucleic acids - purines, pyrimidines, nucleoside, nucleotide, RNA, DNA.

MODULE III GENETICS 7

Genes - structure and functions - behavior, dominance and epigenetics, evolution - inheritance - reproduction and gene distribution - genome of living organisms - plants - bacteria and viruses - animals - humans, genetic engineering.

MODULE IV MICROBIOLOGY AND SENSORS 8

Microbiology - basis of microbial existence - microbial diversity - classification and nomenclature of micro-organisms- impact of microorganisms on industry, agriculture and health, industrial microbiology - primary and secondary screening of micro-organisms, fermentation processes, bioreactors, microbial ecology - microbial bio-remediation - epidemiology and public health.

MODULE V METABOLISM 7

Metabolic processes - bio-membranes, diffusion, absorption, osmo-regulation, photosynthesis, respiration, dialysis, nutrition, digestion and excretion.

MODULE VI BIOLOGY AND ENGINEERS 8

Application of biology in engineering- living things as the solutions (bionics) - living things as models (biometrics) - bio-technology - biomedical engineering- effect of human action on living things - right balance - bioinformatics - bionanotechnology - sensors, biosensors, biochips-ethics in biology.

Total Hours: 45

REFERENCES:

1. Johnson, Arthur T., “Biology for Engineers”, CRC Press, FL, 2011.
2. Campbell and Recee, “Biology”, Pearson, Benjamin Cummins Pub. 8th edition, 2008.
3. Scott Freeman, “Biological Sciences”, Prentice Hall, 2002.

OUTCOMES:

After finishing this course students will be able to

- understand basics of biological processes, composition of cell contents
- understand applications of microbes in industrial manufacturing of proteins, antibodies and antibiotics.
- understand cloning and genetic engineering
- identify the genes in different genome (plants, microbes, animals, human) and compare the genes by bioinformatics approaches

ENB2282	CONFIDENCE BUILDING AND BEHAVIORAL SKILLS	L	T	P	C
		0	0	2	1

OBJECTIVE:

To enable the students to develop communication skills for verbal communication in the work place.

TOPICS OUTLINE:

This course is practical oriented one and exercises will be given to the students group users /individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

LAB ACTIVITIES:

- Introduction: Soft skills definition, examples
- Verbal communication: Case study, communication and discussion
- Prepared speech
- Impromptu speech
- Debate: Case studies - Attitude and Behavior: role play and exploration
- Ability to ask for help - communication and team work
- Manners and etiquette
- Organization and Planning
- Time keeping
- Conduct in workplace
- Conscientiousness
- Work output
- Professionalism
- Motivation
- Ownership of tasks
- Adaptability/flexibility

ASSESSMENT:

The assessment will be continuous and portfolio based. The students must produce the record of the work done through the course of the semester in the individual classes. The portfolio may consist of a) the individual task outline and activities, b) worked out activities c) Pre-designed sheets which may be provided by the Faculty member. The portfolio will be used by the Faculty member for assessment. The course coordinator in consultation with the course committee shall decide at the beginning of the semester, the number of exercises, method of assessment of each and the weightage for the end semester assessment.

OUTCOMES:

The students should be able to:

- develop verbal communication skills.
- debate with other students confidently
- communicate effectively their ideas.

ITB2215	WEB TECHNOLOGY LAB	L	T	P	C
		1	0	3	2

OBJECTIVES:

- To obtain knowledge in Client side and Server Side Scripting Languages and to create simple Web Applications and Web sites.
- To design web pages dynamically and to implement the web applications using servelets and JSP.
- To acquire programming knowledge in web based languages and web services with SOAP (Simple Object Access Protocols) and REST (Representational State Transfer Protocols) Protocols.

LIST OF EXERCISES:

1. Creation of web applications using HTML, DHTML (Simple Data Binding - Moving with a record set - Sorting Table data - Binding of an Image and table).
2. Implement the following types of Style sheets in the DHTML and Javascript application.
   - Internal CSS
   - External CSS
   - Inline CSS
3. Java Scripts - Object Based Scripting for Web, Structures - Functions - Arrays - Java Script Objects.
4. Jquery Implementation - Enhance the WebPages using Jquery.
5. Demonstrate Simple XML implementation using HTML and JavaScript. Transformation in XML using XSLT, Demonstrate Xpath, Xlink and XML Namespaces and XML Schema.
6. Configure and Customize Web servers Apache Tomcat and HTTP Apache.
7. Implementation of JSP - Objects - Scripting in Net Beans.
8. Demonstrate simple PHP applications, Session Management in PHP.
9. Implementation of Message Application and Database connectivity using MYSQL.
10. Creation of User Interface using Flash.

11. Creation of Simple Applications using Photoshop.
12. Implementation of SOAP and WSDL.

OUTCOMES:

The students must be able to:

- Develop web applications and deploy it in a particular environment with appropriate web servers.
- Analyse the different scripting languages and learn to apply the same in different context in web technology
- Implement dynamic applications and apply it for real time problems.

ITB2216	NETWORKING LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To implement the Address resolution Protocol and Reverse Address resolution Protocol using C language.
- To write, execute and debug c programs which use Socket API.
- To implement the Socket Programming for Client and Server using TCP.
- To implement the Socket Programming for Client and Server using UDP.
- To understand how to use TCP and UDP based sockets and their differences.
- Develop DNS Server to resolve a given host name.
- Study of Network Simulators.

LIST OF EXERCISES:

1. Simulation of ARP / RARP.
2. Write a program that takes a binary file as input and performs bit stuffing and CRC Computation.
3. Develop an application for transferring files over RS232.
4. Simulation of Sliding-Window protocol.
5. Simulation of BGP / OSPF routing protocol.
6. Develop a Client - Server application for chat.
7. Develop a Client that contacts a given DNS Server to resolve a given host name.
8. Write a Client to download a file from a HTTP Server.
9. Study of NS2.
10. Study of Glomosim / OPNET.

OUTCOMES:

- Recognize the packet system and protocol of layers of a network stack .
- Recognize the features of client/server systems and programs, with a view to be able to implement simple systems in this model.
- Analyze, develop and implement the client and server of a simple program over a transport layer.
- Network Simulators mainly used for doing research in networking area.

ITB2217	MICROPROCESSORS AND MICRO CONTROLLERS LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To introduce microprocessors and basics of system design using microprocessors.
- To understand h/w architecture, instruction set and programming of 8085 microprocessor.
- To study the h/w architecture, instruction set and programming of 8086 microprocessor.
- To introduce the peripheral interfacing of microprocessors.
- To understand through case studies, the system design principles using 8085 and 8086.
- To introduce the h/w architecture, instruction set, programming and interfacing of 8051 microcontroller.

LIST OF EXERCISES:

1. Programming with 8085 - 8-bit / 16-bit multiplication/division using repeated addition/subtraction.
2. Programming with 8085-code conversion, decimal arithmetic, bit manipulations.
3. Programming with 8085-matrix multiplication, floating point operations.
4. Programming with 8086 - String manipulation, search, find and replace, copy operations, sorting. (PC Required)
5. Using BIOS/DOS calls: Keyboard control, display, file manipulation. (PC Required)
6. Using BIOS/DOS calls: Disk operations. (PC Required)
7. Interfacing with 8085/8086 - 8255, 8253.
8. Interfacing with 8085/8086 - 8279, 8251.
9. 8051 Microcontroller based experiments - Simple assembly language programs. (cross assembler required)
10. 8051 Microcontroller based experiments - Simple control applications. (cross assembler required)

OUTCOMES:

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

- write programs using 8085, 8086 and 8051 instructions.
- design microprocessor and microcontroller based system using interfacing concepts.
- develop small applications using 8085, 8086 and 8051 instructions.

SEMESTER V

ITB3101	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart fundamental concepts in the area of mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, embedded systems, and software.
- To introduce selected topics of current research interest in the field.
- Students can understand and build systems support mechanisms for mobile computing systems including client-server web/database/file systems, and mobile networks for achieving the goal of anytime, anywhere computing in wireless mobile environments.

MODULE I WIRELESS COMMUNICATION FUNDAMENTALS 8

Wireless Transmission - Frequencies for Radio Transmission - Signals - Antennas - Signal Propogation - Multiplexing - Modulation - Spread spectrum - MAC - FDMA - TDMA - CDMA.

MODULE II PRVASIVE COMPUTING PRINCIPLES 8

Pervasive Computing - Information Access Devices - Smart Identification - Embedded Controls - Entertainment Systems

MODULE III SOFTWARE 8

Java - Operating Systems: Windows CE - Palm OS - Symbian OS - Java Card-Client Middleware - Security.

MODULE IV CONNECTING THE WORLD 7

Internet Protocols and Formats - Mobile Internet - Voice - Web Services - Connectivity.

MODULE V BACK-END SERVER INFRASTRUCTURE 7

Service Discovery - Back-End Server Infrastructure: Gateways - Application Servers - Internet Portals-Synchronization.

MODULE VI SERVICES **7**

Home Services - Communication Services - Home Automation - Security Services - Travel and Business Services - Consumer Services.

Total Hours: 45

TEXT BOOK:

1. Uwe Hansmann, Lothar Merk, Martin S.Nicklous and Thomas Stober, "Principles of Mobile Computing", 2nd Edition, Springer International, 2003.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", PHI/Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.
3. Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2002.

OUTCOMES:

Upon completion of this program a student will be able to:

- understand the concepts and features of mobile computing technologies and applications.
- good understanding of working principles of wireless and mobile communication networks.
- identify the important issues of developing mobile computing systems and applications.
- develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools.

ITB3102 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the object oriented life cycle.
- To know how to identify objects, relationships, services and attributes through UML.
- To provide knowledge in Object Oriented Design process.
- To analyze about software quality and usability.

MODULE I INTRODUCTION **7**

An Overview of Object Oriented Systems Development - Object Basics - Object Oriented Systems Development Life Cycle.

MODULE II OBJECT ORIENTED METHODOLOGIES **9**

Unified Approach - Development Process - Unified Modeling Language - Use case - Class diagram: The Essential - Advanced Concepts - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram - Communication Diagrams - Composite Structure - Timing Diagrams.

MODULE III OBJECT ORIENTED ANALYSIS **8**

Identifying use cases - Object Analysis - Classification - Identifying Object relationships - Attributes and Methods.

MODULE IV OBJECT ORIENTED DESIGN **7**

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability.

MODULE V APPLICATIONS **7**

System Architecture: Satellite - Based Navigation - Control System: Traffic Management - Artificial Intelligence - Cryptanalysis - Web Application: Vacation Tracking System.

MODULE VI SOFTWARE QUALITY AND USABILITY **7**

Designing Interface Objects - Software Quality Assurance - System Usability - Measuring User Satisfaction

Total Hours: 45

TEXT BOOKS:

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 1999.
2. Martin Fowler, "UML Distilled", 3rd Edition, Pearson Education, 2007.

REFERENCES:

1. John Deacon, "Object Oriented Analysis and Design", Pearson Education, 2009.
2. Bennett, Farmer, Steve McRobb, "Object-oriented Systems Analysis and Design: Using UML", McGraw-Hill Higher Education, 2010.
3. Grady Booch, "Object Oriented Analysis and Design with Applications", 3rd Edition, Pearson, 2010.

OUTCOMES:

- Students will able to elucidate Software Requirements.
- Students are able to analyze requirements.
- They will gain capability to design for any software.

ITB3103 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- Master the basic concepts and appreciate the applications of database systems.
- Master the basics of SQL and relational algebra expressions.
- Mastering the design principles for logical design of databases, including the E-R method and normalization approach.
- Be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing.
- Master the basics of query evaluation techniques and query optimization.

MODULE I INTRODUCTION AND CONCEPTUAL MODELING 7

Introduction to File and Database systems- Database system structure - Data Models - Introduction to Network and Hierarchical Models - ER model

MODULE II RELATIONAL MODEL 7

Relational Model - Relational Algebra and Calculus - SQL - Data definition- Queries in SQL- Updates- Views - Integrity and Security

MODULE III DATA STORAGE 8

Relational Database design - Functional dependences and Normalization for Relational Databases (up to BCNF) - Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files

MODULE IV HASHING, INDEXING AND QUERY PROCESSING 7

Hashing Techniques - Index Structure for files -Different types of Indexes- B-Tree - B+Tree - Query Processing.

MODULE V TRANSACTION MANAGEMENT 8

Transaction Processing - Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules - Concurrency Control - Types of Locks- Two Phases locking-

Deadlock- Time stamp based concurrency control - Recovery Techniques - Concepts- Immediate Update- Deferred Update - Shadow Paging.

MODULE VI CURRENT TRENDS **8**

Object Oriented Databases - Need for Complex Data types - OO data Model- Nested relations - Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage - XML- Structure of XML- Data- XML Document- Schema- Querying and Transformation - Data Mining and Data Warehousing.

Total Hours: 45

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 4th Edition, McGraw-Hill, 2002.

REFERENCES:

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", 3rd Edition, Pearson Education, 2003.
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
3. Peter Rob and Corlos Coronel, "Database System, Design, Implementation and Management", 5th edition, 2003.
4. Hector Garcia Molina, Jeffrey D.Ullman and Jennifer Widom, "Database System Implementation", Pearson Education, 2000.

OUTCOMES:

In this course, students will learn to:

- study the physical and logical database designs, database modeling, relational, hierarchical, and network models.
- understand and use data manipulation language SQL to query, update, and manage a database.
- develop an understanding of essential DBMS concepts such as: Integrity, Concurrency, Object oriented database, Distributed database, Data mining and Data Warehousing.
- design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

ITB3104 OPERATING SYSTEMS **L T P C**
3 0 0 3

OBJECTIVES:

- This course provides the overview of computer system and the operating system, the concepts of process, memory, and I/O management.
- To summarize the various approaches for solving the problem of mutual exclusion in an operating system.
- Compare and contrast the various CPU scheduling algorithms.
- To explain conditions that lead to deadlock.
- To provide knowledge in memory hierarchy and cost-performance trade-offs.

MODULE I OPERATING SYSTEM TYPES **7**

Introduction - Mainframe systems - Desktop Systems - Multiprocessor Systems - Distributed Systems - Clustered Systems - Real Time Systems - Handheld Systems - Hardware Protection - System Components - Operating System Services - System Calls - System Programs.

MODULE II PROCESS SCHEDULING **8**

Process Concept - Process Scheduling - Operations on Processes - Cooperating Processes - Inter-process Communication- CPU Scheduling - Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Multiple-Processor Scheduling - Real Time Scheduling.

MODULE III PROCESS SYNCHRONIZATION **7**

The Critical-Section Problem - Synchronization Hardware - Semaphores - Classic problems of Synchronization - Critical regions - Monitors- Threads - Overview - Threading issues.

MODULE IV DEADLOCKS **7**

System Model - Deadlock Characterization - Methods for handling Deadlocks- Deadlock Prevention - Deadlock avoidance - Deadlock detection - Recovery from Deadlocks.

MODULE V STORAGE MANAGEMENT 8

Storage Management - Swapping - Contiguous Memory allocation - Paging - Segmentation - Segmentation with Paging-Virtual Memory - Demand Paging-Process creation - Page Replacement - Allocation of frames - Thrashing.

MODULE VI FILE SYSTEM & DISK MANAGEMENT 8

File Concept - Access Methods - Directory Structure - File System Mounting - File Sharing - Protection- File System Structure - File System Implementation-Directory Implementation - Allocation Methods - Free-space Management-Kernel I/O Subsystems - Disk Structure - Disk Scheduling - Disk Management-Swap-Space Management. Case Study: The Linux System, Windows.

Total Hours: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 6th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

REFERENCES:

1. Harvey M. Deitel, "Operating Systems", 2nd Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt.Ltd, 2003.
3. William Stallings, "Operating System", 4th Edition, Prentice Hall of India, 2003.
4. Pramod Chandra P. Bhatt, "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003.

OUTCOMES:

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

- Understand the different types of operating systems.
- Understand the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
- Learn the concepts of deadlock in operating systems and how they can be managed / avoided.
- Understand virtual memory management.

GEB3201 ENVIRONMENTAL SCIENCE AND ENGINEERING **L T P C**
3 0 0 3

OBJECTIVE:

- To impart the basic scientific knowledge on the environment and human impacts on various elements of environment and assessment tools.

MODULE I PHYSICAL ENVIRONMENT **8**

Earth"s surface - the Interior of Earth - Plate Tectonics - Composition of the Crust: Rocks - formation and types, Soils - formation and components - soil profile.

Atmosphere - structure and composition - weather and climate - tropospheric airflow

Hydrosphere - water budget - hydrological cycle - Rainwater and precipitation, River Water and solids, Lake Water and stratification, Seawater and solids, soil moisture and groundwater.

Bioelement cycling - The Oxygen cycles - the carbon cycle - the nitrogen cycle - the phosphorous cycle - the sulfur cycle sodium, potassium and magnesium cycles.

MODULE II BIOLOGICAL ENVIRONMENT **7**

Cellular basis of life - prokaryotes and eukaryotes - cell respiration - photosynthesis - DNA and RNA - genetically modified life.

Population dynamics - population - population growth - survival and growth curves - population regulation - future of human population.

Biological communities - Five major interactions: competition, predation, parasitism, mutualism and commensalism - Concepts of habitat and niche - natural selection - species richness and species diversity - ecological succession and climax.

Ecosystem and Biomes - Food Chains and food webs - biomagnifications - ecological pyramids - Trophic levels - Energy flow in ecosystem - ecosystem stability - Terrestrial and aquatic biomes.

MODULE III IMPACTS ON NATURAL RESOURCES AND CONSERVATION 9

Biological resources - nature and importance - direct damage - introduced species - Habitat degradation, loss and fragmentation - Values of biodiversity- hotspots of biodiversity, threats to biodiversity- endangered and endemic species of India- conservation of biodiversity, in-situ and ex-situ conservation.

Land Utilization - past patterns of land use - Urban and Industrial development- deforestation, salinisation, soil erosion, and desertification - Modern Agriculture and Impacts.

Waste management - types of solid wastes: domestic, municipal, industrial and e-wastes - disposal options - reduce, recovery, reuse - waste minimization, cleaner production technology.

MODULE IV IMPACTS ON WATER AND AIR AND CONSERVATION 8

Water pollution - organic oxygen demanding wastes - anthropogenic phosphate and eutrophication - Ground water contamination - Usage of fertilizer and pesticides- acid rain -acid mine discharges - toxic metals - organochlorines - endocrine disrupting substances- treatment process - Rain water harvesting and watershed management- manmade radionuclide"s - thermal pollution

Atmospheric pollution - primary and secondary pollutants - anthropogenic, xenobiotic, synergism, sources and sink, residence time, levels and impacts of major pollutants - processes leading to smog, acid rain, global warming, stratospheric ozone depletion - Noise pollution and abatement.

MODULE V IMPACTS ON ENERGY AND CONSERVATION, ENVIRONMENTAL CRISIS 8

Energy - Renewable and non renewable energy resources - thermal power plants - nuclear fuels, fossil fuels, solar energy, wind energy, wave energy, tidal energy, ocean thermal energy, hydropower, geothermal energy, biomass energy

Environment crisis - state of environment in developed and developing countries- managing environmental challenges for future - disaster management, floods, earthquake, cyclone and landslides.

MODULE-VI ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABILITY **5**

Environmental Impact Assessment - Impacts: magnitude and significance - steps in EIA - methods - precautionary principle and polluter pays principle - role of NGOs and Public - value education -Environment protection act (air, water, wild life) and forest Conservation act

Concept of Sustainability - Sustainable Development - Gaia Hypothesis - Traditional Knowledge for sustainability.

Total Hours: 45

TEXT BOOKS:

1. Andrew R. W. Jackson and Julie M. Jackson, "Environmental Science (The Natural Environment and Human Impact)", Pearson Education Limited, 2000.
2. G Tyler Miller, Jr., Thomson Brooks/Cole, "Environmental Science (Working with the Earth)", 2006.

REFERENCES:

1. Bryan G. Norton, "Sustainability: A Philosophy of Adaptive Ecosystem Management",2005.
2. Larry W. Canter, "Environmental Impact Assessment", McGraw-Hill, 1996.
3. James Lovelock, "The Revenge of Gaia: Why the Earth is Fighting Back and How We Can Still Save Humanity", Penguin UK, 2007.
4. David McGeary and Charles C Plummer ,Physical Geology, Earth Revealed, WCB McGraw Hill, 1998.

OUTCOME:

Student should have gained basic scientific knowledge on the environment and human impacts on various elements of environment and assessment tools.

ENB3181 CAREER BUILDING AND PEOPLE SKILLS

L	T	P	C
0	0	2	1

OBJECTIVE:

- To prepare the students for building their competencies and career building skills.

COURSE OUTLINE:

This course is practical oriented one and exercises will be given to the students group users /individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

LAB ACTIVITIES:

- Preparation for the placement
- Group discussions: Do"s and Don"ts - handling of Group discussions - What evaluators look for.
- Interview - awareness of facing questions - Do"s and Don"ts of personal interview.
- Selection of appropriate field vis-à-vis personality / interest.
- Preparation of Resume-Objectives, profiles vis-à-vis companies requirement.
- Enabling students to prepare for different procedures / levels to enter into any company - books / websites to help for further preparation.
- Technical interview - how to prepare and face it.
- Workplace skills
- Presentation skills
- Oral presentations
- Technical presentations
- Business presentations
- Technical writing
- Interpersonal relationships - with colleagues - clients - understanding one"s own behavior - perception by others.

ASSESSMENT:

As the course is practical one, it will be assessed using a portfolio based assessment. The students must in consultation with the Faculty member, plan a portfolio of evidence for the above mentioned activities. The students must develop a résumé or résumés that promote own ability to meet specific job requirements and plan their portfolio in a format appropriate to industry they wish to target. The case studies will contain direct observation of the candidate developing career plans, résumés and skills portfolio, reflect written or oral questioning to assess knowledge and problem-solving activities to assess ability to align career aspirations with realistic career goals. The course coordinator in consultation with the course committee will decide the number of exercises and mark to be awarded for each beside the weightage for the end semester assessment.

OUTCOMES:

The course will help the students to

- Develop team work skills
- Take part effectively in various selection procedures followed by the recruiters.

ITB3105	CASE TOOLS LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- Define the process of object-oriented analysis and design to software development.
- Pointing out the importance and function of each UML model throughout the process of object-oriented analysis and design and explaining the notation of various elements in these models.
- Providing students with the necessary knowledge and skills in using object-oriented CASE tools.Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. Program Analysis and Project Planning.
   Thorough study of the problem - Identify project scope, Objectives, Infrastructure.
2. Software requirement Analysis.
   Describe the individual Phases / Modules of the project, Identify deliverables.
3. Data Modelling.
   Use work products -use case diagrams and activity diagrams, class diagrams, sequence diagrams and add interface to class diagrams.
4. Software development and debugging.
5. Study of software testing tools.

LIST OF EXERCISES:

1. Student Marks Analyzing System.
2. Quiz System.
3. Online Flight Ticket Reservation System.
4. Payroll System.
5. Course Registration System.
6. E-mail client system.
7. Stock Maintenance system.

8. Real-Time Scheduler system.
9. Platform assignment system for the trains in a railway station.
10. Expert system to prescribe the medicines for the given symptom.
11. Remote computer monitoring system.

OUTCOMES:

Students on successful completion of the course should have gained the following skills

- Show the importance of systems analysis and design in solving complex problems.
- Show how the object-oriented approach differs from the traditional approach to systems analysis and design.

ITB3106	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

The major objective of this lab is

- To provide a strong formal foundation in database concepts, technology and practice tothe students to groom them into well-informed database application developers.
- To present the concepts and techniques relating to query processing by SQL engines,ODBC and its implementations.
- To give a good formal foundation on the relational model of data.

LIST OF EXERCISES:

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Design and implementation of Payroll Processing System.
7. Design and implementation of Banking System.
8. Design and implementation of Library Information System.

OUTCOMES:

After undergoing this laboratory module, the participant should be able to

- Experience in basic concepts of database management systems.
- Understand, appreciate and effectively explain the underlying concepts of database technologies.
- Populate and query a database using SQL DML/DDL commands.
- To design a small-scale database oriented applications.

ITB3107	OPERATING SYSTEM LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

The major objective of this lab is

- To know about the various operating systems like Windows, UNIX, Mac, etc.
- To understand the resource management provided by operating systems.
- To learn the concepts and theories of operating systems.
- To discover the implementation issues of operating systems.

LIST OF EXERCISES:

1. Shell programming Command syntax - write simple functions - basic tests - loops - patterns - expansions - substitutions.
2. Programs using Unix system calls - fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Programs using the I/O system calls of UNIX (open, read, write, etc)
4. Programs to simulate UNIX commands like ls, grep, etc.
5. Simulation of following CPU scheduling algorithms: For each of the scheduling algorithms, compute Average waiting time & Average turnaround time and draw the Gantt chart.

   A. FCFS

   B. SJF (preemptive and non-preemptive)

   C. Priority Scheduling (preemptive and non-preemptive)

   D. Round Robin Scheduling
6. Implement the Producer - Consumer problem using semaphores.
7. Implementation of Bankers algorithm for Deadlock avoidance.
8. Implement the following memory Allocation Strategies using arrays:

   A. First Fit

   B. Worst Fit

   C. Best Fit
9. Implementation of Memory Management schemes using the following Page

replacement algorithms:

A. FIFO page replacement algorithm

B. Optimal page replacement algorithm

C. LRU page replacement algorithm

10. Implement the following File Allocation Techniques:

A. Contiguous allocation

B. Linked allocation

C. Indexed allocation

OUTCOMES:

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

- Work with UNIX based systems.
- Know the basic system calls in Unix and their functionalities.
- Apply the scheduling algorithms in programming.
- Understand the scenario of multiple process execution in computer systems.
- Expertise in memory allocation techniques.

SEMESTER VI

ECB4102	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- This course will introduce students to embedded systems by providing a detailed overview of the important topics in the field.
- This course will equip students with the software development skills necessary for practitioners in the embedded systems field.
- Entire software development lifecycle and examine the various issues involved in developing software for embedded systems.

MODULE I EMBEDDED COMPUTING PLATFORM 7

Embedded computing - characteristics and challenges - embedded system design process-- Overview of Processors and hardware units in an embedded system.

MODULE II COMPUTING PLATFORM AND DESIGN ANALYSIS 9

CPU buses - Memory devices - I/O devices - Component interfacing - Design with microprocessors - Development and Debugging - Program design - Model of programs - Assembly and Linking - Basic compilation techniques - Analysis and optimization of execution time, power, energy, program size - Program validation and testing.

MODULE III REAL TIME OPERATING SYSTEMS (RTOS) 7

Overview of Operating Systems (OS) concepts - Real time systems - Types- Need for RTOS in Embedded Systems -Compare OS and RTOS - RTOS Tasks - Task States - Multitasking -Context Switching - Scheduling Algorithms- IPC mechanisms .

MODULE IV DISTRIBUTED EMBEDDED SYSTEMS 8

Communication buses - Shared memory communication - accelerated design- networks for embedded systems - networks based design - Internet enabled systems.

MODULE V EMBEDDED SOFTWARE DEVELOPMENT TOOLS 7

Host and target machines - Linkers / Locators for Embedded Software - Debugging techniques - Instruction set simulators Laboratory tools - Practical example - Source code.

MODULE VI SOFTWARE TECHNOLOGY FOR EMBEDDED SYSTEMS 7

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - C" Program compilers - Cross compiler - Optimization of memory codes.

Total Hours:45

TEXT BOOKS:

1. Marilyn Wolf, "Computers as components ", Elsevier, 2012.
2. Qing Li and Carolyn Yao, "Real-Time Concepts for Embedded Systems", CMP Books, 2003.
3. Michael Bass, "Programming Embedded Systems in C and C++", Oreilly, 2003.

REFERENCES:

1. David E.Simon, "An Embedded Software Primer", Pearson Education, 2003.
2. Rajkamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw-Hill, First reprint Oct. 2003.
3. Steve Heath, "Embedded System Design", 2nd Edition, Elsevier, 2004.
4. Frank Vahid and Tony Gwargie, "Embedded System Design", John Wiley & sons, 2002.

OUTCOMES:

On completion of this course the student will be able to

- Develop Embedded Programs in C and C++.
- Apply various code minimization techniques.

ITB3211 INFORMATION SECURITY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basics of Information Security.
- To know the legal, ethical and professional issues in Information Security.
- To explore the technological aspects of Information Security.
- To study the critical need for ensuring Information Security in Organizations.

MODULE I CRYPTOGRAPHY **9**

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

MODULE II PROGRAM SECURITY **7**

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

MODULE III OPERATING SYSTEM SECURITY **7**

Memory and Address Protection - File Protection Mechanisms - User Authentication - Trusted Operating Systems - Designing Trusted Operating Systems- Assurance in Trusted Operating Systems-

MODULE IV DATABASE AND DATA MINING SECURITY **7**

Introduction to Databases - Database Security Requirements - Reliability & Integrity - Sensitive data - Inference - Multilevel Databases - Proposals for Multilevel Security - Data Mining.

MODULE V NETWORK SECURITY **7**

Threats in Networks - Network Security Controls - firewalls - Intrusion Detection Systems - Secure E-Mail

MODULE VI ADMINSTERING SECURITY AND ETHICAL ISSUES **8**

Security Planning - Risk Analysis - Organizational Security Policies - Physical Security - Protecting Programs and Data - Information and the Law - Software Failures - Computer Crime - Privacy - Ethical Issues.

Total Hours: 45

TEXT BOOK :

1. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 3rd Edition, Pearson Education, 2003.

REFERENCES:

1. William Stallings, "Cryptography and Network Security - Principles and Practices", 3rd Edition, Pearson Education, 2003.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.

OUTCOMES:

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

- 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.

ITB3212 GRAPHICS AND MULTIMEDIA L T P C
3 0 0 3

OBJECTIVES:

- To study the various graphical techniques and algorithms.
- To impart the basic knowledge of multimedia concepts and various I/O technologies.
- To enable the students to develop their creativity.
- To understand the fundamental graphical operations and to get a glimpse of recent advances in computer graphics.
- To learn the user interface issues that make the computer easy for the novice user.

MODULE I INTRODUCTION 7

Introduction - Overview of Graphics Systems- Output Primitives- Line - Curve and Ellipse Algorithms - Attributes of Output Primitives.

MODULE II TWO-DIMENSIONAL CONCEPTS 7

Two-Dimensional Geometric Transformations - Two-Dimensional Viewing.

MODULE III THREE-DIMENSIONAL CONCEPTS 8

Three-Dimensional Object Representations - Three-Dimensional Geometric and Modeling Transformations - Three-Dimensional Viewing - Color models - Animation

MODULE IV MULTIMEDIA SYSTEMS DESIGN 7

An Introduction - Multimedia applications - Multimedia System Architecture - Evolving technologies for Multimedia - Defining objects for Multimedia systems- Multimedia Data interface standards - Multimedia Databases.

MODULE V MULTIMEDIA FILE HANDLING 8

Compression & Decompression - Data & File Format standards - Multimedia I/O technologies - Digital voice and audio - video image and animation - Full motion video - Storage and retrieval Technologies.

MODULE VI HYPERMEDIA **8**

Multimedia Authoring & User Interface - Hypermedia messaging - Mobile Messaging - Hypermedia message component - creating Hypermedia message - Integrated multimedia message standards - Integrated Document management - Distributed Multimedia Systems.

Total Hours: 45

TEXT BOOKS:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education, 2003.
2. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003.

REFERENCES:

1. Judith Jeffcoate, "Multimedia in practice technology and Applications", PHI, 1998.
2. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", 2nd Edition, Pearson Education, 2003.

OUTCOMES:

Upon completion of this program students should be able to:

- Present their knowledge and understanding in the theories and principles of graphics and multimedia technology.
- Produce marketable software with commercial values accepted by the global market.
- Design application systems by utilizing standard software development.
- Processes (planning requirements analysis, design, implementation, testing and maintenance).
- Utilize standard methods and tools in the management of computer graphics and multimedia (including project management, application development, computer graphics and multimedia)

MSB3181 MANAGEMENT OF BUSINESS ORGANISATION **L T P C**
3 0 0 3

OBJECTIVES:

- To give an exposure to principles of management and organizational structures.
- To introduce concepts of operation and material management.
- To provide an understanding of management of human resources.
- To impart some basic knowledge on marketing, pricing and selling.
- To give an overview of accounting and management of finance.

MODULE I PRINCIPLES OF MANAGEMENT **7**

Functions of management - planning - organizing - staffing - direction - motivation - communication - coordination - control, organizational structures-line - line and staff - matrix type, functional relationships - span of control, Management by Objectives (MBO) - Forms of Industrial ownership

MODULE II OPERATIONS MANAGEMENT **8**

Introduction to operations management - functions of production/operations management - types of production, Overview of facility location - lay out planning, introduction to production planning and control, work study, quality assurance, lean manufacturing and six sigma, plant maintenance and management.

MODULE III MATERIALS MANAGEMENT **8**

Materials Planning - types of inventory, Purchasing function - source selection-negotiation - ordering, Stores management - functions - types of stores - overview of inventory control, Introduction to newer concepts: MRP-I - MRP-II-ERP - JIT.

MODULE IV HUMAN RESOURCE MANAGEMENT **7**

Human Resource Management - objectives - role of Human Resource Manager-manpower planning - selection and placement - training - motivation-performance assessment - Introduction to grievances handling and labour welfare.

MODULE V MARKETING MANAGEMENT 7

Marketing - concept and definition - Elements of marketing mix - PLC - Steps in new product development - Pricing objectives and methods - Advertising types/media - Steps in personal selling - Sales promotion methods - Distribution channels: functions, types.

MODULE VI FINANCIAL MANAGEMENT 8

Financial management functions - introduction to financial accounts, financial performance - profit and loss account statement - balance sheet, budgetary control - meaning - uses - limitations - types of costs - basics of depreciation methods -break-even analysis - meaning - assumption - uses and limitations, working capital - meaning and relevance - Use of operating ratios

Total Hours : 45

REFERENCES:

1. Bhushan Y.K., "Fundamentals of Business Organisation and Management", Sultan Chand & Co., 2003.
2. Banga & Sharma, "Industrial Engineering & Management", 11th Edition, Khanna Publications, 2007.
3. Khanna, O.P., "Industrial Engineering & Management", Dhanpat Rai Publications, 2004.
4. S.N.Maheswari, "Principles of Management Accounting" , 16th Edition, S.Chand & Company Ltd. 2007.

OUTCOMES:

After doing the course,

- the students would have gained basic knowledge of the concepts of management and the functions of management.
- the students would have learnt fundamentals of the functional areas of management viz., operations management, materials management, marketing management, human resources management and financial management.

ITB3213 MOBILE APPLICATION DEVELOPMENT LAB

L	T	P	C
0	0	3	1

OBJECTIVES:

- To develop applications for current and emerging mobile computing devices
- To learn the processes, tools and frameworks required to develop applications for current and emerging mobile computing devices.
- To know all stages of the software development life-cycle from inception through to implementation and testing.
- To consider the impact of user characteristics, device capabilities, networking infrastructure and deployment environment, on the specified requirements of a software project.

LIST OF EXERCISES:

1. Simple mobile applications using J2ME.
2. Create a simple audio player mobile application using J2ME.
3. Simple mobile applications for Android platform. [4 examples]
4. Simple Mobile IP based Network programming applications. [2 examples]
5. Create simple mobile games [Example: 3 X 3 Tic-Tac-Toe game].
6. Simple mobile applications for Apple iOS platform. [2 examples]

OUTCOMES:

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

- Describe the limitations and challenges of working in a mobile and wireless environment as well as the commercial and research opportunities presented by these technologies.
- Apply the different types of application models/architectures used to develop mobile software applications.
- Describe the components and structure of a mobile development frameworks (Android SDK and Eclipse Android Development Tools (ADT)) and learn how and when to apply the different components to develop a working system.
- Work within the capabilities and limitations of a range of mobile computing devices.
- Design, implement and deploy mobile applications using an appropriate software development environment.

ITB3214	SOFTWARE DEVELOPMENT LAB	L	T	P	C
		0	0	3	1

OBJECTIVES

- Create a project team and appoint a project leader.
- Assume the role of client .discuss, evaluate and propose the requirements for a real world problem.
- Discuss the software requirement with team lead.
- Use the template to write requirements.
- To take part in ongoing project development process such as requirement analysis, design, implementation and testing.
- Learn where and how to make improvements in the software development process through developing projects.

Note: List of exercises will be framed based on the professional elective chosen.

OUTCOMES:

After the completion of this course, a successful student will be able to do the following:

- Use the basic principles of software engineering in managing complex software project.
- Effectively express themselves in written and oral form.
- Demonstrate ability to think critically.
- Demonstrate ability to integrate knowledge and idea in a coherent and meaningful manner .
- Work effectively with others.

ITB3215	GRAPHICS AND MULTIMEDIA LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To make students aware of the concepts underlying modern Computer Graphics.
- Learn to do animation using Adobe Flash, Write Action script.
- Learn to do Image Editing using Adobe Photoshop.

LIST OF EXERCISES:

1. To implement Simple DDA algorithm for line drawing.
2. To implement Bresenham"s algorithms for line, circle and ellipse drawing.
3. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
4. To implement Cohen-Sutherland 2D clipping and window-viewport mapping
5. To implement Sutherland - Hodgeman polygon clipping.
6. To perform 3D Transformations such as translation, rotation and scaling.
7. To visualize projections of 3D images.
8. To implement painters algorithm for visible surface identification.
9. To convert between color models.
10. To implement text compression algorithm.
11. To implement image compression algorithm.
12. To perform animation using any Animation software.
13. To perform basic operations on image using any image editing software.

OUTCOMES:

At the end of the course

- Students will be able to learn graphics and multimedia by learning how to draw the output primitives and transformations.
- Students will have the generic skills to design algorithms for 2D geometric transformations , 3D transformations, Algorithms for clipping,Learn to draw basic Output Primitives like Line, Circle, Ellipse, Attributes of Line ,Circle, Ellipse.
- Learn to apply the Multimedia softwares.

SEMESTER VII

ITB4101	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to enable the students:

- To discuss the distinctions between different levels of testing.
- To describe the principles of software testing and maturity levels.
- To describe strategies for generating system test cases.
- To understand the essential characteristics of tool used for test automation.
- Demonstrate the ability to apply multiple methods to develop reliability estimates for a software system.

MODULE I SOFTWARE TESTING-INTRODUCTION 9

Testing as an Engineering Activity - Role of Process in Software Quality - Testing as a Process - Basic Definitions, TMM levels- 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 II STRATEGIES AND METHODS FOR TEST CASE DESIGN 9

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 -Using White-Box Approach to Test design - Test Adequacy Criteria - Coverage and Control Flow Graphs - Covering Code Logic - Paths - White-box Based Test Design - Additional White Box Test design approaches - Evaluating Test Adequacy Criteria.

MODULE III LEVELS OF TESTING AND TESTING GOALS, PLANS AND POLICIE 9

The Need for Levels of Testing - MODULE Testing -Integration testing-System Testing - types of system testing - Acceptance Testing-types of acceptance test -testing OO systems - usability and accessibility testing-Testing and

debugging Goals and policies-Test plan components-The role of three groups in Test Planning and Policy Development.

MODULE IV CONTROLLING & MONITORING 9

Introducing the test specialist - Skills needed by a test specialist - Building a Testing Group-Structure of the testing group- Measurements and milestones for controlling and monitoring-Criteria for test completion- software configuration management-Controlling and Monitoring: Three critical views.

MODULE V TEST MEASUREMENTS 9

Reviews as a testing activity-Types of Reviews-Developing a Review Program-Measurement program to support product and process Quality-Review of Quality concepts-Quality costs-An approach to usability Testing.

MODULE VI TESTERS WORKBENCH 9

Defect analysis and prevention-Defect casual Analysis-Evaluating Testing Tools for the workbench-Tool categories-process reuse-Approach to model development-TMM structure-TMM Assessment model components.

Total Hours: 45

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing - Principles and Practices", Pearson education, 2006.
2. Ilene Burnstein, "Practical Software Testing", Springer, 2003.

REFERENCES:

1. Limaye L G, "Software Testing - Principles, Techniques and Tools", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009.
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education, 2008.
3. Boris Beizer, "Software Testing Techniques", 2nd Edition, Dreamtech, 2003.

OUTCOMES:

Students who have completed this course would have learned

- Various test processes and continuous quality improvement

- Types of errors and fault models
- To write proper test case for an application
- Test adequacy assessment using: control flow, data flow, and program mutations
- The use of various test tools
- Application of software testing techniques in commercial environments.

ITB4102 WIRELESS NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- To explain the constraints of the wireless physical layer that affect the design and performance of ad hoc and sensor networks, protocols, and applications.
- To explain the performance of various unicast and multicast routing protocols that have been proposed for ad hoc networks.
- To explain the operation of several media access protocols that have been proposed for ad hoc and sensor networks.
- To describe the platform architectures that are suitable for mobile computing and communications, e.g. personal digital assistants (PDAs), handsets, etc.
- To explain various security threats to ad hoc networks and describe proposed solutions.

MODULE I PHYSICAL LAYER ALTERNATIVES FOR WIRELESS NETWORKS 8

Applied Wireless Transmission Techniques. Short Distance Baseband Transmission. Pulse Transmission. Carrier Modulated Transmission. Traditional Digital Cellular Transmission. Broadband Modems for Higher Speeds. Spread Spectrum Transmissions. High-Speed Modems for Spread Spectrum Technology. Diversity and Smart Receiving Techniques. Comparison of Modulation Schemes. Coding Techniques for Wireless Communications

MODULE II PRINCIPLES OF WIRELESS NETWORK OPERATION 8

Wireless networks topologies, cellular topology, cell fundamentals signal to interference ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, micro cell method, overload cells, channels allocation techniques and capacity expansion FCA, channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

MODULE III GSM, CDMA AND TDMA TECHNOLOGY 8

Mechanism to support a mobile environment, communication in the infrastructure, IS-95 CDMA forward channel, IS - 95 CDMA reverse channel, pallert and frame formats in IS - 95; forward channel in W-CDMA and CDMA 2000, reverse channels in W-CDMA and CDMA-2000.

MODULE IV LOCAL BROADBAND NETWORKS 7

Historical overviews of the LAN industry, evolution of the WLAN industry, wireless home networking, IEEE 802.11,Physical Layer, Basic MAC Layer Mechanisms, CSMA/CA Mechanisms, other MAC Layers functionalities.

MODULE V AD HOC NETWORKS 7

Overviews of Ad hoc networks,, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Proactive, Reactive and Hybrid routing protocols - DSDV, AODV, DSR, ABR, TORA, ZRP.

MODULE VI WPAN AND GEOLOCATION SYSTEMS 7

IEEE 802.15 WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geo location technologies for wireless geo location, geo location standards for E.911 service.

Total Hours: 45

TEXT BOOK:

1. Kaveh Pahlavan, Prashant Krishnamoorthy, "Principles of Wireless Networks- A united approach", Pearson Education, 2002.

REFERENCES:

1. Jochen Schiller, "Mobile Communications", 2nd Edition, Pearson Education, 2003.
2. X.Wang and H.V.Poor, "Wireless Communication Systems", Pearson education, 2004.
3. M.Mallick, "Mobile and Wireless design essentials", Wiley Publishing Inc. 2003.
4. P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, "Wireless Networks", John Wiley & Sons, 2003.

OUTCOMES:

Upon completion of this program a student will be able to:

- Understand the fundamentals of wireless networks.
- Be familiar with the IEEE 802.11, ITU, and IS-x standards for multiple access wireless networking including ad hoc networks.

- Gain the knowledge on microwave characteristics, cellular radio techniques and wireless LANs.
- Analyze currently available commercial implementations of several wireless technologies.
- Design wireless networks considering the business goals, network security, protocols and management.

ITB4103 VIRTUALIZATION TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide knowledge on various types of virtualization techniques
- To know how to apply virtualization for server consolidation
- To impart knowledge on network and storage virtualization

MODULE I INTRODUCTION **8**

Understanding Virtualization, Describing Virtualization, Understanding the Importance of Virtualization, Understanding Virtualization Software Operation, Desktop Virtualization - Network Virtualization - Server and Machine Virtualization - Storage Virtualization - System-level or Operating Virtualization-Application Virtualization-Virtualization Advantages, Understanding Hypervisors, Describing a Hypervisor, Understanding the Role of a Hypervisor, Comparing Today"s Hypervisors.

MODULE II VIRTUAL MACHINES **8**

Understanding Virtual Machines-Describing a Virtual Machine-How a Virtual Machine Works-Working with Virtual Machines-Creating a Virtual Machine-Performing P2V Conversions-Loading Your Environment-Building a New Virtual Machine-Installing Windows into a Virtual Machine-Installing Linux into a Virtual Machine.

MODULE III SERVER CONSOLIDATION **7**

Hardware Virtualization - Virtual Hardware Overview - Sever Virtualization - Physical and Logical Partitioning - Types of Server Virtualization - Business cases for Sever Virtualization - Uses of Virtual server Consolidation - Planning for Development - Selecting server Virtualization Platform-Understanding Availability.

MODULE IV PROCESSOR AND MEMORY VIRTUALIZATION **7**

Managing CPUs for a Virtual Machine-Understanding CPU Virtualization-Configuring VM CPU Options-Tuning Practices for VM CPUs- Managing Memory for a Virtual Machine-Understanding Memory Virtualization-Configuring VM Memory Options-Tuning Practices for VM Memory.

MODULE V STORAGE AND NETWORK VIRTUALIZATION 8

Managing Storage for a Virtual Machine-Understanding Storage Virtualization-Configuring VM Storage Options-Tuning Practices for VM Storage-Managing Networking for a Virtual Machine- Understanding Network Virtualization-Configuring VM Network Options-Tuning Practices for Virtual Networks-Copying a Virtual Machine-Cloning a Virtual Machine-Working with Templates-Saving a Virtual Machine State.

MODULE VI DEVICES AND APPLICATIONS IN VIRTUAL MACHINES 7

Using Virtual Machine Tools-Understanding Virtual Devices-Configuring a CD/DVD Drive-Configuring a Sound Card-Configuring USB Devices-Configuring Graphic Displays-Configuring Other Devices-Deploying Applications in a Virtual Environment-Understanding Virtual Appliances and vApps

Total Hours: 45

TEXT BOOKS:

1. Matthew Portnoy, "Virtualization Essentials", John Wiley & Sons, Inc., 2012.
2. William von Hagen, "Professional Xen Virtualization", Wrox Publications, January 2008.

REFERENCES:

1. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
2. Kumar Reddy, Victor Moreno, "Network virtualization", Cisco Press, July 2006.
3. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.
4. Chris Wolf, Erick M. Halter, "Virtualization: From the Desktop to the Enterprise", APress 2005.

OUTCOMES:

Students will be able to

- understand virtualization concepts
- manage devices and applications in virtual machines
- install applications on virtual machines

ITB4104	MINI PROJECT	L	T	P	C
		0	0	3	1

OBJECTIVES:

- The mini project is designed to help students develop practical ability and knowledge about practical tools / techniques in order to solve real life problems related to the industry, academic institutions and computer science research.
- Each student will have to prepare proper documentation consisting of Software Requirements Specification (SRS), Modeling Techniques, Development Strategies, Implementation and Testing Strategies.
- Learn to apply the theoretical concepts in appropriate application.
- Learning new tools and new languages.

OUTCOMES:

The students will be able to,

- Co-ordinate with team members and communicate effectively.
- Use the techniques and latest computing tools to implement the proposed idea.

ITB4105	SOFTWARE TESTING LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- Understand the basic concepts of software testing.
- Plan, track and control the software testing effort.

Prepare the following documents and carry out the testing technique for two of the exercises done in IT210-Case Tools lab.

1. Software Requirement Specification
2. Software Test Plan
3. Test case design
4. Apply black box and white box testing techniques to design a test suite with a high level of path-coverage for
   - Stack class that implements methods such as push, pop, size, etc.
   - Queue Class that implements methods like enqueue, dequeue, etc.
5. Unit testing using Junit testing tool.
6. Functional Testing.
7. Perfomance and Load Testing using JMeter/Load Runner.
   - Develop a simple web application to demonstrate
8. Integration testing with HttpUnit
9. Study of Loadrunner testing tool
10. Study of cross browser testing tools- Selenium
11. Using Selenium IDE, Write a test suite containing minimum 4 test cases.
12. Install Selenium server and demonstrate it using a script in Java/PHP.

OUTCOMES:

Students on successful completion of the course should have gained the following skills

- Methods of test generation from requirements
- Test adequacy assessment using: control flow, data flow, and program mutations
- The use of various test tools
- Application of software testing techniques in commercial environments

ITB4106	VIRTUALIZATION LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.
- To enthuse students to conduct experiments by the arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.
- To provide a complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self evaluation.
- To share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distance.

LIST OF EXERCISES:

1. Study of Physical Machine resources
2. Study of virtual machines
3. VM Management and Configurations
4. Creation of Virtual Machines using Xen, KVM, Vmware
5. Creation of VM Images, VM Template and VM Networks
6. Creating Windows and Ubuntu Virtual Machines using Eucalpytus and OpenNebula-Open Source Midddleware technology
7. Checking Resource Limitations
8. Storage Virtualization

OUTCOMES:

At the end of this course

- The students can able to handle unexpected data.
- Still understand physical meanings of their data.

ITB4107	WIRELESS NETWORKS LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- Introduce various wireless systems and standards and their basic operation cases.
- Learn to simulate wireless networks and analyze the simulation results.

LIST OF EXERCISES:
(Experiments using NS2/matlab/Qualnet/Routers/Switches, etc.,)

1. Wireless Access Point - configuring and enabling security
2. Wi-Fi based Data Acquisition
3. Routing protocols for IP network using routers
4. Configuration of VLAN using switches
5. PDA mobility analysis using layer 3 switches
6. Hidden and exposed terminal problem
7. Signaling in wireless networks (RTS, CTS, DATA and ACK)
8. AODV/DSR
9. RTP protocol of VoIP
10. Implementation of network security algorithms
11. Network performance analysis using packet sniffer

OUTCOMES:

The students will be able to

- exposed basic wireless communication techniques.
- introduced various types of wireless networks and standards
- learn simulating wireless networks and reporting their findings.

SEMESTER VIII

		L	T	P	C
ITB4211	**PROJECT WORK**	**0**	**0**	**18**	**9**

OBJECTIVES:

- Learn to formulate, and provide solutions for the identified problems.
- Understand the computing requirements and design appropriate solutions

OUTCOMES:

The students will be able to,

- Co-ordinate with team members and communicate effectively.
- Use the techniques and latest computing tools to implement the proposed idea.
- Handle real time projects in IT industry.

ELECTIVES

ITBX01 PRINCIPLES OF COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand basic analog and digital communication system theory and design, with an emphasis on wireless communication methods.
- To understand basic signals, analog modulation, demodulation and radio receivers.
- To understand source digitization, digital multiplexing and modulation.
- To understand the various noises in communication systems.

MODULE I AMPLITUDE MODULATION: TRANSMISSION 8

Principles of amplitude modulation – AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM power distribution, AM modulator circuits – low level AM modulator, medium power AM modulator, AM transmitters – low level transmitters, high level transmitters.

MODULE II ANGLE MODULATION: TRANSMISSION 8

Angle Modulation – FM and PM waveforms, phase deviation and modulation index, frequency deviation, phase and frequency modulators and demodulators, frequency spectrum of a angle modulated waves, Bandwidth requirement, Broadcast band FM, Average power FM and PM modulators – Direct FM and PM, Direct FM transmitters, Indirect transmitters, Angle modulation Vs. amplitude modulation.

MODULE III RECIEVERS 8

AM reception: AM receivers – TRF, Super heterodyne receivers, Receiver Parameters, AM Detector, Automatic Gain Control, Double Conversion AM receivers, FM receivers: FM demodulators – Round-Travis Detector, Foster-Seeley Discriminator, Ratio Detector, PLL FM demodulators, FM noise suppression, Frequency Vs. phase Modulation, Comparison with AM Receiver.

MODULE IV DIGITAL MODULATION TECHNIQUES 7

Introduction, Binary PSK, DPSK, Differentially encoded PSK, QPSK, M-ary PSK, QASK, Binary FSK, Performance comparison of various systems of Digital Modulation.

MODULE V BASEBAND DATA TRANSMISSION 7

Sampling theorem, Quadrature sampling of band pass signals, reconstruction of message from its samples, Signal distortion in sampling, Discrete PAM signals, power spectra of Discrete PAM signals, ISI Nyquist Criterion for Distortion less baseband binary transmission, baseband M-ary PAM systems, adaptive equalization for data transmission.

MODULE VI SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 7

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, Performance of DS-SS, FH spread spectrum - slow frequency hopping, fast frequency hopping, Comparison and Application of Spread Spectrum methods, Multiple access techniques, Wireless communication systems – FDMA, TDMA and CDMA, Comparison, Source coding of speech for wireless communications.

Total Hours: 45

TEXT BOOKS:

1. Wayne Tomasi, “Electronic Communication Systems: Fundamentals Through Advanced”, Pearson Education, 2001.
2. Simon Haykin, “Digital Communications”, John Wiley & Sons, 2003.

REFERENCES:

1. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley & Sons, 2001.
2. Taub & Schilling, “Principles of Communication Systems”, 2nd Edition, TMH, 2003.
3. Martin S.Roden, “Analog and Digital Communication System”, 3rd Edition, PHI, 2002.
4. Blake (ROY), Thomson, “Electronic Communication Systems”, 2nd Edition, 2007.

OUTCOMES:

Students will be able to

- Describe the basic types of signals and signal representations in communication system.
- Describe the basic signal processing techniques used for signal transmission in communication system.
- Explain generation and detection of linear analog modulation techniques.
- Understand how information is put into electronic for storage and delivery.
- Explain the operation and performance of CW modulation techniques in noisy channels.

ITBX02 DISTRIBUTED COMPUTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the components of OS and recognize them in different OS.
- To give insight into the basic principles of how distributed computer systems are working.
- To provide depth knowledge and skills in designing, development and management of efficient distributed computing systems.

MODULE I TYPES OF DISTRIBUTED SYSTEMS 8

Introduction - Goals - hardware concepts - bus based multiprocessor - switched multiprocessor - bus based multicomputer - switched multicomputer - software concepts - network operating systems - Multiprocessor time sharing system- Real time system.

MODULE II DESIGN ISSUES 7

True distributed system - Design issues in distributed operating systems- transparency – Types of transparency- Flexibility – Reliability- Introduction to Fault Tolerance - Performance – Scalability.

MODULE III COMMUNICATIONS 7

Communication-Layered Protocols-Issues in communications-Client server model - remote procedure call - group communication

MODULE IV SYNCHRONIZATION 8

Synchronization-Clock Synchronization - Mutual Exclusion - Election Algorithms - Atomic transactions - Deadlock - System models - Processor Allocation – Scheduling.

MODULE V DISTRIBUTED FILE SYSTEMS 7

Introduction to Distributed file systems- Distributed file system design – implementation – file models – fault tolerance – file replication – multimedia.

MODULE VI DISTRIBUTED SHARED MEMORY 8

Distributed shared memory-consistency models – page based distributed

shared memory - shared variable distributed shared memory – Distributed programming languages – Case studies – Ameoba.

Total Hours: 45

TEXT BOOK:

1. Andrew S.Tanenbaum, “Distributed Operating Systems”, Pearson Education Asia, 2001.

REFERENCES:

1. Mukesh singhal and Niranjan G.Shivaratri, “Advanced concepts in Operating System”, Tata McGraw Hill, 2001.
2. Pradeep.K and Sinha, “Distributed operating systems”, PHI, 2001.

OUTCOMES:

The students completing the course are expected to possess the following skills and abilities:

- Understand and be familiar with the computer system resources and resource management concepts/algorithms.
- Describe and apply basic methods and algorithms for distributed systems.
- Implement distributed software and specific functions of a distributed system.

ITBX03	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 **8**

Introduction-Parallel and Distributed Computing- Cluster Computing-Grid Computing- Virtual Organization and the Grid Standards -Anatomy and Physiology of Grid- Web and Grid Services.

MODULE II STANDARDIZATION OF GRID TECHNOLOGY **8**

Service Oriented Grid Architecture – web Services- Open Grid Services Infrastructure-OGSA Services and Schema- OGSA implementations.

MODULE III GRID SECURITY **6**

Grid Security-A Brief Security Primer-PKI-X 509 Certificates-Grid Security Requirement -WS security.

MODULE IV RESOURCE MANAGEMENT **8**

Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principles of Local Schedulers- Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.

MODULE V KNOWLEDGE ORIENTED GRIDS **7**

Knowledge for Grid applications- Metadata, Knowledge and Semantics-Architectures for Knowledge Oriented Grids- Representing Knowledge-Case study.

MODULE VI GRID MIDDLEWARE **8**

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

TEXT BOOKS:

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

2. Parvin Asadzadeh, Rajkumar Buyya, Chun Ling Kei, Deepa Nayar, and Srikumar Venugopal, “Global Grids and Software Toolkits: A Study of Four Grid Middleware Technologies, High Performance Computing: Paradigm and Infrastructure”, Laurence Yang and Minyi Guo (editors), Wiley Press, New Jersey, 2005.

3. Jarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz, “Grid Resource Management: State of the Art and Future Trends”, (International Series in Operations Research & Management Science),1st Edition, Springer, 2003.

4. “Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience”, Wiley Press, New York, USA, 2008.

5. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making The Global Infrastructure a Reality”, Wiley, 2003

OUTCOMES:

Students will be able to

- Understand and explain the basic concepts of Grid Computing.
- Explain the advantages of using Grid Computing within a given environment.
- Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup.

ITBX04	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn about computing using cloud
- To know the various technologies available for cloud
- To understand the challenges in cloud computing
- To learn how to ensure security in cloud

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.

MODULE II CLOUD COMPUTING TECHNOLOGY **8**

Hardware and Infrastructure – Thick and thin clients – Cloud providers and consumers – Cloud services - Accessing the cloud – Cloud Platforms and Frameworks – Web Applications – Web API"s – Web Browsers.

MODULE III CLOUD STORAGE AND STANDARDS **8**

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 MONITORING AND MANAGEMENT **8**

Architecture for Federated Cloud Computing – SLA Management in cloud – Service provider perspective - Performance Prediction for HPC on Clouds - Study of Hypervisors – Virtualization technology management – Multitenancy.

MODULE V VIRTUALIZATION **6**

Virtualization technology Overview - Virtual Machines Provisioning and Manageability - Virtual Machine Migration Services - VM Provisioning and Migration in Action, VM Life Cycle and VM Monitoring. Amazon Elastic Compute Cloud, Eucalyptus, VM Dynamic Management Using Open Nebula, Aneka.

MODULE VI CLOUD SECURITY AND CHALLENGES 7

Cloud security fundamentals-Vulnerability assessment tool for cloud- Privacy and Security in cloud-Cloud computing security architecture - Trusted Cloud computing, Secure Execution Environments - Identity Management and Access control- Issues in cloud computing-Implementing real time application over cloud platform- QoS Issues in Cloud – Load Balancing.

Total Hours: 45

TEXT BOOKS:

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. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, “Cloud Computing for Dummies”, 2010.

REFERENCES:

1. Kai Hwang, Fox and Dongarra, Morgan Kaufmann, “Distributed and Cloud Computing”, 1st Edition, Elseiver, 2012.
2. Scott Granneman, “Google Apps Deciphered: Compute in the cloud to streamline your desktop”, Pearson Education, 2009.
3. Tim Malhar, S.Kumaraswammy, S.Latif, “Cloud Security & Privacy”, SPD, O”REILLY 2009.
4. Anthony T Velte, “Cloud Computing: A Practical Approach”, Mc Graw Hill, 2009.

OUTCOMES:

Upon completion of the course students are able to

- Implement cloud environment
- Provide solutions for issues in cloud computing

ITBX05 SERVICE ORIENTED ARCHITECTURE

L	T	P	C
3	0	0	3

OBJECTIVES:

- Understand SOA, service orientation and web services.
- Analyzing and designing business based on SOA principles.
- To learn service oriented analysis techniques.
- To learn technology underlying the service design.

MODULE I **8**

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate -Principles of service orientation.

MODULE II **8**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration –Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer.

MODULE III **8**

Service oriented analysis – Business-centric SOA – Deriving business services- servicemodeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design– Application service design – Task centric business service design.

MODULE IV **9**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

MODULE V **6**

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WSSecurity.

MODULE VI **6**

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

Total Hours: 45

REFERENCES:

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.
2. Newcomer, Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services-An Architect”s Guide”, Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, “Enterprise SOA Designing IT for Business Innovation”, 1st Edition, O’Reilly, 2006.
5. Shankar Kambhampaly, “Service–Oriented Architecture for Enterprise Applications”, Wiley India Pvt Ltd, 2008.
6. Mark O’Neill, et al. , “Web Services Security”, Tata McGraw-Hill , 2003

OUTCOMES:

- Perform service oriented analysis.
- Model service candidate derived from existing business Documentation.
- Design the composition of an SOA.
- Design application services for technology abstraction.
- Assess SOA support provided by J2EE and .NET platform.

ITBX06 PRINCIPLES OF DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To have an overview of signals and systems.
- To compare DFT & FFT
- To study the design of IIR and FIR filters.
- To study the effect of finite word lengths & applications of DSP.

MODULE I CLASSIFICATION OF SIGNALS AND SYSTEMS **7**

Continuous time signals, discrete time signals, step, Ramp, Impulse, Exponential signals, Classification of CT and DT signals - periodic and aperiodic- odd and even, energy and power, Deterministic and Random signals, Classification of systems – Linear Time Invariant Systems, Causal and non causal systems, stable and unstable systems, Impulse response, Response of continuous time LTI systems, Convolution Integral.

MODULE II ANALYSIS OF DISCRETE TIME SIGNAL **7**

Difference equation representation of discrete time systems, Discrete time Fourier series, Discrete Time Fourier Transform (DTFT), Frequency response of LTI system, Z transforms.

MODULE III DISCRETE TIMEM LTI SYSTEMS **8**

Impulse response, Convolution sum, Discrete Fourier Transform (DFT), Fast Fourier Transform, radix 2 FFT, Decimation in time(DIT) and Decimation in frequency(DIF) FFT algorithms.

MODULE IV IIR FILTER DESIGN **8**

Analog Butterworth filters, Analog to analog transformation, IIR filter design by Impulse Invariance method and bilinear transformation, Realization structures for IIR filters.

MODULE V FIR FILTER DESIGN **8**

Symmetric &Antisymteric FIR filters – Linear phase filter – Windowing technique – Rectangular, Kaiser windows – Frequency sampling techniques – Structure for FIR systems.

MODULE VI FINITE WORD LENGTH EFFECTS 7

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling – analytical model of sample and hold operations.

Total Hours: 45

TEXT BOOKS:

1. John G Proakis and Dimtris G Manolakis, “Digital Signal Processing Principles, Algorithms and Application”, 3rd Edition, PHI/Pearson Education, 2000.
2. Alan V. Oppenheim, Alan S. Willsky with S.HamidNawab, “Signals & Systems”, Pearson / Prentice Hall of India Pvt. Ltd., 2003.

REFERENCES:

1. K.Lindner, “Signals and Systems”, McGraw-Hill International, 1999.
2. Simon Haykin and Barry Van Veen, “Signals and Systems”, John Wiley & Sons, Inc., 1999.
3. Charles H.Roth, Jr., “Fundamentals of Logic Design”, 4th Edition, Jaico Publishing House, 2000.

OUTCOMES:

At the conclusion of this course, students are expected to be able to:

- Describe the Sampling Theorem and how this relates to Aliasing and Folding.
- Determine if a system is a Linear Time-Invariant (LTI) System.
- Be able to take the Z-transform of a LTI system.
- Determine the frequency response of FIR and IIR filters.
- Be able to design, analyze, and implement digital filters.
- Be able to implement filters on a digital signal processor.

ITBX07 PERVASIVE COMPUTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know about the applications of pervasive computing.
- To understand the use of pervasive computing on web applications.
- To gain knowledge about PDA"s using pervasive computing.
- To learn the user interface issues in pervasive computing.

MODULE I INTRODUCTION **7**

Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols.

MODULE II WEB APPLICATION CONCEPTS **8**

Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security - Wireless Mark-Up language (WML) – Introduction.

MODULE III VOICE TECHNOLOGY **7**

Voice Enabling Pervasive Computing - Voice Standards - Speech Applications in Pervasive Computing and security.

MODULE IV PERSONAL DIGITAL ASSISTANTS **8**

PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture.

MODULE V USER INTERFACE ISSUES **7**

User Interface Issues in Pervasive Computing, Architecture - Smart Card-based Authentication Mechanisms - Wearable computing Architecture.

MODULE VI PERVASIVE WEB APPLICATION ARCHITECTURE **8**

Introduction - scalability and availability - Development of Pervasive computing Web Applications - Pervasive application architecture. Example application – User interface overview – Architecture – Implementation.

Total Hours: 45

TEXT BOOKS:

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff. "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addision Wesley, Reading, 2002.

2. Uwe Hansman, Lothat Merk, Martin S Nicklous & Thomas Stober, "Principles of Mobile Computing", 2nd Edition, Springer- Verlag, New Delhi, 2003.

REFERENCES:

1. Rahul Banerjee, "Internetworking Technologies: An Engineering Perspective", Prentice –Hall of India, New Delhi, 2003. (ISBN 81-203-2185-5).

2. Rahul Banerjee, "Lecture Notes in Pervasive Computing", Outline Notes, BITS-Pilani, 2003.

OUTCOMES:

Students will be able to

- Learn the basics of pervasive computing.
- Know about the protocols used in pervasive computing.
- Understand the use of XML and WML for web applications in pervasive computing.
- Aware of voice standards and applications in pervasive computing.
- Acquaint knowledge about pervasive computing based PDA and its interfaces.

ITBX08 DATA WAREHOUSING AND DATA MINING **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the concept of data mining with a detail coverage of basic tasks, metrics, issues and implication.
- To explain core topics like classification, clustering and association rules are exhaustively dealt with.
- To introduce the concept of data warehousing with special emphasis on architecture and design.

MODULE I INTRODUCTION TO DATA WAREHOUSING **8**

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

MODULE II DATA PREPROCESSING, LANGUAGE, ARCHITECTURES, CONCEPT DESCRIPTION **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 RULES **8**

Association Rule Mining – Single dimensional Boolean association rules from transactional databases – Multi-level Association rules from transaction databases.

MODULE IV CLASSIFICATION AND CLUSTERING **8**

Classification and Predication – Issues – Decision tree induction – Bayesian Classification – Association Rule based – Other Classification methods – Prediction – Classifier Accuracy – Cluster Analysis – Types of data – Categorization of methods – Partitioning methods – Outlier Analysis

MODULE V MINING COMPLEX TYPES OF DATA **6**

Multidimensional analysis and descriptive mining of complex data objects – mining spatial databases – mining multimedia databases – mining text databases – mining the World Wide Web

MODULE VI APPLICATIONS AND TRENDS IN DATA MINING 6

Data mining applications – Data mining system products and research prototypes – Additional themes on data mining – Social impacts of data mining – Trends in data mining

Total Hours: 45

TEXT BOOK:

1. J.Han, M.Kamber, "Data Mining: Concepts and Techniques", Academic Press 2001.

REFERENCES:

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2004.
2. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", Pearson Education, 2003.
3. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data mining", PHI, 2004.
4. W.H.Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.
5. Alex Bezon, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", McGraw Hill Edition, 2001.
6. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley-Interscience Publication, 2003.

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Identify the key processes of data mining, data warehousing and knowledge discovery process.
- Describe the basic principles and algorithms used in practical data mining and understand their strengths and weaknesses.
- Apply data mining techniques to solve problems in other disciplines in a mathematical way.
- Apply data mining methodologies with information systems and generate results which can be immediately used for decision making in well-defined business problems.

ITBX09 THEORY OF COMPUTATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide an understanding of basic concepts in the theory of computation.
- To study Push Down Automata, Turing Machines, Universal Computation, Church-Turing thesis, the halting problem and general undecidability.
- To develop knowledge and the core expertise in Theory of Computation.
- To assess via formal reasoning through computing to solve problems in science and engineering.

MODULE I AUTOMATA **8**

Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

MODULE II REGULAR EXPRESSIONS AND LANGUAGES **8**

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

MODULE III CONTEXT-FREE GRAMMAR AND LANGUAGES **8**

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.

MODULE IV PROPERTIES OF CONTEXT-FREE LANGUAGES **7**

Normal forms for CFG – Pumping Lemma for CFL - Closure Properties of CFL – Decision of Algorithms of CFL.

MODULE V TURING MACHINES **7**

Turing Machines – Programming Techniques for TM, Modification of Turing Machines, Church”s hypothesis, Turing machines as enumerators.

MODULE VI UNDECIDABILITY **7**

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post"s Correspondence Problem

Total Hours: 45

TEXT BOOK:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", 2nd Edition, Pearson Education, 2003.

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", 2nd Edition, Pearson Education/PHI, 2003.
2. J.Martin, "Introduction to Languages and the Theory of Computation", 3rd Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

OUTCOMES:

Upon completion of the course, students should possess the following skills:

- Synthesize finite automata with specific properties.
- Use the pumping lemma and closure properties to prove particular problems cannot be solved by finite automata.
- Prove undecidability using diagonalization and reducibility methods.
- Use the relationship between recognizability and decidability to determine decidability properties of problems.

ITBX10 INFORMATION SYSTEMS DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To know the basics of managing the digital firm.
- To understand the design, development and maintenance of information systems.
- To discuss basic issues in knowledge management and information systems.
- To know the ethical and security issues in information system

MODULE I MANAGING THE DIGITAL FIRM 9

Why information systems – contemporary approaches to information systems – new role of information systems- major types of systems in organizations – systems from a functional perspective – enterprise applications – organizations and information systems – managers decision making and information systems – information systems and business strategy.

MODULE II DESIGNING INFORMATION SYSTEMS 9

Systems as planned organizational change – business process re-engineering and process improvement – overview of systems development – alternate system – Building approaches – Understanding the business value of Information Systems - The importance of change management in information system success and failure – Managing Implementation.

MODULE III DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS 9

Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off-the shelf software packages – Outsourcing – Comparison of different methodologies.

MODULE IV KNOWLEDGE MANAGEMENT, ETHICS AND SECURITY 9

Knowledge Management in the organization – Information and Knowledge base systems – Decision -support systems – Understanding ethical and Social issues packed to systems – Ethics in an Information society – The moral dimensions of Information Systems – System vulnerability and abuse – Creating a control environment – Ensuring System Quality.

MODULE V INFORMATION ARCHITECTURE 9

Defining Information Architecture – why Information Architecture matters – Information Architecture Specialists - Practicing Information Architecture in the Real world –Information Ecologies – User needs and Behavior – The "Too-Simple" Information Model – Information Needs – Information Seeking Behaviors.

MODULE VI BASIC PRINCIPLES Of INFORMATION ARCHITECTURE 9

The anatomy of Information Architecture – Visualizing Information Architecture– Information Architecture Components - Organizing Systems – Challenges of Organizing Information – Organization Schemes_ Organization Structures – Creating Cohesive Organization Systems - Search Systems – Basic Search System Anatomy – Search Algorithms.

Total Hours: 45

TEXT BOOKS:

1. Lauaon Kenneth & Landon Jane, "Management Information Systems: Managing the Digital firm", 8th edition, PHI, 2004.
2. Uma G. Gupta, "Management Information Systems – A Management Prespective", Galgotia publications Pvt. Ltd., 1998.
3. Louis Rosenfel and Peter Morville, "Information Architecture for the World Wide Web", O'Reilly Associates, 2002.

OUTCOMES:

- Students will know fundamentals of essential stages in information system development at a level, which is further evolved in specialized subjects.
- Students will be able to develop suitable models during information system requirements analysis and design, mainly in the UML language.

ITBX11 SOFTWARE QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

The objective of this course is to enable the students:

- To understand the fundamental concepts of quality management.
- To acquire the knowledge of understanding the "widely-used" quality analysis tools and techniques.
- To have the exposure about software quality assurance, quality measures, and quality control.
- To introduce philosophies and strategies to quality related issues.

MODULE I SOFTWARE QUALITY ASSURANCE 7

What Is Software Quality – Assuring Software Quality Assurance – Software Quality Assurance Planning – Fundamentals Of Measurement Theory – Software Quality Metrics Overview

MODULE II SOFTWARE QUALITY MEASUREMENTS 7

Applying The Seven Basic Quality Tools In Software Development – Selecting Quality Goals And Measures – Principles Of Measurement – Measures And Metrics – Quality Function Deployment – Measuring And Analyzing Customer Satisfaction.

MODULE III SOFTWARE QUALITY MANAGEMENT MODELS 8

Quality Management Systems – A Historical Perspective, A QMS For Software – Quality Management Systems – The ISO 9000 Series Of Quality Management Standards – Models And Standards For Process Improvement – Dos And Don”ts Of Software Process Improvement.

MODULE IV SOFTWARE QUALITY METRICS 8

Product Quality Metrics: Defect Density-Customer Problems Metric-CustomerSatisfaction Metrics-Function Points- In-Process Quality Metrics: Defect Arrival Pattern-Phase-Based Defect Removal Pattern- Defect Removal Effectiveness-Metrics for Software Maintenance: Backlog Management Index-Fix Response Time- Fix Quality-Software Quality Indicators.

MODULE V SOFTWARE MANAGEMENT RENAISSANCE 7

Conventional Software Management – Evolution Of Software Economics – Improving Software Economics – The Old And The New.

MODULE VI SOFTWARE MANAGEMENT PROCESS FRAMEWORK & DISCIPLINE 8

Life Cycle Process – Model Based Software Architectures – Workflow Of The Process – Checkpoint Of The Process – Iterative Process Planning – Project Organizations And Responsibilities – Process Automation.

Total Hours: 45

REFERENCES:

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", 3rd Edition, Artech House Publishers, 2007.
2. R.A. Khan, K.Mustafa, S.I. Ahson, "Software Quality Concepts and Practices", Narosa Publication, 2006.
3. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson Edition, India, 2004.
4. Alan C. Gillies, "Software Quality Theory and Management", 2nd Edition, Thomson Press, 2003.

OUTCOMES:

Upon completion of the course, the student should be able to

- Understand software quality management problems, general solutions, technologies and standards.
- Define, implement, and apply software (process) metrics apply software quality management to software and software development processes.

ITBX12	ADHOC NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To know the difference between wired and adhoc networks.
- To gain the knowledge about the applications of adhoc networks.
- To learn about the proactive and reactive protocols.
- To realize the importance of hybrid and hierarchical protocols.

MODULE I INTRODUCTION **8**

Model of Operation. symmetric Links. Layer-2 Ad Hoc Solutions. Proactive versus Reactive Protocols. Multicast. Commercial Applications of Ad Hoc Networking. Conferencing. Home Networking. Emergency Services. Personal Area Networks and Bluetooth. Embedded Computing Applications. Technical and Market Factors Affecting Ad Hoc Networks. Scalability. Power Budget versus Latency. Protocol Deployment and Incompatible Standards.

MODULE II CHANNEL ALLOCATION **8**

Channel allocation methods –802.11 WLAN – MACA – MACAW – MACABI – CSMA – TSMA.

MODULE III DSDV: DESTINATION SEQUENCED DISTANCE VECTOR PROTOCOL **7**

Introduction. Overview of Routing Methods. Link-State. Distance-Vector. Destination-Sequenced Distance Vector Protocol. Protocol Overview. Route Advertisements. Route Table Entry Structure. Responding to Topology Changes. Route Selection Criteria. Operating DSDV at Layer 2. Extending Base Station Coverage. Performance evaluation using simulators.

MODULE IV DSR : DYNAMIC SOURCE ROUTING PROTOCOL FOR MULTI HOP WIRELESS **7**

Ad Hoc Networks Assumptions. DSR Protocol Description — Overview and Important Properties. DSR Route Discovery. DSR Route Maintenance. Additional Route Discovery Features. Additional Route Maintenance Features. Support for Heterogeneous Networks and Mobile IP. Multicast Routing with DSR. Location of DSR Functions in the ISO Network Reference Model. Performance evaluation using simulators.

MODULE V AODV: AD HOC ON-DEMAND DISTANCE-VECTOR PROTOCOL 7

AODV Properties. Unicast Route Establishment. Route Discovery. Expanding Ring Search. Forward Path Setup. Route Maintenance. Local Connectivity Management. Multicast Route Establishment. Route Discovery. Forward Path Setup. Multicast Route Activation/Deactivation. Multicast Tree Maintenance. Performance evaluation using simulators.

MODULE VI HYBRID AND HIERARCHICAL ROUTING PROTOCOLS 8

ZRP: A Hybrid Framework for Routing in Ad Hoc Networks. The Zone Routing Protocol. ZRP – Formal Description. Hiearchical based Routing – Hierarchical State Routing Protocol, Fisheye Routing Protocol.

Total Hours: 45

TEXT BOOKS:

1. Charles E. Perkins, “Ad Hoc Networking”, Addison Wesley, December 2000.
2. C. Siva Ram Murthy, B.S. Manoj, “Adhoc Wireless Networks”, Prentice Hall, 2004.

REFERENCES:

1. C.K. Toh, “Adhoc Mobile Wireless Networks: Protocols and Systems”, Pearson Education, 2009.
2. Elizabeth M.Royer and C.K.Toh, “A Review of Current Routing Protocols for Mobile Adhoc Networks”, IEEE Personal Communications, April 1999.

OUTCOMES:

- Acquaint the basic knowledge of adhoc networks.
- Familiar with the MAC layer protocols.
- Learn about the protocols DSDV, DSR, AODV, ZRP & Hierarchical protocols.
- Understand difference between the protocols & practical issues.

ITBX13 DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVES:

The course aims to provide understanding of

- The basic principles and concepts in digital image processing
- The application of digital image analysis moving towards image interpretation.
- The techniques and tools for digital image processing, and finally also introduce image analysis techniques in the form of image segmentation.
- To study the image fundamentals and mathematical transforms necessary for image processing.

MODULE I DIGITAL IMAGE FUNDAMENTALS 7

Digital image fundamentals - Digital Image through scanner, digital camera. Concept of gray levels. Imaging Geometry – Image sampling and quantization Basic relationship between pixels.

MODULE II DIGITAL IMAGE TRANSFORMS 8

Basic geometric transformations-Introduction to Fourier Transform and DFT , Properties of 2D Fourier Transform , FFT , Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

MODULE III IMAGE ENHANCEMENT TECHNIQUES 7

Spatial Domain methods: Basic grey level transformation, Histogram equalization, Image subtraction, Image averaging, Spatial filtering: Smoothing, sharpening filters, Laplacian filters , Frequency domain filters : Smoothing, Sharpening filters.

MODULE IV IMAGE RESTORATION 7

Model of Image Degradation/restoration process, Noise models , Inverse filtering, Least mean square filtering , Constrained least mean square filtering, Blind image Restoration, Pseudo inverse , Singular value decomposition.

MODULE V IMAGE COMPRESSION 8

Need for data compression, Lossless compression: Variable length coding, LZW coding, Bit plane coding, predictive coding-DPCM. Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

MODULE VI IMAGE SEGMENTATION AND REPRESENTATION 8

Edge detection , Thresholding, Region Based segmentation , Boundary representation: chair codes- Polygonal approximation , Boundary segments, boundary descriptors: Simple descriptors-Fourier descriptors, Regional descriptors, Simple descriptors.

Total Hours: 45

REFERENCES:

1. Rafael C Gonzalez, Richard E Woods, “Digital Image Processing”, 2nd Edition, Pearson Education, 2003.
2. William K Pratt, “Digital Image Processing”, John Willey, 2001.
3. Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, “Image Processing Analysis and Machine Vision”, 1999.
4. A.K. Jain, PHI, “Fundamentals of Digital Image Processing”, New Delhi ,1995.
5. Chanda Dutta Magundar , “Digital Image Processing and Applications”, Prentice Hall of India, 2000.

OUTCOMES:

Upon successful completion of the course students will be able to:

- Describe the fundamental concepts and process flow of digital image analysis
- Familiar with the techniques for image compression and segmentation.
- Appropriately apply digital image analysis techniques and Enhance their critical thinking skills.

ITBX14 SATELLITE COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To learn the overview of satellite systems in relation to other terrestrial systems.
- To study various multiplexing and multiple access techniques.
- To study about satellite link design, interference and attenuation.
- To learn satellite navigation, global positioning system and differential GPS.
- To study the various fields of application of satellite communication

MODULE I ORBITAL MECHANICS AND LAUNCHING METHODS 8

Introduction, Kepler"s laws, Newton"s laws, Orbital parameters, Definitions of Terms for Earth-orbiting Satellites, Orbital perturbations, Station keeping, Geo stationary and Non- geo stationary orbits, Eclipse of Satellite, Calendars-Universal Time, Julian Dates, Sidereal Time. Launch vehicles and propulsion, Launching orbits, Hohmann transfer, Frequency allocation, frequency co-ordination and regulatory services.

MODULE II SPACE SEGMENT AND SPACE LINK 8

Spacecraft configuration- Methods of stabilization, Satellite subsystems-Communication payload and supporting subsystems: Transponders, Wideband Receiver, Input Demultiplexer, Power Amplifier, Antenna Subsystem, Power Supply, Thermal Control, Attitude Control (AOCS), TT&C Subsystem, Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade– Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density– Input Back Off, Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise. Polarization

MODULE III SATELLITE ACCESS 8

Modulation and Multiplexing: Voice, data, Video, Analog- Digital transmission system, Digital video Broadcast, Multiple access: FDMA-Pre-assigned FDMA,

Demand-Assigned FDMA, SPADE System. TDMA- Reference Burst; Preamble and Post-amble, Carrier recovery, Network synchronization, unique word detection, Traffic Date, Frame Efficiency and Channel capacity, pre-assigned TDMA, Demand assigned TDMA, Satellite switched TDMA Speech Interpolation and Prediction, Downlink analysis for Digital transmission, CDMA- Direct-Sequence spread spectrum.

MODULE IV SATELLITE SERVICES AND THE INTERNET 7

code signal c(t) – autocorrelation function for c(t) – Acquisition and tracking – Spectrum spreading and dispreading – CDMA throughput – Problems- Network Layers – TCP Link – Satellite Links and TCP – Enhancing TCP Over Satellite Channels Using Standard Mechanisms (RFC-2488) – Requests for comments– Split TCP connections – Asymmetric Channels – Proposed Systems.

MODULE V EARTH SEGMENT 7

Introduction, The Sub-satellite Point, Antenna look angles, limits of visibility, Sun transit outages, The Polar Mount Antenna, Transmitters, Power amplifiers (HPA), Receivers, Low noise amplifiers (LNA), Types of Antennas, TT&C systems, Power supplies, Terrestrial Interface, TRVO, MATV, CATV, Test Equipments Measurements on G/T, C/No, EIRP, Antenna gain.

MODULE VI SATELLITE APPLICATIONS 7

INTELAST Series, INSAT, VSAT, Facsimile system, Weather service, Remote sensing, Mobile satellite services: GSM, GPS, INMARSAT,LEO, MEO, Satellite navigational System, Direct Broadcast Satellite(DBS), Direct to Home Broadcast(DTH), Digital Audio Broadcast(DAB), Business TV(BTV), GRAMSAT, Specialized services: E mail, Video conferencing, Internet.

Total Hours: 45

TEXT BOOK:

1. Dennis Roddy, “Satellite Communications”, 3rd Edition, McGraw-Hill Publication, 2001.

REFERENCES:

1. Timothy Pratt – Charles Bostian & Jeremy Allmuti, “Satellite Communications”, John Willy & Sons (Asia) Pvt. Ltd. 2004

2. Wilbur L. Pritchars Henri G.Suyder Hond Robert A.Nelson, “Satellite Communication Systems Engineering”, 2nd Edition, Pearson Education Ltd., 2003.

3. M.Richharia, “Satellite Communication Systems”, 2nd Edition, McGraw-Hill Telecommunications, 2003.

OUTCOMES:

- Apply analytical skills and solve elementary problems in electromagnetic antenna theory.
- Implement design methodologies for various antenna structures used in mobile and satellite communication systems.
- Identify the commercial requirements and characteristics of antennas.
- Utilize commercially available and industry relevant simulation software.
- Experimentally test and characterize the performance of antennas.

ITBX15 NATURAL LANGUAGE PROCESSING **L T P C**
3 0 0 3

OBJECTIVES:

- To provide a general introduction including the use of state automata for Language processing.
- To provide the fundamentals of syntax including a basic parse.
- To explain advanced feature like feature structures and realistic parsing methodologies.
- To explain basic concepts of remotes processing.
- To give details about a typical natural language processing applications.

MODULE I INTRODUCTION **8**

\Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding. Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon-Free FSTs: The porter stammer - Human morphological processing.

MODULE II SYNTAX **8**

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing – Back off - Deleted Interpolation – Entropy - English Word Classes– Tag sets for English - Part of Speech Tagging - Rule-Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Transformation-Based Tagging– Other issues.

MODULE III CONTEXT FREE GRAMMAR **8**

Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase - Coordination - Agreement - The verb phase and sub categorization - Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite-State and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

MODULE IV ADVANCED FEATURES AND SYNTAX **7**

Features and Unification: Feature structures - Unification of feature structures - Features structures in the grammar - Implementing unification - Parsing with unification constraints - Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar - problems with PCFGs - Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

MODULE V SEMANTIC **7**

Representing Meaning: Computational desiderata for representations - Meaning structure of language - First order predicate calculus - Some linguistically relevant concepts - Related representational approaches - Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - Word Net: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

MODULE VI APPLICATIONS **7**

Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation - Robust word sense disambiguation - Information retrieval - other information retrieval tasks. Natural Language Generation: Introduction to language generation - Architecture for generation - Surface realization - Discourse planning - Other issues. Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques - Usability and system development.

Total Hours: 45

TEXT BOOKS:

1. Daniel Jurafsky & James H.Martin, “Speech and Language Processing”, Pearson Education (Singapore) Pt. Ltd., 2002.

2. Chris Manning and Hinrich Schütze, “Foundations of Statistical Natural Language Processing”, MIT Press. Cambridge, MA: May 1999.

REFERENCE:

1. James Allen, “Natural Language Understanding”, Pearson Education, 2003.

OUTCOMES:

- describe major trends and systems in Natural Language Processing.
- describe simple feature-based semantic systems typically based on logic showing the difference between building semantic representations and interpreting semantic representations.
- understanding the role of regular grammars and CFGs in parsing different elements of a text corpus.
- ability to demonstrate a knowledge of at least one method for resolving pronoun referents as an example of semantic interpretation.

ITBX16 PRINCIPLES OF COMPILER DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

The objective of this course is to enable the students:

- To have a knowledge about various phases of compiler.
- To understand, design and implement a lexical analyzer and a parser.
- To understand and design code generation schemes.
- To understand optimization of codes and runtime environment.
- To be able to design and implement a simple compiler.

MODULE I INTRODUCTION, LEXICAL ANALYSIS 8

Language processors - Structure of a Compiler - Phases of a complier - Evolution of Programming Languages - The science of building a compiler - Applications of computer technology - Programming language basics - Lexical analysis: The role of Lexical analyzer - Input buffering - Specifications of tokens - Recognition of tokens.

MODULE II SYNTAX ANALYSIS 12

Introduction – Context free grammars – Writing a grammar – Top-down parsing – Bottom-up parsing – Introduction to LR parsing – Simple LR – More powerful LR parsers – Using ambiguous grammars – Parser generators.

MODULE III SYNTAX DIRECTED TRANSLATION 7

Syntax directed definitions – Evaluation order for SDDs – Applications for syntax-directed translation – Syntax directed translation schemes.

MODULE IV INTERMEDIATE CODE GENERATION: 6

Variants of syntax trees – Three address code – Types and declarations – Translation of expressions – Type checking – Control Flow – Back patching – Switch statements – Intermediate code for procedures.

MODULE V RUN-TIME ENVIRONMENTS 6

Storage organization – Stack allocation of space – Access to non-local data on the stack – Heap management – Introduction to garbage collection.

MODULE VI CODE GENERATION **6**

Issues in the design of code generator – The target language – Addresses in the target code – Basic blocks and flow graphs – Optimization of basic blocks – A simple code generator.

Total Hours: 45

TEXT BOOK:

1. Alfred V.Aho, Monica S.Lam, Ravi Sethi, Jeffery D.Ullman, “Compilers Principles, Techniques and Tools”, 2nd Edition, Pearson Education, 2011.

REFRENCES:

1. Allen Holub I, “Compiler Design in C”, Prentice Hall of India, 1990.
2. Charles N.Fischer Richard J.Leblanc, “Crafting a Compiler with C”, 1st Edition, 1991.

OUTCOMES:

On completion of the course the student will:

- be able to prove an understanding of a program language structure and its translation to executable code by constructing and demonstrating a compiler for a language defined by a certain grammar.
- prove knowledge of ongoing events when executing programs written in high level language.
- know how to design a compiler for a regular high level language.

ITBX17	BIO INFORMATICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is to enable the students:

- To impart knowledge on basic techniques of Bioinformatics.
- To understand dynamic programming concepts.
- To explore various issues in Information retrieval.

MODULE I INTRODUCTION **9**

Life in Space and Time, Dogmas, Data Archives, WWW, Computers, Biological Classification, Use of Sequences, Protein Structure, Clinical Implications.

MODULE II GENOME ORGANIZATION **9**

Genomics and Proteomics, Eavesdropping on transmission of genetic information, Genomes of prokaryotes, Genomes of Eukaryotes, Human Genome, SNPs, Genetic Diversity, Evolution of Genomes.

MODULE III ARCHIVES AND INFORMATION RETRIEVAL **9**

Introduction, The archives, Gateways to Archives.

MODULE IV ALIGNMENTS AND PHYLOGENETIC TREES **9**

Introduction to Sequence Alignment, The dot plot, Dot plots and Sequence Alignments, Measures of Sequence similarity, computing the Alignment, The dynamic programming algorithm, Significance of alignments, multiple sequence alignment, Applications. Phylogeny, Phylogenetic trees.

MODULE V PROTEIN STRUCTURE **9**

Protein Stability and Folding, Applications of Hydrophobicity, Superposition of structures, DALI, Evolution of Protein Structures, Classification of Protein Structures, Protein Structure prediction and modeling, Assignment of protein structures to genomes, Prediction of protein function.

MODULE VI DRUG DISCOVERY AND PHARMAINFORMATICS **9**

Drug discovery and development - target identification and validation - identifying the lead compound - optimization of lead compound - chemical libraries.

Total Hours: 45

TEXT BOOKS:

1. Arthur M Lesk, “Introduction to Bioinformatics”, Oxford University Press, India, 2004.
2. S.C. Rastogi & others, “Bioinformatics - Concepts, Skills, and Applications”, CBS Publishing, 2003.
3. S. Ignacimuthu, S.J., “Basic Bioinformatics”, Narosa Publishing House, 1995.

REFERENCES:

1. T K Attwood, D J parry-Smith, “Introduction to Bioinformatics”, 1st Edition, 11th Reprint Pearson Education, 2005.
2. C S V Murthy, “Bioinformatics”, 1st Edition, Himalaya Publishing House, 2003.
3. Stephen A. Krawetz, David D. Womble, “Introduction to Bioinformatics A Theoretical and Practical Approach”, Humana Press, 2003.
4. Hooman H. Rashidi, Lukas K. Buehler, “Bioinformatics Basics-Applications in Biological Science and Medicine”, CRC press, 2005.

OUTCOMES:

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

- Sequencing Alignment and Dynamic Programming.
- Sequence Databases.
- Evolutionary Trees and Phylogeny.

ITBX18 ENTERPRISE RESOURCE PLANNING **L T P C**
3 0 0 3

OBJECTIVES:

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

MODULE I INTRODUCTION **8**

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM.

MODULE II ERP IMPLEMENTATION **8**

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring.

MODULE III ERP IN ACTION **7**

After ERP Implementation, Operation and Maintenance of the ERP System, Measuring the Performance of the ERP System, Maximizing the ERP System.

MODULE IV THE BUSINESS MODULES **7**

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

MODULE V THE ERP MARKET **8**

ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA.

MODULE VI ERP – PRESENT AND FUTURE **7**

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions.

Total Hours: 45

TEXT BOOK:

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000.

REFERENCES:

1. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003.

2. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”,Thompson Course Technology, USA, 2001.

OUTCOMES:

Upon completion of this course students should be able to:

- Understand how business processes are mapped (translated) into enterprise system software and how managerial decisions integrate across disciplines.
- Develop working knowledge of enterprise system modules to enable efficient navigation and information access for management.
- Differentiate enterprise system transactions, queries, and reports within a manager”s role and develop competence in transforming raw data into management information.

ITBX19	KNOWLEDGE BASED DECISION SUPPORT SYSTEM	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To become familiar with the theoretical perspectives of knowledge creation, knowledge transfer, knowledge sharing, and knowledge leadership roles and skills.
- To understand how the study of communication relates to knowledge development and knowledge sharing in organizations.
- To read about and discuss the relationship between knowledge management and a learning organization, Development of support system Methods of managing knowledge Intelligent decision system development.

MODULE I INTRODUCTION **7**

Decision making, Systems, Modeling, and support - Introduction and Definition - Systems - Models - Modeling process - Decision making: The intelligence phase - The design phase - The choice phase - Evaluation: The implementation phase -Alternative Decision - Making models - Decision support systems - Decision makers - Case applications.

MODULE II DECISION SUPPORT SYSTEM DEVELOPMENT **8**

Decision Support System Development: Introduction - Life cycle - Methodologies - prototype - Technology Levels and Tools - Development platforms - Tool selection - Developing DSS. Enterprise systems: Concepts and Definition - Evolution of information systems - Information needs - Characteristics and capabilities – Comparing and Integrating EIS and DSS - EIS data access, Data Warehouse, OLAP, Multidimensional analysis, Presentation and the web - Including soft information enterprise on systems- Organizational DSS - supply and value chains and decision support - supply chain problems and solutions - computerized systems MRP, ERP, SCM - frontline decision support systems.

MODULE III KNOWLEDGE MANAGEMENT **8**

Introduction - Organizational learning and memory - Knowledge management -Development -methods, Technologies, and Tools - success -Knowledge management and Artificial intelligence - Electronic document management.

Knowledge acquisition and validation: Knowledge engineering - Scope - Acquisition methods - Interviews - Tracking methods - Observation and other methods - Grid analysis - Machine Learning: Rule induction, case-based reasoning - Neural computing - Intelligent agents - Selection of an appropriate knowledge acquisition methods - Multiple experts - Validation and verification of the knowledge base - Analysis, coding, documenting, and diagramming - Numeric and documented knowledge acquisition - Knowledge acquisition and the Internet/Intranets.

MODULE IV KNOWLEDGE REPRESENTATION AND INFERENCE TECHNIQUES 8

Knowledge representation: Introduction - Representation in logic and other schemas - Semantic networks - Production rules - Frames - Multiple knowledge representation - Experimental knowledge representations - Representing uncertainty.Inference Techniques: Reasoning in artificial intelligence - Inference with rules: The Inference tree - Inference with frames- Model-based and case- based reasoning - Explanation and Meta knowledge- Inference with uncertainty - Representing uncertainty - Probabilities and related approaches - Theory of certainty - Approximate reasoning using fuzzy logic.

MODULE V INTELLIGENT SYSTEM DEVELOPMENT 7

Intelligent Systems Development: Prototyping: Project Initialization – System analysis and design - Software classification: Building expert systems with tools - Shells and environments - Software selection - Hardware -Rapid prototyping and a demonstration prototype - System development - Implementation - Post implementation.

MODULE VI MANAGEMENT SUPPORT SYSTEMS 7

Implementing and integrating management support systems - Implementation: The major issues - Strategies - System integration – Generic models MSS, DSS, ES - Integrating EIS, DSS and ES, and global integration - Intelligent DSS - Intelligent modeling and model management – Examples of integrated systems - Problems and issues in integration. Impacts of Management Support Systems - Introduction - overview - Organizational structure and related areas - MSS support to business process reengineering - Personnel management issues - Impact on individuals - Productivity, quality, and competitiveness - decision making and the manager manager”s

job - Issues of legality, privacy, and ethics - Intelligent systems and employment levels - Internet communication - other societal impacts - managerial implications and social responsibilities .

Total Hours: 45

TEXT BOOK:

1. Efrain Turban, Jay Aaronson, “Decision Support Systems and Intelligent Systems”, 6th Edition, Pearson Education, 2001.

REFERENCES:

1. Ganesh Natarajan, Sandhya Shekhar, “Knowledge management – Enabling Business Growth”, Tata McGraw Hill, 2002.
2. George M.Marakas, “Decision Support System”, Prentice Hall, India, 2003.
3. Efrem A.Mallach, “Decision Support and Data Warehouse Systems”, Tata McGraw-Hill, 2002.

OUTCOME:

- This course exposes the students to one of the important applications of the computer, knowledge management within an organization.

ITBX20 ELECTRONICS COMMERCE

L	T	P	C
3	0	0	3

OBJECTIVIES:

- To understand Ecommerce and to understand how Ecommerce is affecting business enterprise, consumers and people.
- To have an awareness about different types of ecommerce websites and different modes of payments.
- To have an awareness about security and legal issues in ecommerce.

MODULE I **8**

Introduction – Electronic Commerce Framework – The Anatomy of E-Commerce Applications. The Network Infrastructure for E-Commerce, The Internet as a Network Infrastructure.

MODULE II **8**

Electronic Payment Systems, Interorganizational Commerce and EDI, EDI Implementation, MIME and Value – added Networks.

MODULE III **8**

Advertising and Marketing on the Internet, Computer Based Education and Training, Technological Components of Education on-Demand, Digital Copy rights and Electronic Commerce, Software Agent.

MODULE IV **8**

The Corporate Digital Library – Dimensions of Internal Electronics Commerce Systems, Making a Business case for a document Library, Types of Digital documents, Issues behind document Infrastructure, Corporate data warehouses, Documents Active / Compound document architecture.

MODULE V **8**

Structured Documents-Structured Document Fundamentals-Document Interchange Representations-Separating Logical Structure from Physical Structure-Document Markup-Document Markup Languages.

MODULE VI **5**

Multimedia and Digital Video – Broad band Telecommunications – Mobile and Wireless Computing Fundamentals.

Total Hours: 45

TEXT BOOK:

1. Kalakota & Whinston, “Frontiers of Electronic Commerce”, Pearson Education, 2002.

REFERENCES:

1. Kamalesh K. Bajaj, “E-Commerce: The Cutting Edge & Business”, Tata McGraw-Hill, 2003.
2. Brenda Kennan, “Managing your E-Commerce Business”, Prentice Hall of India, 2001.
3. Elias M. Awad, “Electronic Commerce from Vision to Fulfillment”, Prentice Hall of India, 2003.
4. Bharat Bhaskar, “Electronic Commerce – Framework, Technology and Application”, TMH, 2003.
5. Effy Oz, “Foundations of E-Commerce”, Prentice Hall of India, 2001.
6. Jim A Carter, “Developing E-Commerce Systems”, Prentice Hall of India, 2001.

OUTCOMES:

Students will be able to

- do E-business and build Ecommerce websites.
- comprehend the underlying ecommerce mechanism and driving forces of Ecommerce.
- understand the critical building blocks of Ecommerce.
- plan, organize implement and effectively respond to dynamic market environment.

ITBX21 WEB COLLABORATION AND TECHNOLOGY **L T P C**
3 0 0 3

OBJECTIVES:

- To have current knowledge about the collaborative and interactive web.
- To describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address
- To demonstrate techniques for improving the accessibility of JavaScript Webpage.
- To demonstrate server side programming with semantic web implications.

MODULE I INTRODUCTION **8**

History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, and IMAP. Introduction to JAVA Scripts – Object Based Scripting for the web. Structures – Functions – Arrays – Objects – Jquery implementation of JavaScript.

MODULE II DYNAMIC HTML **7**

Introduction – Object reference - Collectors all and Children. Dynamic style - Dynamic positioning - Event Model – Filters –Transitions – Data Binding – Sorting table data – Binding of an Image and table – Cascading Style Sheets – Types and Dynamic Implementation.

MODULE III TRANSFORMATION OF WEB 1.0 to WEB 2.0 and WEB 3.0 **7**

Technology Overview, Rich User Experience, User Participation, Dynamic Content, Metadata, Web Standards and scalability, Openness and collective intelligence, Web 1.0 vs. Web 2.0 – Mashups- Semantic Web and its Implications.

MODULE IV SERVER SIDE PROGRAMMING **8**

Three tiers Architecture – Java Servlets – Architecture Overview – Generating Dynamic Content – Life cycle – JSP - Applications – Introduction to JSF- Java struts - Data base Connectivity- Open source Languages - Introduction to PHP and MYSQL – WAMP- Web servers – Apache – Nginix.

MODULE V WEB SERVICES, STANDARDS & SPECIFICATIONS 8

Description Languages, Protocols - REST (Representational State Transfer), SOAP, Collaboration architecture and standards (Enterprise bus), Security, Messaging, Reliability, Transaction, Business Process & Management, Collaboration- SOA.

MODULE VI RICH INTERNET APPLICATIONS 7

Introduction to Photoshop - Dream weaver – Flash – AJAX – Cloud and RIA - Software as a Service –Applications in SaaS - Impact of RIA on cloud.

Total Hours: 45

TEXT BOOK:

1. Deitel & Deitel, Goldberg, “Internet and World Wide Web – How to Program”, Pearson Education Asia, 2001.

REFERENCES:

1. Eric Ladd, Jim O’Donnel, “Using HTML 4, XML and JAVA”, Prentice Hall of India, 1999.
2. Aferganatel, “Web Programming: Desktop Management”, PHI, 2004.
3. Ravi Kumar Jain Brajesh Prabhakar, “Wiki - A New Wave in Web Collaboration”, Icfai University Press, 2006.
4. Vivek Chopra, Sing Li, Rupert Jones, Jon Eaves, John T. Bell, “Beginning Java Server Pages”, Wrox Publishers, 2005.
5. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”-Prentice Hall, 2006.
6. Imothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, “Beginning PHP 6, Apache, MySQL 6 Web Development”, Wrox Publications, 2009.

OUTCOMES:

The students will be able to:

- analyze the web page and identify elements and attributes.
- create Web pages dynamically using Cascading style sheets and XHTML.
- imbibe knowledge about new technologies like JSF, PHP and Jquery.
- acquire knowledge about Cloud and RIA.

ITBX22 XML AND WEB SERVICES L T P C
3 0 0 3

OBJECTIVES:

- Understand Web Services and its Infrastructure.
- Building a Web Service.
- Use of BPEL and WSDL for implementing web services.

MODULE I XML TECHNOLOGY FAMILY 8

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

MODULE II MOTIVATIONS FOR WEB SERVICES 7

Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service-oriented Architecture (SOA).

MODULE III ARCHITECTING WEB SERVICES 7

Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

MODULE IV WEB SERVICES BUILDING BLOCKS 7

Transport protocols for web services – messaging with web services - protocols - SOAP - describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad-Hoc Discovery - Securing web services.

MODULE V IMPLEMENTING XML IN E-BUSINESS 8

B2B – B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – RosettaNet - Applied XML in vertical industry – web services for mobile devices.

MODULE VI XML CONTENT MANAGEMENT AND SECURITY 8

Semantic Web – Role of Meta data in web content - Resource Description

Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL .

Total Hours: 45

TEXT BOOKS:

1. Ron Schmelzer et al., "XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCES:

1. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
2. David Chappell, "Understanding .NET A Tutorial and Analysis", Addison Wesley, 2002.
3. Kennard Scibner and Mark C.Stiver, "Understanding SOAP", SAMS publishing.
4. Alexander Nakhimovsky and Tom Myers, "XML Programming: Web Applications and Web Services with JSP and ASP", Apress, 2002.

OUTCOMES:

- Understand the key standards that form the foundation for Web services, XML, WSDL, SOAP, and UDDI.
- The role of web services in commercial applications.
- The principles of web service provision.
- Use of Java for implementing web services.

ITBX23 USER INTERFACE DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concept of menus, windows, interfaces and business functions.
- To know the various characteristics and components of windows.
- To study about various problems in windows design with color, text, graphics.

MODULE I **8**

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.

MODULE II **9**

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

MODULE III **8**

Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

MODULE IV **8**

Text for web pages - effective feedback-guidance & assistance-Internationalization-accesssibility-Icons-Image-Multimedia -coloring.

MODULE V **6**

Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

MODULE VI **6**

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

Total Hours: 45

REFERENCES:

1. Wilbent. O. Galitz ,"The Essential Guide to User Interface Design", John Wiley& Sons, 2001.
2. Alan Cooper, "The Essential of User Interface Design", Wiley – Dream Tech Ltd., 2002.
3. Sharp, Rogers, Preece, "Interaction Design", Wiley India, 2007.
4. Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.

OUTCOMES:

After the completion of the course the student

- able to give an account of the historic development of user interfaces.
- demonstrate knowledge of some theories of design of user interfaces.
- demonstrate knowledge of different interaction styles.
- gain the knowledge about some interaction design and their applicability.

ITBX24	GRAPH THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

In this course, students will learn to:

- Appreciate and develop facility with mathematical structures.
- Connect the different representations and properties of graphs and develop facility in their use in algorithms.
- Write graph-theoretic proofs by studying existing proofs.
- Understand the place of graph theory in the larger structure of discrete mathematics.
- Understand the foundations of Computer Science and appreciate some of its theoretical and applied uses.
- Represent graphs as data structures, and develop graph algorithms for classical problems in graph theory.
- Implement many of the standard algorithms of graph theory;
- Prove simple results in graph theory.

MODULE I INTRODUCTION **8**

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler Graphs – Hamiltonian Paths and Circuits – Trees – Properties of trees – Distance and Centers in Tree – Rooted and Binary Trees.

MODULE II TREES, CONNECTIVITY, PLANARITY **8**

Spanning trees – Fundamental Circuits – Spanning Trees in a Weighted Graph – Cut Sets – Properties of Cut Set – All Cut Sets – Fundamental Circuits and Cut Sets – Connectivity and Separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and Geometric Graphs – Planer Graphs – Different Representation of a Planer Graph.

MODULE III MATRICES, COLOURING AND DIRECTED GRAPH **8**

Incidence matrix – Submatrices – Circuit Matrix – Path Matrix – Adjacency Matrix – Chromatic Number – Chromatic partitioning – Chromatic polynomial

– Matching – Covering – Four Color Problem. Directed Graphs – Types of Directed Graphs – Digraphs and Binary Relations – Directed Paths and Connectedness – Euler Graphs – Adjacency Matrix of a Digraph.

MODULE IV DIRECTED GRAPH AND ALGORITHMS 8

Directed Graphs – Types of Directed Graphs –Digraphs and Binary Relations – Directed Paths and Connectedness – Euler Graphs –Adjacency Matrix of a Digraph.Algorithms: Connectedness and Components – Spanning tree – Finding all SpanningTrees of a Graph – Set of Fundamental Circuits – Cut Vertices and Separability –Directed Circuits.

MODULE V ALGORITHMS 5

Algorithms: Shortest Path Algorithm – DFS – Planarity Testing – Isomorphism.

MODULE VI APPLICATIONS 8

The Cantor-Schröder-Bernstein Theorem - Fermat"s (Little) Theorem - The Nielson-Schreier Theorem - The SNP Assembly Problem - Computer Network Security - The Timetabling Problem - Map Coloring and GSM Mobile Phone Networks - Knight"s Tours.

Total Hours: 45

TEXT BOOKS:

1. Ashay Dharwadker and Shariefuddin Pirzada, "Applications of Graph Theory", 2nd Edition, 2011.
2. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.

REFERENCE:

1. R.J. Wilson, "Introduction to Graph Theory", 4th Edition, Pearson Education, 2003.

OUTCOMES:

- Understand the basic definitions and properties associated with simple planar graphs, including isomorphism, connectivity, and Euler"s formula.
- Describe the difference between Eulerian and Hamiltonian graphs.
- Understand of basic notions of Graph Theory
- Know Fundamental Theorems in Graph Theory.
- Study of algorithmic Graph Theory.

ITBX25 TELECOMMUNICATION SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To have knowledge about characteristics of Transmission and microwave devices.
- To study about the fundamentals of satellite communication.
- To gain brief knowledge about optical communication and advances in telephone systems.
- To understand the essentials of cellular communication systems.

MODULE I METHODS OF COMMUNICATION 9

Transmission lines – Types and Characteristics, Antenna Fundamentals – Different types of antennas & their Characteristics, Radio Frequency wave propagation- Microwave –Principles, Devices (Reflex Klystron, Magnetron, TWT)-(Principles Only) Radar - Pulsed Radar - CW Radar (Principles and Block Diagram Only).

MODULE II INTRODUCTION TO SATELLITE COMMUNICATIONS 6

Satellite orbits- Satellite communication systems –Earth stations- Applications: Surveillance, Navigation, Mobile Communication, TV Broadcast, Satellite Radio, SatelliteTelephone-TheInternet.

MODULE III INTRODUCTION TO FIBER OPTIC COMMUNICATION 6

Light wave communication systems – Fiber structure and function types of Fiber – Optical Transmitter & Receiver –Fiber optic Data communication systems

MODULE IV TELEPHONE SYSTEM AND ITS APPLICATION 6

Telephones –Telephone system- Facsimile- Cellular telephone system-Paging system –IntegratedservicesDigitalNetworks(ISDN)

MODULE V CELLULAR RADIO 10

Citizen"s band Radio, Cordless Telephone, Improved Mobile Telephone service (IMTS), Introduction to Advanced Mobile Phone Service (AMPS), GSM – RF channels and time slots – Voice transmission – Frequency Hopping - Subscriber ID module – GSM Privacy and Security – IS-95 CDMA PCS – Channels – Forward Channel – Reverse Channel – Voice Coding – Power Control – Hand-off and CDMA Security.

MODULE VI SIMULATION METHODOLOGY **8**

Introduction, Aspects of methodology, Performance Estimation, Simulation sampling frequency, Low pass equivalent simulation models for band pass signals, Multicarrier signals, Non-linear and time-varying systems, Post processing – Basic graphical techniques and estimations.

TotalHours:45

TEXT BOOKS:

1. William.H.Tranter, K. Sam Shanmugam, Theodore. S. Rappaport, Kurt L. Kosbar, “Principles of Communication Systems Simulation”, Pearson Education (Singapore) Pvt. Ltd, 2004.
2. Louis.E.Frenzel, “Communication Electronics – Principles and Application”, 3rd Edition, Tata McGraw-Hill, 2002.
3. Roy Blake, “Wireless Communication Technology”, Thomson Delmar Learning, 2nd Reprint, 2002.

REFERENCES:

1. Wayne Tomasi, “Electronic Communication systems”, 4th Edition, Pearson Education, 2001.
2. Marin Cole, “Introduction to Telecommunications –Voice, Data and Internet”, Pearson Education, 2001.

OUTCOMES:

At the end of this subject, students should be able to:

- understand the basic concept of communications.
- explain digital communication and its application in telecommunication
- characterize the different types of optical fibers and mathematically analyze optical fibers, light sources and detectors used in optical fiber communications.
- describe the basic operations and characteristics of antenna and waveguides.
- describe different types of satellite systems and solve basic communication problems in satellite system
- explain basic concept of telephony and switching system.
- expose to the latest technology in telecommunications system

ITBX26 SOFT COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- To become familiar with AI and neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

MODULE I INTRODUCTION 8

Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning.

MODULE II INTRODUCTION TO NEURAL NETWROK 8

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb"s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN.

MODULE III MLP 7

Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA. Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine.

MODULE IV FUZZY LOGIC **8**

Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system: fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

MODULE V GENETIC ALGORITHM **7**

Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

MODULE VI APPLICATION OF COMPUTATIONAL INTELLIGENCE **7**

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

Total Hours: 45

TEXT BOOK:

1. S.Rajasekaran & G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications”, PHI Publication, 2002.

REFERENCES:

1. S.N. Sivanandam & S.N. Deepa, “Principles of Soft Computing”, Wiley Publications, 2007
2. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
3. N.K.Bose, “Neural Network Fundamentals with Graphs, Algorithms, and Applications” TMH, 1996.
4. Klir & Yuan, “Fuzzy sets & Fuzzy Logic: Theory & Application”, Prentice Hall of India Pub, 1995.
5. Kosko: “Neural Network & Fuzzy System”, PHI Publication, 1992.
6. Rich E and Knight K, “Artificial Intelligence”, TMH, 1991.

OUTCOME:

At the completion of the course the students are familiar with the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

ITBX27	CYBER SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of Cyber Security Standards and Laws.
- To know the legal, ethical and professional issues in Cyber security.
- To understand Cyber Frauds and Abuse and its Security Measures.
- To know the technological aspects of Cyber Security.

MODULE I FUNDAMENTALS OF CYBER SECURITY 8

Security problem in computing – Cryptography Basics – History of Encryption– Modern Methods – Legitimate versus Fraudulent Encryption methods – Encryption used in Internet.

MODULE II TYPES OF THREATS AND SECURITY MEASURES 8

Security Programs – Non-malicious program Errors – Virus and other Malicious Code – Targeted Malicious Code – Control against program threats – Web Attacks – DOS – Online Security Resources.

MODULE III APPLICATION SECURITY 8

Introduction to Databases - Database Security Requirements – Reliability & Integrity – Multilevel Databases - E-Mail and Internet Security – SQL Injection – Cross Site Scripting – Local File Inclusion – Intrusion Detection Software"s.

MODULE IV PHYSICAL SECURITY AND FORENSICS 7

Firewalls – Benefits and Limitations – Firewall Types - Components – Server Room Design and Temperature Maintenance – Cyber Terrorism and Military Operation Attacks- Introduction to Forensics – Finding evidence on PC and Evidence on System Logs – Windows and Linux logs.

MODULE V CYBER STALKING & FRAUD 7

Introduction – Internet Frauds – Auction Frauds – Identity theft – Phishing – Pharming- Cyber Stalking – Laws about Internet Fraud – Protecting against Cyber Crime – Secure Browser settings – Industry Espionage.

MODULE VI CYBER SECURITY STANDARDS AND POLICIES 7

Introduction– ISO 27001– ISO 27002 - PCI DSS – Compliance - IT ACT – Copyright ACT, Patents. Definition of Policy – Types- User Policies- Administrative Policies – Access control – Developmental Policies.

Total Hours: 45

TEXT BOOK:

1. Chuck Easttom, “Computer Security Fundamentals”, 2nd Edition, Pearson Education, 2012.

REFERENCES:

1. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, 3rd Edition, Pearson Education, 2003.
2. William Stallings, “Cryptography and Network Security – Principles and Practices”, 3rd Edition, Pearson Education, 2003.
3. Atul Kahate, “Cryptography and Network Security”, Tata McGraw Hill, 2000.

OUTCOMES:

- Upon completion of this course, attendees should be able to satisfy the critical need for ensuring Cyber Security in Organizations.
- The students attending this course will be able to analyse the attacks and threats.
- They can also provide solutions with Intrusion Detection systems and Softwares.
- They will understand have knowledge about Cyber Frauds and Cyber Laws.

ITBX28 C # AND .NET FRAMEWORK L T P C
3 0 0 3

OBJECTIVES:

- To understand the concepts and elementary use of .NET and the .NET library.
- To understand the syntax and use of C# as a development tool.
- To be able to use C# in desktop and web application development.
- To have a working knowledge of newer technologies such as LINQ and WPF.

MODULE I INTRODUCTION TO C# 8

Understanding .NET - Overview of C# - Literals – Variables - Data Types – Operators - Expressions – Branching – Looping – Methods – Arrays – Strings- Structures and Enumerations.

MODULE II OBJECT ORIENTED ASPECTS OF C# 9

Classes – Objects – Inheritance – Polymorphism – Interfaces - Operator Overloading-Delegates – Events - Errors and Exceptions.

MODULE III APPLICATION DEVELOPMENT ON .NET 8

Building Windows Applications - Accessing Data with ADO.NET - XML and ADO.Net – Simple and Complex Data Binding – Data Grid View Class.

MODULE IV WEB BASED APPLICATION DEVELOPMENT ON .NET 8

Programming Web Applications with Web Forms - .Net Coding Design Guidelines – Security – Application Development.

MODULE V THE CLR AND THE .NET FRAMEWORK 6

Assemblies – Versioning – Attributes – Reflection - Viewing Metadata - Type Discovery - Reflecting on a Type – Marshaling – Remoting - Understanding Server Object Types - Specifying a Server with Interface – Thread Operation – Synchronization.

MODULE VI BUILDING WEBSERVICES USING .NET 6

Building a Server - Building the Client - Programming Web services – Web Service Client – WSDL and SOAP – Web Services with complex Data types. - XML web services using ASP.Net.

Total Hours: 45

TEXT BOOKS:

1. E. Balagurusamy, “Programming in C#”, Tata McGraw-Hill, 2004.
2. J. Liberty, “Programming C#”, 2nd Edition, O’Reilly, 2002.

REFERENCES:

1. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill, 2004.
2. Robinson et al, “Professional C#”, 2nd Edition, Wrox Press, 2002.
3. Andrew Troelsen, “C# and the .NET Platform”, 2003.
4. S. Thamarai Selvi, R. Murugesan, “A Textbook on C#”, Pearson Education, 2003.

OUTCOMES:

Students who complete this course will be able to do the following:

- Develop simple C# programs
- Use appropriate data sources and data adapters in C# applications.
- Being able to develop C# desktop applications and web applications.

GENERAL ELECTIVES

		L	T	P	C
GEBX01	DISASTER MANAGEMENT	3	0	0	3

OBJECTIVES:

- To give an exposure to various environmental hazards and disasters: and various concepts and principles to manage disaster.
- To give exposure to various environmental policies & programs in India for disaster management.

MODULE I ENVIRONMENTAL HAZARDS **7**

Environmental hazards, Environmental Disasters and Environmental stress-Meaning and concepts. Vulnerability and disaster preparedness.

MODULE II NATURAL DISASTERS **7**

Natural hazards and Disasters - Volcanic Eruption, Earthquakes, Tsunamis, Landslides, Cyclones, Lightning, Hailstorms, Floods, Droughts, Cold waves, Heat waves and Fire.

MODULE III MAN-MADE DISASTERS **7**

Man induced hazards & Disasters - Soil Erosion, Chemical hazards, Population Explosion.

MODULE IV DISASTER MANAGEMENT **8**

Emerging approaches in Disaster Management- Preparing hazard zonation maps, Predictability / forecasting & warning, Preparing disaster preparedness plan, Land use zoning, Communication. Disaster resistant house construction, Population reduction in vulnerable areas, Awareness - Rescue training for search & operation at national & regional level - Immediate relief, Assessment surveys, Political, Administrative, Social, Economic, Environmental Aspects.

MODULE V NATURAL DISASTER REDUCTION & MANAGEMENT **8**

Provision of Immediate relief measures to disaster affected people, Prediction of Hazards & Disasters, Measures of adjustment to natural hazards.

MODULE VI ENVIRONMENTAL POLICIES & PROGRAMMES IN INDIA 8

Regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India. Ecological planning for sustainability & sustainable development in India, Sustainable rural development: A Remedy to Disasters, Role of Panchayats in Disaster mitigations, Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & training.

Total Hours: 45

REFERENCES:

1. Satender, "Disaster Management in Hills", Concept Publishing Co., New Delhi, 2003.
2. Singh, R.B. (Ed.), "Environmental Geography", Heritage Publishers, New Delhi,1990.
3. Savinder Singh, "Environmental Geography", Prayag Pustak Bhawan,1997.
4. Kates, B.I. and White, G.F., "The Environment as Hazards", Oxford University Press, New York, 1978.
5. Gupta, H.K., (Ed), "Disaster Management", University Press, India, 2003.
6. Singh, R.B.,"Space Technology for Disaster Mitigation in India (INCED)", University of Tokyo, 1994.
7. Bhandani, R.K., "An overview on Natural & Manmade Disaster & their Reduction", IIPA Publication, CSIR, New Delhi, 1994.
8. Gupta, M.C., "Manuals on Natural Disaster management in India", National Centre for Disaster Management, IIPA Publication, New Delhi, 2001.

OUTCOMES:

At the end of the course, the students will

- achieve sufficient knowledge on the disaster prevention strategy, early warning system, disaster preparedness, response and human resource development.
- be familiar with the National Policy on Disaster Management.

GEBX02	NANO TECHNOLOGY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basic concepts of Nanoscience relevant to the field of engineering.
- To provide an exposure about the importance of various synthesis method.
- To enrich the knowledge of students in various characterisation techniques.

MODULE I INTRODUCTION & CLASSIFICATION OF NANOMATERIALS 9

Definition - Origin of nanotechnology - Difference between bulk and nanomaterials- Top-down and bottom-up processes - Size dependent properties (magnetic, electronic,transport and optical), Classification based on dimensional property - 0D, 1D, 2D and 3D nanostructures – Kubo gap.

MODULE II TYPES OF NANOMATERIALS 9

Metal oxides and metal nano particles - Ceramic nano particles - Semi conducting quantum dots - Core-shell quantum dots - Nanocomposites - Micellar nanoparticles.

MODULE III PRODUCTION OF NANOPARTICLES 7

Sol-gel, hydrothermal, solvothermal, Plasma Arcing, Electro deposition, RF sputtering, Pulsed laser deposition, Chemical vapour, deposition.

MODULE IV CARBON BASED NANOMATERIALS 6

Carbon nanotubes: Single wall nanotubes (SWNT), Multiwall nanotubes (MWNT) - structures-carbon nanofibre, Fullerenes-Application of carbon nanotubes and Fullerenes.

MODULE V NANOPHOTONICS 7

Light and nanotechnology, Interaction of light and nanotechnology, Nanoholes and photons, nanoparticles and nanostructures; Nanostructured polymers, Photonic Crystals, Solar cells.

MODULE VI CHARACTERISATION TECHNIQUES 7

Basic principles of scanning Electron Microscopy (SEM), Atomic force

microscopy (AFM), Scanning tunneling microscopy (STM), Scanning probe microscopy (SPM) and Transmission electron microscopy (TEM), Particle size analyzer, Luminescence techniques.

Total Hours: 45

TEXTBOOKS:

1. Hari Singh Nalwa, "Handbook of Nanostructured Materials and Nanotechnology", Academic Press, 2000.
2. Guozhong Cao, "Nanostructures and Nano materials-Synthesis, Properties and Applications", Imperial College Press (2011).
3. Zhong Lin Wang, "Handbook of Nanophase and Nanomaterials (Vol 1 and II)", Springer, 2002.
4. Mick Wilson, Kamali Kannangara, Geoff smith, "Nanotechnology: Basic Science and Emerging Technologies", Overseas press, 2005.

REFERENCES:

1. A. Nabok, "Organic and Inorganic Nanostructures", Artech House, 2005.
2. C.Dupas, P.Houdy, M.Lahmani, Nanoscience: "Nanotechnologies and Nanophysics", Springer-Verlag Berlin Heidelberg, 2007.
3. Mick Wilson, Kamali Kannangara, Michells Simmons and Burkhard Raguse, "Nano Technology – Basic Science and Emerging Technologies", 1st Edition, Overseas Press, New Delhi,2005.
4. M.S. Ramachandra Rao, Shubra SinghH, "Nanoscience and Nanotechnology: Fundamentals to Frontiers", Wiley, 2013.

OUTCOMES:

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

- Apply the knowledge of different types of nanomaterials for various engineering applications.
- Acquire the knowledge of various methods of production of nanomaterials.
- Familiarize with various characterization techniques.

GEBX03	CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the system modeling and to derive their transfer function.
- To provide adequate knowledge of time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of Control systems.

MODULE I BASIC CONCEPTS AND SYSTEM REPRESENTATION 8

Control System - Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Block diagram reduction techniques – Signal flow graphs.

MODULE II TIME RESPONSE ANALYSIS AND DESIGN 8

Time response – Time domain specifications – Types of test input – First and Second order system - Type I and Type II System – Response - Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feedback control.

MODULE III FREQUENCY RESPONSE ANALYSIS AND DESIGN 7

Performance specifications - correlation to time domain specifications - bode plots and polar plots – gain and phase margin – constant M and N circles and Nichols chart – all pass and non-minimum phase systems.

MODULE IV STABILITY 8

Characteristics equation – Location of roots in s plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin – Nyquist stability criterion.

MODULE V COMPENSATOR DESIGN 8

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots and root locus technique.

MODULE VI CONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS 6

Synchros – AC servomotors - DC Servo motors - Stepper motors - AC Tacho generator - DC Tacho generator - Typical applications of control system in industry.

Total Hours : 45

REFERENCES:

1. K. Ogata, "Modern Control Engineering", 4th Edition, Pearson Education, New Delhi, 2003.
2. I.J. Nagrath & M. Gopal, "Control Systems Engineering", New Age International Publishers, 2003.
3. C.J.Chesmond, "Basic Control System Technology", Viva student edition, 1998.
4. I.J.Nagarath and M.Gopal, "Control System Engineering", Wiley Eastern Ltd., Reprint, 1995.
5. R.C.Dorf and R.H.Bishop, "Modern Control Systems", Addison-Wesley (MATLAB Reference), 1995.

OUTCOMES:

At the end of the course, the student is expected to possess knowledge and achieve skills on the following:

- Proper understanding of basics of Control Systems.
- Ability and skill to carry-out time domain and frequency domain analysis.
- Capable of determining stability of the system using Routh Hurwitz criterion, Root locus and Nyquist criterion.
- Ability to design lag, lead and lag lead compensator networks.

GEBX04 GREEN DESIGN AND SUSTAINABILITY

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart knowledge to face challenges, the technology poses for water, energy, and climate change by implementing sustainable design.

MODULE I CONCEPTS OF SUSTAINABLE DEVELOPMENT **7**

Objectives of Sustainable Development - Need for sustainable development- Environment and development linkages - Globalisation and environment- Population, poverty and pollution- global, regional and local environment issues- Green house gases and climate change.

MODULE II SUSTAINABLE DEVELOPMENT OF SOCIO ECONOMIC SYSTEMS **8**

Demographic dynamics of sustainability- Policies for socio economic development- Sustainable Development through trade- Economic growth- Action Plan for implementing sustainable development- Sustainable Energy and Agriculture.

MODULE III FRAME WORK FOR ACHIEVING SUSTAINBAILITY **7**

Sustainability indicators- Hurdles to sustainability- Business and Industry – Science and Technology for Sustainable Development- Performance indicators of sustainability and assessment mechanism- Constraints and barriers of Sustainable Development.

MODULE IV GREEN BUILDINGS **8**

Introduction to Green Building- Energy- Water- Materials and Resources - Sustainable Sites and Land Use - Indoor Environmental Quality- Life Cycle Assessment- Energy, water and materials efficiency.

MODULE V ENERGY CONSERVATION AND EFFICIENCY **7**

Energy savings- Energy Audit- Requirements- Benefits of Energy conservation- Energy conservation measures for buildings- Energy wastage- impact to the environment.

MODULE VI GREEN BUILDINGS DESIGN **8**

Elements of Green Buildings Design- Foundation, Electrical, Plumbing, flooring, Decking, roofing, insulation, wall coverings, windows, siding, doors and finishing, LEED certification for Green Buildings, Green Buildings for sustainability.

Total Hours: 45

TEXT BOOK:

1. Kirby, J., Okeefe, P., and Timber lake, “Sustainable Development”, Earthscan Publication, London, 1995.

REFERENCE:

1. Charles Kibert, J., “Sustainable Construction: Green Building Design and Delivery”, 2nd Edition, John Wiley and sons, 2007.

OUTCOMES:

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

- explain the relationship between sustainability and emergence of green building practices.
- address the economic, environmental, and social concerns.

GEBX05 KNOWLEDGE MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

The course

- Focuses on positioning knowledge as a valuable commodity, embedded in products and in the tacit knowledge of highly mobile individual employees.
- Presents KM as a deliberate and systematic approach to cultivating and sharing an organization's knowledge base.
- Brings out the paradigm in terms of information technology and intellectual capital.

MODULE I KNOWLEDGE MANAGEMENT 6

KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence – Experience – Common Sense – Cognition and KM – Types of Knowledge – History of Knowledge Management - From Physical assets to Knowledge Assets – Expert knowledge – Human Thinking and Learning.

MODULE II KNOWLEDGE MANAGEMENT SYSTEMS AND MODELS 9

Challenges in Building KM Systems – Conventional Vs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – KM cycle - Different variants of KM cycle - KM models - Implications and practical implementations.

MODULE III CAPTURING KNOWLEDGE AND SHARING 9

Tacit knowledge capture - Explicit knowledge codification - Knowledge taxonomies - Knowledge sharing - Communities - Obstacles to knowledge capture and sharing.

MODULE IV KNOWLEDGE MANAGEMENT TOOLS 9

KM System tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Knowledge capture and creation tools - Content creation tools - Data mining and knowledge discovery - Content management tools - Knowledge sharing and dissemination tools - Group ware and Collaboration tools - Intelligent filtering tools.

MODULE V KNOWLEDGE APPLICATION **6**

KM at individual level - Knowledge workers - Task analysis and modeling - Knowledge application at group and organizational levels - Knowledge repositories - Knowledge reuse -Case study: e-learning.

MODULE VI VALUE OF KNOWLEDGE MANAGEMENT **6**

KM return on investment and metrics - Benchmarking method - Balanced scorecard method - House of quality method - Results based assessment method - Measuring success - Future challenges for KM.

Total Hours:45

TEXT BOOKS:

1. Elias M. Awad, Hassan M. Ghaziri, “Knowledge Management”, Prentice Hall, 2nd Edition, 2010.
2. Jay Liebowitz, “Handbooks on Knowledge Management”, 2nd Edition, 2012.
3. Irma Becerra-Fernandez, Rajiv Sabherwal, ”Knowledge Management: Systems and Processes”, 2010.

OUTCOMES:

Students who complete this course will be able to

- describe the fundamental concepts in the study of knowledge and its creation, acquisition, representation, dissemination, use and re-use, and management.
- explains the core concepts, methods, techniques, and tools for computer support of knowledge management.
- critically evaluate current trends in knowledge management and apply it for e-learning

GEBX06 APPROPRIATE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

- To impart students knowledge about the basics and applications of various appropriate technologies in the field of civil engineering.

MODULE I BASICS CONCEPTS 9

Back ground, Tools, Choices and Implications, Appropriate Technology Movement (an overview) - Basic design process, basic financial analysis-discounted cash flow, and energy fundamentals.

MODULE II APPROPRIATE TECHNOLOGY WITH REFERENCE TO BUILDING DESIGN 9

Appropriate Building Materials, Appropriate Energy Saving Techniques, Water Conservation (Indoor), Rain Water Harvesting.

MODULE III WATER, HEALTH AND SANITATION MANAGEMENT 9

Water Storage: Designing Dams and Pipelines, Appropriate Selection for Sanitation Technique, Sewerage, Communal Health and Waste Water Recycling.

MODULE IV WASTE MANAGEMENT 9

Types of Waste - Sources - Collections and On-Site Processing -Transferring Stations - Disposal Systems - Recycling.

MODULE V ENERGY EFFICIENT TECHNIQUES 9

Green building concepts-renewable energy sources- Solar – Steam and wind-Biofuels - Biogas – Electricity.

MODULE VI TECHNOLOGY POLICY 9

Government Policies- Energy Policy-Appropriate technology Development Centre-its function and responsibilities-Building policies-Case Studies.

Total Hours: 45

TEXT BOOKS:

1. Barrett Hazeltine and Christopher Bull, “Appropriate Technology: Tools Choices and Implications”, Academic Press, Orlando, USA, 1998.

2. Ken Darrow and Mike Saxenian, “Appropriate Technology Source Book : A Guide to Practical Books for Village and Small Community Technology”, Stanford, 1986.

REFERENCES:

1. Richard Heeks, “Technology and Developing Countries: Practical Applications Theoretical Issues”, 1995.

2. John Pickford, “The Worth of Water : Technical Briefs on Health, Water and Sanitation”, Intermediate Technology Publications, 1998.

OUTCOME:

- At the end of the course, the students will be able to use suitable technologies for various conditions for sustainable development.

GEBX07 SYSTEM ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic principles of systems engineering
- To understand the systems engineering methodology
- To provide a systems viewpoint

MODULE I INTERDICTION TO SYSTEMS ENGINEERING 8

Concept of Systems Engineering – Origin – Systems Approach – Advantages of systems approach – Examples.

The building blocks of modern systems – Systems and environment – Interfaces – Complexity of Modern Systems.

MODULE II SYSTEM DEVELOPMENT PROCESS AND MANAGEMENT 8

System life cycle – the systems engineering method – Role of Testing – Management of system development – Risk Management – Organisation.

MODULE III CONCEPT DEVELOPMENT 8

Need Analysis – Concept Exploration – Performance requirement and validation - Concept selection and validation – systems architecture – Decision making.

MODULE IV ESTABLISHING ENGINEERING SYSTEMS 8

Risk Analysis – Risk Mitigation –System performance Analysis – Simulation Techniques in System Analysis – Validation Methods..

MODULE V DECISION SUPPORT TOOLS IN SYSTEMS ENGINEERING 7

Analytical decision support – Statistical influences on system design – System performance analysis – System Reliability, Availability and Maintainability (RAM) – Analysis of Alternatives.

MODULE VI CASE STUDIES 6

Case studies in Software Systems Engineering – Systems for Product Design - Manufacturing Systems.

Total Hours: 45

REFERENCES:

1. Charles S. Wasson, “System Analysis, Design, and Development: Concepts, Principles, and Practices”, Wiley Series in Systems Engineering and Management, 2006.

2. Kossiakoff Alexander and William N. Sweet A, “Systems Engineering: Principles And Practice”, Wiley Student Edition, 2009.

OUTCOMES:

At the end of the course the student will have the

- ability to have systems of view of problems and issues at hand.
- ability to comprehend systems in their totality and specific.
- ability to design, build and evaluate simple systems for industrial requirement.
- ability to analyze systems and strengthen them for performance enhancement.

GEBX08 VALUE ANALYSIS AND ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To get acquainted with value analysis and engineering tool for productivity improvement.
- To understand and analyze the theory and methodology of Value Engineering.

MODULE I VALUE ENGINEERING BASICS 8

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Difference between Value analysis and Value Engineering, Types of Value, function - Basic and Secondary functions, concept of cost and worth, creativity In Value Engineering.

MODULE II VALUE ENGINEERING JOB PLAN AND PROCESS 6

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioural and organizational aspects of Value Engineering, Ten principles of Value analysis, Benefits of Value Engineering.

MODULE III ORIENTATION AND INFORMATION PHASES 8

Launching Value Engineering project work - Objectives and Targets - VE Project work: a time-bound programme - Projects and Teams - Time Schedule - Co-ordination - Consultant. Technical data - Marketing related information - Competition profile - Cost data - Materials Management related information - Quality related information - Manufacturing data.

MODULE IV FUNCTION ANALYSIS AND CREATIVE PHASES 9

Objectives - Function definition - Classification of functions - Higher level functions – Function – Cost – Function – Worth - Value Gap - Value index - How to carry out Function Analysis? – Fast Diagraming - Cost Modelling.

Creativity - How to improve creativity of an individual? – How to promote creativity in the organisation? - Obstacles to Creativity - Mental road blocks - Creativity killer phrases. Positive thinking - Ideas stimulators - Creativity techniques - Brainstorming.

MODULE V EVALUATION, INVESTIGATION AND RECOMMENDATION 6

Paired comparison and Evaluation Matrix techniques - Criteria for selection of VE solutions. Design – Materials – Quality – Marketing – Manufacturing - Preview session. The report - presentation.

MODULE VI IMPLEMENTATION PHASE AND CASE STUDIES 8

Design department - Materials department - Production Planning & Control - Quality Control – Manufacturing – Marketing - Need for co-ordinated teams - The Action Plan. Value Engineering case studies.

Total Hours: 45

TEXTBOOKS:

1. Mudge, Arthur E. “Value Engineering- A systematic approach”, McGraw Hill, New York, 2000.
2. Kumar S, Singh R K and Jha J K (Ed), “Value Engineering”, Narosa Publishing House, 2005.

REFERENCES:

1. Park RJ, “Value Engineering: A Plan for Invention”, St.Lucie Press, New York, 1999.
2. Lawrence, D.M., “Techniques of Value Analysis and Engineering”, McGraw Hill 1988.
3. George, E.D., “Engineering Design: a Material and Processing Approach”, McGraw Hill, 1991.
4. Heller, D.E., “Value Management, Value Engineering and Cost Reduction”, Addison Wesley, 1988.

OUTCOME:

- The student will be able to realize the value of products, processes and implement value analysis to achieve productivity improvement.

GEBX09 OPTIMIZATION TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- Introduce methods of optimization to engineering students, including linear programming, network flow algorithms, integer programming, interior point methods, quadratic programming, nonlinear programming, and heuristic methods.
- The goal is to maintain a balance between theory, numerical computation, problem setup for solution by optimization techniques, and applications to engineering systems.

MODULE I INTRODUCTION **7**

Overview of Optimization techniques for Civil Engineering Problems - Introduction to methods of optimization - Classification of Optimization problems - optimality and convexity - General optimization algorithm - necessary and sufficient conditions for optimality.

MODULE II LINEAR PROGRAMMING **8**

Introduction to linear programming - a geometric perspective - Standard form in linear programming; basic solutions; fundamental theorem of linear programming - Simplex Algorithm for Solving Linear Programs - Duality; complementary slackness; economic interpretation of the dual;

MODULE III DYNAMIC PROGRAMMING **8**

Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP.

MODULE IV APPLICATIONS **8**

Regression modeling in engineering; industrial blending problems; dynamic optimal control of engineering systems; optimal estimation in environmental engineering - Water resources; production planning in industrial engineering; transportation problem - Heuristic optimization methods: genetic algorithms;

ecological engineering application; Minimum cost network flow algorithms; out-of-kilter method; primal-dual methods; Dynamic Programming Applications - Water allocation as a sequential process - Capacity expansion and Reservoir operation.

MODULE V INTEGER PROGRAMMING 8

Integer programming - applications in optimal irrigation scheduling in agricultural engineering - Interior point optimization methods - affine scaling method.

MODULE VI NON-LINEAR PROGRAMMING 6

Non-linear programming - Kuhn-Tucker conditions for constrained nonlinear programming problems; necessary and sufficient conditions; quadratic programming; applications.

Total Hours: 45

REFERENCES:

1. Taha, H.A., “Operations Research - An Introduction", 9th Edition, Pearson Prentice Hall, 2011.
2. Winston.W.L. “Operations Research”, 4th Edition, Thomson – Brooks/Cole, 2003.
3. Kreyszig .E., “Advanced Engineering Mathematics“,10th Edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.

OUTCOMES:

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

- basic theoretical principles in optimization.
- formulation of optimization models.
- solution methods in optimization.
- methods of sensitivity analysis and post processing of results.
- applications to a wide range of engineering problems.

GEBX10	ENGINEERING SYSTEM MODELLING AND SIMULATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the concepts, techniques, tools for modeling and simulation systems and environments through the use of computers.
- To study the various aspects of discrete dynamic, stochastic systems modeling and conducting experiments with those models on a computer.

MODULE I INTRODUCTION **6**

Systems – Modelling – types – systems components – Steps in model building- Simulation Algorithms and Heuristics; Simulation Languages.

MODULE II RANDOM NUMBERS / VARIATES **7**

Random numbers – methods of generation – random variates for standard distributions like uniform, exponential, Poisson, binomial, normal etc. – Testing of Random variates – Monte Carlo Simulation.

MODULE III MODELLING PROCESS **7**

Primitive Models : Establishing relationships via physical laws; Establishing relationships via curve fitting; Parameters estimation problems; Elementary state transition models.

MODULE IV DESIGN OF SIMULATION EXPERIMENTS **9**

Steps on Design of Simulation Experiments – Development of models using of Highlevel language for systems like Queuing, Inventory, Replacement, Production etc., – Model validation and verification, Output analysis.

MODULE V SIMULATION LANGUAGES **10**

Need for simulation Languages – Comparisons & Selection of Languages – GPSSARENA- EXTEND – Study of any one of the languages.

MODULE VI CASE STUDIES USING SIMULATION LANGUAGES **6**

Total Hours: 45

REFERENCES:

1. Law, A.M., & W.D. Kelton, “Simulation Modelling and Analysis”, McGraw Hill, Singapore, 2000.
2. Harrel, C.R., et. al., “System Improvement Using Simulation”, 3rd Edition, JMI Consulting Group and ProModel Corporation, 1995.
3. Harrel, C.R. & T. Kerim, “Simulation Made Easy, A Manager’s Guide”, IIE Press, 1995.
4. Geoffrey Gordon, “Systems Simulation”, Prentice Hall, 2002.
5. David Kelton, Rondall P Sadowski, David T Sturrock, “Simulation with Arena”, Mc Graw Hill, 2004.

OUTCOMES:

The student should be able to

- Model and simulate systems and environments through the use of computers.
- Conduct experiments with discrete dynamic, stochastic system models on a computer.

GEBX11	SUPPLY CHAIN MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various decision phases in a supply chain
- To be aware of the Supply Chain and its drivers
- To design Supply Chain Network
- To build a aggregate plan in supply chain
- To understand Sourcing Decisions in Supply Chain
- To comprehend the influence of Information technology in Supply Chain

MODULE I INTRODUCTION TO SUPPLY CHAIN 9

Understanding Supply Chain - Decision phases - Supply chain performance - Competitive and supply chain strategies - Achieving strategic fit - Expanding strategic scope

MODULE II SUPPLY CHAIN DRIVERS AND DESIGN 9

Drivers of supply chain performance – Designing distribution network - Network Design in the Supply Chain - Network design in Uncertain Environment

MODULE III AGGREGATE PLANNING AND MANAGING SUPPLY, DEMAND AND INVENTORY 9

Aggregate Planning in a Supply chain: role - Managing Supply - Managing Demand in Supply Chain – Cycle and Safety inventory in supply chain – Level of product availability.

MODULE IV SOURCING AND TRANSPORTATION 9

Sourcing decision in supply chain - Third and Fourth – Party Logistics providers - Supplier scoring and assessment - Transportation in a Supply Chain – Risk and Trade-offs in transportation design.

MODULE V INFORMATION TECHNOLOGY IN A SUPPLY CHAIN 9

Information technology in a supply chain – CRM, ISCM, SRM in supply chain - Over view of recent trends in Supply Chain: e-SRM, e-LRM, e-SCM.

Total Hours: 45

REFERENCES:

1. Sunil Chopra and Peter Meindl, “Supply Chain Management-Strategy Planning and Operation”, Pearson Education, 4th Indian Reprint, 2010.
2. Jananth Shah “Supply Chain Management – Text and Cases“ Pearson Education, 2008.
3. Altekar Rahul V, “Supply Chain Management-Concept and Cases”, Prentice Hall India, 2005.
4. Monczka et al., “Purchasing and Supply Chain Management”, Thomson Learning, 2nd Edition, 2nd Reprint, 2002.

OUTCOMES:

- After taking up the course the student will be able to brighten his prospects of taking up a career on supply chain management.
- The student decision making capability specific to supply chain issues in an industry is improved.
- The student can plan a well defined execution of supply chain strategy in companies.
- The student will be able to design a optimal distribution network as per the demands of the industry.
- The student can also determine the most favorable transportation plan for a company.
- The student will also be able to bring in company from paper environment to paperless environment.

GEBX12 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To get acquainted with the various statistical tools and approaches for quality control and continuous improvement.
- To get aware of the importance of ISO and Quality Systems.

MODULE I INTRODUCTION 8

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

MODULE II TQM PRINCIPLES 7

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits.

MODULE III TQM IMPROVEMENT PROCESS 8

Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

MODULE IV STATISTICAL PROCESS CONTROL (SPC) 8

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

MODULE V TQM TOOLS 7

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality

Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

MODULE VI QUALITY SYSTEMS **7**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

Total Hours: 45

TEXT BOOK:

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education, Inc. 2003.

REFERENCES:

1. James R.Evans & William M.Lidsay, "The Management and Control of Quality", 5th Edition, South-Western (Thomson Learning), 2002.
2. Feigenbaum.A.V., "Total Quality Management", McGraw-Hill, 1991.
3. Oakland.J.S., "Total Quality Management", Butterworth Hcinemann Ltd., Oxford, 1989.
4. Narayana V. and Sreenivasan. N.S., "Quality Management – Concepts and Tasks", New Age International, 1996.
5. Zeiri, "Total Quality Management for Engineers", Wood Head Publishers, 1991.

OUTCOMES:

The student should be able to

- apply the various statistical tools and approaches for Quality control.
- achieve continuous process improvement through TQM.

GEBX13 ENERGY STUDIES L T P C
3 0 0 3

OBJECTIVES:

- To learn the growing demand, supply of energy on global and national levels and the need for renewable energy promotion.
- To understand the basic need for energy conservation and waste heat recovery.
- To learn the important aspects of energy audit and management.
- To get acquainted with the global environmental issues and carbon credits.

MODULE I GLOBAL AND NATIONAL ENERGY SCENARIO 7

Role of energy in economic development, various energy resources - overall energy demand and availability- Energy consumption in various sectors and its changing pattern - Exponential increase in energy consumption and projected future demands. Need for renewable energy.

MODULE II SOLAR ENERGY 8

Solar Radiation – Measurements of Solar Radiation - Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

MODULE III OTHER RENEWABLE ENERGY SOURCES 8

Power from wind – wind turbine working and types, solar thermal power plants – low medium and high power generation, power from wave , tidal, geothermal sources, OTEC system. MHD power plants – working, types, merits and demerits. Energy from biomass.

MODULE IV COGENERATION, WASTE HEAT RECOVERY AND COMBINED CYCLE PLANTS 8

Cogeneration principles- topping and bottoming cycles, role in process industries. Energy from wastes- waste heat recovery- heat recovery from industrial processes. Heat exchange systems – recuperative and regenerative heat exchangers – commercially available waste heat recovery devices. Combined cycle plants – concept, need and advantages, different combinations and practical scope.

MODULE V ENERGY CONSERVATION AND MANAGEMENT 7

Need for energy conservation – use of energy efficient equipments. Energy conservation opportunities - in educational institutions, residential, transport, municipal, industrial and commercial sectors – concept of green building. Energy audit in industries – need, principle and advantages. Case studies.

MODULE VI GLOBAL ENRGY ISSUES AND CARBON CREDITS 7

Energy crisis, fossil consumption and its impact on environmental climate change. Energy treaties – Montreal and Kyoto protocols - Transition from carbon rich and nuclear to carbon free technologies, carbon foot print – credits – clean development mechanism.

Total Hours: 45

TEXT BOOKS:

1. S.S. Rao and B.B. Parulekar, “Energy Technology”, 3rd Edition, Khanna Publishers, New Delhi, 2011.
2. O. Callaghn. P.W., “Design and Management for Energy Conservation”, Pergamon Press, Oxford, 1981.

REFERENCES:

1. G.D. Rai, “Non Conventional Energy Sources”, Khanna Publishers, New Delhi, 2011.
2. Archie, W Culp. “Principles of Energy Conservation”, McGraw Hill, 1991.
3. D Patrick and S W Fardo, “Energy Management and Conservation”, PHI,1990
4. P. O’Callaghan: “Energy Management”, McGraw - Hill Book Company, 1993.
5. Kenney, W. F., “Energy Conservation in Process Industries”, Academic Press, 1983.

OUTCOMES:

The student should be able to

- Realize the global and national energy status and need to switch over to renewable energy technology.
- Energy audit and suggest methodologies for energy savings.
- Utilize the available resources in an optimal way.
- Concern about the global environmental issues & promote carbon credits.

GEBX14	ROBOTICS	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To learn about the robots, various components, of Robots, programming and their applications.

MODULE I INTRODUCTION **8**

Definition- Need - Application, Types of robots – Classifications – Configuration, work volume, control loops, controls and intelligence- basic parts - functions – specifications. of robot, degrees of freedoms, end effectors – types, selection

MODULE II ROBOT DRIVES AND CONTROL **8**

Controlling the Robot motion – Position and velocity sensing devices – Design of drive systems – Hydraulic and Pneumatic drives – Linear and rotary actuators and control valves – Electro hydraulic servo valves, electric drives – Motors – Designing of end effectors – Vacuum, magnetic and air operated grippers.

MODULE III ROBOT SENSORS **8**

Transducers and Sensors – Tactile sensor – Proximity and range sensors – Sensing joint forces – Robotic vision system – Image Representation - Image Grabbing –Image processing and analysis – Edge Enhancement – Contrast Stretching – Band Rationing - Image segmentation – Pattern recognition – Training of vision system.

MODULE IV ROBOT PROGRAMMING & AI TECHNIQUES **7**

Types of Programming – Teach pendant programming – Basic concepts in AI techniques – Concept of knowledge representations – Expert system and its components.

MODULE V ROBOTIC WORK CELLS AND APPLICATIONS OF ROBOTS **7**

Robotic cell layouts – Inter locks – Humanoid robots – Micro robots – Application of robots in surgery, Manufacturing industries, space and underwater.

MODULE VI ROBOT KINEMATICS AND DYNAMICS **7**

Forward and inverse Kinematic equations, Denvit – Hartenbers representations Fundamental problems with D-H representation, differential motion and velocity

of frames - Dynamic equations for sing, double and multiple DOF robots – static force analysis of robots.

Total Hours: 45

REFERENCES:

1. Yoram Koren," Robotics for Engineers", Mc Graw-Hill, 1987.
2. Kozyrey, Yu, "Industrial Robots", MIR Publishers Moscow, 1985.
3. Richard. D, Klafter, Thomas, A, Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Prentice-Hall of India Pvt. Ltd., 1984.
4. Deb, S.R. "Robotics Technology and Flexible Automation", Tata Mc Graw-Hill, 1994.
5. Mikell, P. Groover, Mitchell Weis, Roger, N. Nagel, Nicholas G. Odrey, "Industrial Robotics Technology, Programming and Applications", Mc Graw- Hill, Int. 1986.
6. Timothy Jordanides et al,"Expert Systems and Robotics", Springer –Verlag, New York, May 1991.

OUTCOMES:

Students would be able to

- Understand about the robots, its various components.
- Design Robots for industrial applications.
- Do programming for robots and apply them in real time applications.

GEBX15	CYBER SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of Cyber Security Standards and Laws.
- To know the legal, ethical and professional issues in Cyber security.
- To understand Cyber Frauds and Abuse and its Security Measures.
- To know the technological aspects of Cyber Security.

MODULE I FUNDAMENTALS OF CYBER SECURITY 8

Security problem in computing – Cryptography Basics – History of Encryption – Modern Methods – Legitimate versus Fraudulent Encryption methods – Encryption used in Internet.

MODULE II TYPES OF THREATS AND SECURITY MEASURES 8

Security Programs – Non-malicious program Errors – Virus and other Malicious Code – Targeted Malicious Code – Control against program threats – Web Attacks – DOS – Online Security Resources.

MODULE III APPLICATION SECURITY 8

Introduction to Databases - Database Security Requirements – Reliability & Integrity – Multilevel Databases - E-Mail and Internet Security – SQL Injection – Cross Site Scripting – Local File Inclusion – Intrusion Detection Software"s.

MODULE IV PHYSICAL SECURITY AND FORENSICS 7

Firewalls – Benefits and Limitations – Firewall Types - Components – Server Room Design and Temperature Maintenance – Cyber Terrorism and Military Operation Attacks- Introduction to Forensics – Finding evidence on PC and Evidence on System Logs – Windows and Linux logs.

MODULE V CYBER STALKING & FRAUD 7

Introduction – Internet Frauds – Auction Frauds – Identity theft – Phishing – Pharming- Cyber Stalking – Laws about Internet Fraud – Protecting against Cyber Crime – Secure Browser settings – Industry Espionage.

MODULE VI CYBER SECURITY STANDARDS AND POLICIES 7

Introduction– ISO 27001– ISO 27002 - PCI DSS – Compliance - IT ACT – Copyright ACT, Patents. Definition of Policy – Types- User Policies- Administrative Policies – Access control – Developmental Policies.

Total Hours: 45

TEXT BOOK:

1. Chuck Easttom, “Computer Security Fundamentals”, 2nd Edition, Pearson Education, 2012.

REFERENCES:

1. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, 3rd Edition, Pearson Education, 2003.
2. William Stallings, “Cryptography and Network Security – Principles and Practices”, 3rd Edition, Pearson Education, 2003.
3. Atul Kahate, “Cryptography and Network Security”, Tata McGraw Hill, 2000.

OUTCOMES:

Upon completion of this course, attendees should be able to satisfy the critical need for ensuring Cyber Security in Organizations.

- The students attending this course will be able to analyse the attacks and threats.
- They can also provide solutions with Intrusion Detection systems and Softwares.
- They will have knowledge about Cyber Frauds and Cyber Laws.

GEBX16 USABILITY ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

The objective of this course is

- To understand the emerging concept of usability, requirements gathering and analysis.
- To learn about human computer interaction with the help of interfaces that has high usability.

MODULE I INTRODUCTION 6

Cost Savings – Usability Now – Usability Slogans – Discount Usability Engineering – Usability – Definition – Example – Trade-offs – Categories – Interaction Design – Understanding & Conceptualizing Interaction – Cognitive Aspects.

MODULE II USER INTERFACES 8

Generation of User Interfaces – Batch Systems, Line Oriented Interfaces, Full Screen Interfaces, Graphical User Interfaces, Next Generation Interfaces, Long Term Trends – Usability Engineering Life Cycle – Interfaces – Data Gathering – Data Analysis Interpretation and Presentation.

MODULE III INTERACTION DESIGN 8

Process of Interaction Design - Establishing Requirements – Design, Prototyping and Construction - Evaluation and Framework.

MODULE IV USABILITY TESTING 8

Usability Heuristics – Simple and Natural Dialogue, Users' Language, Memory Load, Consistency, Feedback, Clearly Marked Exits, Shortcuts, Error Messages, Prevent Errors, Documentation, Heuristic Evaluation – Usability Testing - Test Goals and Test Plans, Getting Test Users, Choosing Experimenters, Ethical Aspects, Test Tasks, Stages of a Test, Performance Measurement, Thinking Aloud, Usability Laboratories.

MODULE V USABILITY ASSESSMENT METHODS 8

Observation, Questionnaires and Interviews, Focus Groups, Logging Actual

Use, User Feedback, Usability Methods – Interface Standards - National, International and Vendor Standards, Producing Usable In-House Standards

MODULE VI USER INTERFACES **7**

International Graphical Interfaces, International Usability Engineering, Guidelines for Internationalization, Resource Separation, Multilocale Interfaces – Future Developments – Case Study.

Total Hours : 45

TEXT BOOKS:

1. Yvonne Rogers, Helen Sharp, Jenny Preece, "Interaction Design: Beyond Human - Computer Interaction", John Wiley & Sons, 3rd Edition, 2011 (Module I, II, III).
2. Jakob Nielsen, "Usability Engineering", Morgan Kaufmann Academic Press, 1994. (Module I – VI).

REFERENCES:

1. Ben Shneiderman, Plaisant, Cohen, Jacobs, "Designing the User Interface: Strategies for Effective Human Interaction", Pearson Education, 5th Edition, 2010.
2. Laura M. Leventhal, Julie A. Barnes, "Usability Engineering: Process, Products, and Examples", Pearson/Prentice Hall, 2008

OUTCOMES:

Students who complete this course will be able to

- build effective, flexible and robust user interfaces.
- translate system requirements into appropriate human/computer interaction sequences.
- choose mode, media and device for the application requirements.

GEBX17	INDUSTRIAL SAFETY	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To understand the various safety measures to be taken in different industrial environments.

MODULE I SAFETY MANAGEMENT **7**

Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee- budgeting for safety. safety education and training.

MODULE II SAFETY IN MANUFACTURING **7**

Safety in metal working-Machine guarding -Safety in welding and gas cutting - Safety in cold forming and hot working of metals -Safety in finishing, inspection and testing -Regulation.

MODULE III SAFETY IN CONSTRUCTION **8**

General safety consideration in Excavation, foundation and utilities – Cordoning – Demolition – Dismantling –Clearing debris – Types of foundations – Open footings.

Safety in Erection and closing operation - Safety in typical civil structures – Dams-bridges-water Tanks-Retaining walls-Critical factors for failure-Regular Inspection and monitoring.

MODULE IV ELECTRICAL SAFETY **8**

Electrical Hazards – Energy leakage – Clearance and insulation – Excess energy – Current surges – Electrical causes of fire and explosion – National electrical Safety code.

Selection of Environment, Protection and Interlock – Discharge rods and earthing device – Safety in the use of portable tools - Preventive maintenance.

MODULE V SAFETY IN MATERIAL HANDLING **8**

General safety consideration in material handling devices - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears – Prime movers.

Ergonomic consideration in material handling, design, installation, operation and maintenance of Conveying equipments, hoisting, traveling and slewing mechanisms.

Storage and Retrieval of common goods of shapes and sizes in a general store of a big industry.

MODULE VI SAFETY EDUCATION AND TRAINING 7

Importance of training-identification of training needs-training methods – programme, seminars, conferences, competitions – method of promoting safe practice - motivation – communication - role of government agencies and private consulting agencies in safety training – creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign – Domestic Safety and Training.

Total Hours: 45

REFERENCES:

1. Krishnan N.V, “Safety Management in Industry”, Jaico Publishing House, Bombay, 1997.
2. Blake R.B., “Industrial Safety”, Prentice Hall, Inc., New Jersey, 1973.
3. Fulman J.B., “Construction Safety, Security, and Loss Prevention”, John Wiley and Sons, 1979.
4. Fordham Cooper W., “Electrical Safety Engineering”, Butterworths, London, 1986.
5. Alexandrov M.P., “Material Handling Equipment”, Mir Publishers, Moscow, 1981.

OUTCOMES:

Students would be able to

- Acquire knowledge on various safety Hazards.
- Carry out safety measures for different industrial environments.