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 include 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 create awareness of 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.

REGULATIONS 2013

FOR

B.TECH. DEGREE PROGRAMMES

(WITH AMENDMENTS INCORPORATED TILL JUNE 2 0 1 5)

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.

ADMISSION

a) 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.

b) 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.

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.

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

BRANCHES OF STUDY

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.

ECH. 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

STRUCTURE OF THE PROGRAMME

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.

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

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

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.

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

DURATION OF THE PROGRAMME

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).

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

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

CLASS ADVISOR AND FACULTY ADVISOR

CLASS ADVISOR

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

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.

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

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

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

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.

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.

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.

REGISTRATION AND ENROLMENT

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.

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.

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

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

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.

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.

CREDIT LIMIT FOR ENROLMENT & MOVEMENT TO HIGHER SEMESTER

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

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

ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

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

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.

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.

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.

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.

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

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.

SUBSTITUTE EXAMINATIONS

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.

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.

ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

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.

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.

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.

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.

PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

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.

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.

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.

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.

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

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

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

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.

ELECTIVE CHOICE: OPTION TO DO PROJECT ALONE IN FINAL SEMESTER

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.

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.

PERSONALITY AND CHARACTER DEVELOPMENT

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.

DISCIPLINE

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.

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.

ELIGIBILITY FOR THE AWARD OF DEGREE

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.

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	English*				
		FRB1181	French*				
		ISB1181	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	1	0	4

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
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
							25

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	EC	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

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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

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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:177

PROFESSIONAL ELECTIVES

SEMESTER – V

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	PE	ITBX02	Distributed Computing	3	0	0	3
2.	PE	ITBX06	Principles of Digital Signal Processing	3	0	0	3
3.	PE	ITBX15	Natural Language Processing	3	0	0	3
4.	PE	ITBX16	Principles of Compiler Design	3	0	0	3
5.	PE	ITBX30	Information Coding Techniques	3	0	0	3

SEMESTER – VI

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	PE	ITBX01	Principles of Communication	3	0	0	3
2.	PE	ITBX03	Grid Computing	3	0	0	3
3.	PE	ITBX04	Cloud Computing	3	0	0	3
4.	PE	ITBX09	Theory of Computation	3	0	0	3
5.	PE	ITBX10	Information System Design	3	0	0	3
6.	PE	ITBX12	Adhoc Networks	3	0	0	3
7.	PE	ITBX22	XML and Web Services	3	0	0	3
8.	PE	ITBX24	Graph Theory	3	0	0	3
9.	PE	ITBX28	C# and .NET Framework	3	0	0	3
10.	PE	ITBX29	Cryptography and Network Security	3	0	0	3

11.	PE	ITBX31	Programming in Python	2	0	2	3
12.	PE	ITBX32	Open Source Technologies	1	0	2	2
13.	PE	ITBX33	Principles of Compiler Design	3	0	0	3
14.	PE	ITBX34	Semantic Web	2	0	0	2
15.	PE	ITBX35	Oracle Database Programming	0	0	2	1
16.	PE	ITBX36	R Programming	1	0	1	2
17.	PE	ITBX38	Artificial Intelligence	3	0	0	3
18.	PE	ITBX39	Expert Systems	3	0	0	3
19.	PE	ITBX40	MongoDB for Java developers	0	0	3	1
20.	PE	ITBX41	Network Simulator Lab	0	0	3	1

SEMESTER – VII

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	PE	ITBX05	Service Oriented Architecture	3	0	0	3
2.	PE	ITBX07	Pervasive Computing	3	0	0	3
3.	PE	ITBX08	Data Warehousing and Data Mining	3	0	0	3
4.	PE	ITBX11	Software Quality Management	3	0	0	3
5.	PE	ITBX18	Enterprise Resource Planning	3	0	0	3
6.	PE	ITBX19	Knowledge Based Decision Support System	3	0	0	3
7.	PE	ITBX20	Electronics Commerce	3	0	0	3
8.	PE	ITBX21	Web Collaboration and Technology	3	0	0	3
9.	PE	ITBX23	User Interface Design	3	0	0	3
10.	PE	ITBX25	Telecommunication Systems	3	0	0	3
11.	PE	ITBX43	Internet of Things	3	0	2	4
12.	PE	ITBX44	Programming in Hadoop	3	0	0	3
13.	PE	ITBX45	Green Computing	2	0	0	1
14.	PE	ITBX46	Big Data Analytics	3	0	0	3
15.	PE	ITBX47	Programming in Scala	0	0	2	1
16.	PE	ITBX48	Virtual Reality	2	0	2	3
17.	PE	ITBX49	Software Requirements Management & Software	3	0	0	3
18.	PE	ITBX50	Data Warehousing, Data Mining and Data Mining	3	0	2	4
19.	PE	ITBX51	Cloud Middleware Tools	1	0	2	2
20.	PE	ITBX52	Big Data Tools & Technologies	0	0	3	1
21.	PE	ITBX54	Hybrid Application Development	1	0	2	2

SEMESTER – VIII

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	PE	ITBX13	Digital Image Processing	3	0	0	3
2.	PE	ITBX14	Satellite Communication	3	0	0	3
3.	PE	ITBX17	Bio Informatics	3	0	0	3
4.	PE	ITBX26	Soft Computing	3	0	0	3
5.	PE	ITBX27	Cyber Security	3	0	0	3
6.	PE	ITBX42	Cloud Forensics	3	0	0	3
7.	PE	ITBX53	Forensic Tool Kits	0	0	3	1
8.	PE	ITBX55	Nextgen Technologies	3	0	0	3
9.	PE	ITBX56	Game Theory	3	0	0	3
10.	PE	ITBX57	Machine Learning Algorithms	3	0	0	3

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
18.	GE	GEBX18	Transport Management	Auto
19.	GE	GEBX19	Advanced Optimization Techniques	Mechanical
20.	GE	GEBX20	Plant Engineering	EIE

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 expose students to the concept of flipped learning.
- To discuss a range of vocabulary and enable students to use it in academic and technical contexts.
- To facilitate studentsqeffective use of speaking skill while exchanging ideas and making presentations.
- To help students develop listening skill for identifying accent and intonation and comprehending and analyzing the information.
- To develop reading comprehension skill and help them to infer explicit and implicit meanings.
- To hone their creative and academic writing skills.
- To expose them to the correct usage of language and help them to apply it appropriately.

MODULE I   **8**

L: Listening for specific information . Note-taking
S: Self introduction . Introducing one another
R: Skimming Technical passages
W: Process of writing . Writing short paragraphs
Language focus: Use of prefixes and suffixes ,Simple tense forms

MODULE II   **8**

L: Guessing the meaning through Intonation
S: Exchanging opinions & Agreeing and disagreeing
R: Scanning . reading news paper articles for specific information
W: Argumentative writing . Letter to the editor
Language focus: Modals, Continuous and perfect tenses, Framing questions & Question tags

MODULE III   **7**

L- Listening to a specific topic & predicting the content
S . Getting into conversation- Gathering information
R - Reading between lines
W - Letter inviting a dignitary-Expository Writing
Language Focus: Homonyms & Collocation

MODULE IV   **7**

L: Listening to telephonic conversation, listening for specific information (Intensive)
S: Short presentations
R: Referential and Inferential reading
W:. Letter seeking permission for industrial visit
Language focus: Subject, Verb agreement & Euphemism

MODULE V   **8**

L: Listening to scientific podcasts . Cloze exercises
S: Personal narrations
R: Intensive reading . Interpreting graphical data.
W: Describing a process, Flow chart, Bar chart
Language focus: Passive forms, Connectives & Prepositions

MODULE VI   **7**

L: Appreciation and critical review of popular movie--The Incredibles
S: Discussion in groups - Three Idiots
R: Extensive   reading . APJ Abdul Kalams Wings of Fire -   Reading for critical
appreciation
W: Writing slogans . Rewriting a story with a different ending
Language focus: If clause, Phrasal verbs & Idiomatic expressions

                                                                    Total Hours: 45

REFERENCES:

1. Carol Rosenblum Perry (2011). *The Fine Art of Technical Writing.* CreateSpace
   Independent Publishing Platform, NewDelhi.
2. Dutt,P.K Rajeevan.G and Prakash,C.L.N (2007). *A Course in Communication
   Skills.* Cambridge University Press, India.
3. Kalam,Abdul &Arun Tiwari (2004). *Wings of Fire: An Autobiography* (Simplified
   and Abridged by Mukul Chowdhri). Hyderabad University Press.
4. Sen, Leena (2004). *Communication Skills.* Prentice Hall, New Delhi.
5. Matt Firth, Chris Sowton et al. (2012). *Academic English: An Integrated Skills
   Course for EAP.* Cambridge University Press, Cambridge.

OUTCOMES:

After completion of the course, students will have the ability to

- Explore new information from various sources and perform communicative
  tasks.

- Demonstrate their range of vocabulary in academic and technical contexts.
- Exchange ideas and make presentations.
- Identify, comprehend and respond to different intonation patterns.
- Infer meaning from reading texts.
- Create and construct different kinds of academic documents.
- Communicate effectively using grammatically correct expressions.

FRB1181   **FRENCH**   **L   T   P   C**
                                                                    3   0   0   3

OBJECTIVES:

É   To improve their proficiency in French language.

É   To empower them for successful communication in their professional contexts.

DOSSIER 0   FENÊTRE SUR…   7

Contenus ó l'alphabet - se présenter ó les langues ó les nationalités ó les nombres de 0 à 60 ó les adjectifs de nationalités ó 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 ó Les articles définis ó les adjectifs possessifs ó la négation (ne'..pas) ó les verbes : avoir.

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

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

L'acte de parole

DOSSIER 2 ICI /AILLEURS   12

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

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

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

L'acte de parole

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

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

Les sorties ó proposer, refuser, accepter une sortie ó fixer un rendez-vous ó inviter ó Donner des instructions ó Løimpératif : 2e personne ó Le pronom on=nous ó Les verbes : Pouvoir, vouloir, devoir.

Løacte de parole

Løexamen oral

Total Hours: 45

TEXT BOOK:

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

OUTCOMES:

On completion of the course,

É   The students will be able to deal with their clients effectively at global level.

É   Their proficiency in French Language will have improved.

ISB1181   **ARABIC**   **L T P C**
                                                                          3 0 0 3

OBJECTIVES:

É   To read and write in Arabic language.

É   To learn vocabulary of different fields

É   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 Fidiyya

        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, Prayerhall

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 -Einsteins A & B coefficients (derivation) . Population inversion - pumping - Nd:YAG laser . CO_2 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

CHB 1181 **CHEMISTRY** **L T P C**
(Common to all branches) **3 0 0 3**

OBJECTIVES:

To make students conversant with the

- Water specification for potable and industrial purposes and various treatment methods.
- 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: Mohs scale of hardness . natural abrasives: diamond, corundum, emery, garnets and quartz . artificial abrasives: silicon carbide, boron carbide.
Refractories: characteristics, classification . acid, 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: Principle, 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 and alkalinity in water and describe treatment methods for potable water.
- summarise the properties and uses of various engineering materials and choose the appropriate material for a given application.
- illustrate the different types of electrodes, calculate the emf and apply the electrochemistry principles to explain the mechanism of corrosion.
- describe the mechanism of polymerization and moulding techniques.
- explain the principles and instrumentation of various analytical techniques and adopt the suitable techniques for analysis of compounds / elements.
- outline the principles and significance of green chemistry.

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   08
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:

- To identify and present the basic concepts of demand, supply and equilibrium.
- To explain the types and concepts of national income and inflation.
- To illustrate the fundamental concepts of money, banking and exchange.
- To create an awareness about the industrial sector, markets and trade and their contribution to economic development.
- To describe the five year plans, budget, fiscal policy and taxation.
- To discuss Indian economy and justify the role of engineers in economic development.

MODULE I   INTRODUCTION   8

Classification of economy . open and closed economy . Sectors of economy . Basic principles of Microeconomics . 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 . Price indices - WPI, CPI and Inflation control.

MODULE III   MONEY AND BANKING   7

Role and functions of money - Monetary System - Money market - Role of Central Bank - Monetary policy - Commercial banks - Development banks - Capital market and Debt market.

MODULE IV   INDUSTRY, LABOUR MARKET AND TRADE   7

Public and Private sectors, Contribution to the National economy - Industrial policy - Labour market - Trade: Domestic and International trade.

MODULE V   BUDGET, POLICIES AND INDICATORS   8

Economic development . Five year plans, Macroeconomic indicators - Central budget - Government tax- revenue 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

Indian Economy . Development in the post independence era . Growth of the economy, Economic reforms . Liberalization, Privatization and Globalization - challenges and opportunities, Engineers . Contribution of engineers 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.
5. R.K. Lekhi, Public Finance, Kalyani Publishers.
6. D. M. Mithani, Money, Banking, International Trade and Public Finance, Himalaya Publishing House.
7. R.R. Paul, Monetary Economics, Kalyani Publishers.
8. Benson Kunjukunju and S. Mohanan, Financial System and Financial Institutions in India, New Century Publications.
9. Raddar Datt, K.P.M. Sundharam, Indian Economy, S. Chand.
10. Gregory Mankiw, Principles of Economics, Cengage Learning.
11. Gregory Mankiw, Principles of Microeconomics, Cengage Learning.
12. Uma Kapila, Indian Economy since Independence, Academic Foundation.
13. Andrew Gillespie, Business Economics, Oxford University Press.
14. Pindyck, Rubinfeld and Mehta, Microeconomics, Pearson.
15. C.B. Gupta, Business Environment, Sultan Chand and Sons.

OUTCOMES:

On successful completion of this course,

- Students will have an exposure to the basic concepts of microeconomics and macroeconomics.
- Students will be able to identify the concepts of national income and inflation.
- Students will be able to apply the knowledge of money, banking and exchange in their real life situations.
- Students will have gained knowledge in government budget, economic planning and its implementation.
- Students will have an overview of the economic reforms introduced in Indian economy.

- Students will be able to analyze the importance of economics and apply the knowledge they have gained in their professional pursuits.

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 Poiseuilles method .

3.   Determination of Youngs 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.

CHB 1182   **CHEMISTRY LABORATORY**   **L T P C**

                            (Common for All Branches)   **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-Lamberts law and estimation of Cu^{2+} present in unknown sample.
8. Estimation of Na and K present in the agricultural field.
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   L T P C
**   LABORATORY   0 0 2 1**

(Common to All Branches)

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**   **L T P C**
                                & APPLICATIONS   **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

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 . Greens, Gauss Divergence and Stokes 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 Cauchys integral theorem . Cauchys integral formula . Taylors series and Laurents series expansion . singularities - classification . residues - Cauchys residue theorem . contour integration . Unit circle and semi circular contours (excluding poles on the real axis).

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-Mosottis 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-Pockels 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 describe the fundamental and basic concepts of Sociology.
- To illustrate how society evolved in India with changes in social strata.
- To explain the importance of groups, teams in industrial spheres.
- To develop the knowledge of social impact of economic liberalization and technology.
- To state some basic concepts on ethics, values and human rights.
- To develop social responsibility &human professional ethics.
- To recognize and determine the role of engineers in the economic and social development of the society.

MODULE I   FUNDAMENTALS OF SOCIOLOGY   8

Sociology - definition, evolution, scope- Basic concepts-Social Process- Sociological theories, Social Institutions . family, economic, politics, religion, education, culture, Social Stratification , Socialization & Social Control.

MODULE II   SOCIOLOGY IN INDIAN CONTEXT   7

Development in India. Caste & 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 . Behavior pattern, Group Dynamics . team, enhancing group behaviour. Industrial Organization - formal and informal organizations, Line and staff   organizations - functions*.*

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   7

Ethics and values . Organizational values . personal worth, ethical behavior, Professional ethics-professional rights and responsibilities, 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. Engineers contribution, Ecology and environment . Sustainable development. 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, Fundamentals 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.

7. Haralambos, Heald R.M, Sociology Themes and Perspectives, Oxford, New Delhi-92

8. Ram Ahuja, Social Problems in India,Rawat Publications ,New Delhi

OUTCOMES:

On successful completion of this course,

- Students will have exposure to the fundamentals and the basic concepts of Sociology.
- Students will have gained knowledge about the reality of the society.
- Students will be able to positively respond to the forces of change.
- Students will inculcate common interests of the group and adopt legitimate means to achieve them.

- Students will have knowledge about the impact of technology, modernization, and globalization.
- Students will be able to conform to the rules of the society and communicate effectively with the engineering community and with the society at large

Students will work effectively as individuals, in teams and in multi-disciplinary settings together with the capacity to undertake holistic development of the 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 both with scalar and vector approaches for representing forces and moments acting on particles and rigid bodies and their equilibrium
- To give on 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

Lecture 45 Tutorial :15

                                              Total Hours: 60

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
- Students should 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   1   0   4

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.

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.

                                                            Total Hours : 45

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

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 students will be able to

* Apply the principles of Boolean algebra to manipulate and minimize logic expressions.

* Apply minimization methods to minimize and optimize logic functions of any level.

* Design and analyze combinational and sequential logic circuits.

EEB1281   **INTRODUCTION TO ELECTRICAL AND**   **L T P C**
                  ELECTRONICS ENGINEERING   **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 Analysisq 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 Engineeringq 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 help students identify content specific vocabulary and learn its usage.
- To teach them formal and informal expressions in business communication.
- To expose them to reading for specific purposes, especially in business contexts.
- To expose them to the process of different kinds of formal writing.
- To train them in using the nuances of writing in corporate correspondence.
- To train them in writing effective applications with résumé and reports.

MODULE I   **4**

Introduction - process of writing . ABC of academic and professional writing .
Instructions and recommendations
Reading business related texts for specific information.

MODULE II   **4**

Format and conventions of writing email, memo & fax.
Writing email (Case study), memo, fax, agenda and minutes of the meeting (using mobile applications)

MODULE III   **6**

Format and conventions of writing agenda and minutes of the meeting
Letter Writing--Calling for an interview & letter of inquiry

MODULE IV   **6**

Writing letter of application and Résumé - Different types . Functional, Chronological
Writing ones résumé using Wikispaces

MODULE V   **6**

Reporting an incident, writing a feasibility report, and progress report & discipline specific reports
Reading a case study (industry specific) . collaborative writing using Wikispaces

MODULE VI   **4**

Writing Statement of purpose. Assessing ones strengths and weaknesses & self and peer evaluation of strengths.

                                                        Total Hours: 30

REFERENCES:

1. Riordan,D (2013). Technical Report Writing Today. Cengage Learning, 10th edition. USA.
2. Oliu, W. E., Brusaw, C.T., & Alred, G.J.(2012). Writing that Works: Communicating Effectively on the Job . Bedford/St. Martings. Eleventh Edition.
3. Garner, B.A. (2013). HBR Guide to Better Business Writing (HBR Guide Series). Harvard Business Review Press. USA.
4. Sharma, R.C. & Krishna M. (2002). Business Correspondence and Report Writing. Tata MacGraw . Hill Publishing Company Limited, New Delhi.
5. Macknish, C. (2010). Academic and Professional Writing for Teachers. McGraw-Hill Education. USA.
6. Whitby, Norman (2014). Business Benchmark: Pre-Intermediate to Intermediate. Cambridge University Press, UK.

OUTCOMES:

On completion of the course, the students will have the ability to

- Create different types of academic and professional documents by using the three stages of writing.

- Identify content specific vocabulary and also use them in appropriate contexts.

- Use formal and informal expressions in real life situations.

- Demonstrate reading skills with reference to business related texts.

- Compose written correspondence effectively in work place contexts.

- Write effective letter of applications, résumé and reports.

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

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

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   L T P C
**   ENGINEERING LAB   0 0 3 1**

OBJECTIVES:

˝   To understand,simulate and verify Thevening and Nortong 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 Thevening theorem and Nortong 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, BJTs and FETs and SCR

MAB 2181   TRANSFORMS AND APPLICATIONS   L T P C
           (Common to all B.Tech Programmes)   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 describe the Indian Constitution and Governance of our country.
- To explain human rights, local and International and redressal mechanism.
- To discuss the important aspects of Corporate laws.
- To state the importance of industrial and labour laws of our country.
- To present the laws on contracts and arbitration.
- To state the importance of laws related to intellectual property.

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 - Peoples 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, Workmens 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 Indias Constitution and Constitutional Law, National Book Trust, 3rd edn., 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 edn., 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:

On successful completion of the course

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- Students will `be able to apply the basic concepts of Indian Constitution, Governance and power in their real life situation.
- Students will have developed knowledge in judiciary, human rights, cultural, social and political rights.
- Students will have synthesized knowledge about the corporate and labour laws, contracts, arbitration and laws related to Intellectual Property Rights.

ITB2101   **DATA STRUCTURES**   **L T P C**
                                                              3 0 0 3

OBJECTIVES:

- ˝ To describe about problem solving techniques and the usage of various data structures.
- ˝ To study the various abstract data types and their applications.
- ˝ To study tree ADT and their applications.
- ˝ To design and implement different types of searching and sorting algorithms.
- ˝ To analyze graphical representation and apply algorithms of path finding.

MODULE I   PROBLEM SOLVING & ABSTRACT DATA TYPES   7

Problem solving - Top-down Design . Efficiency- Analysis - Sample algorithms . Introduction to data structures . Data structure types . Abstract Data Types . Arrays . Structures . Unions . Pointers.

MODULE II   LISTS, STACKS AND QUEUES   8

List ADT . Stack ADT . Queue ADT . Circular Queue . Double Ended Queue - Priority Queue . Array implementation of Stack and Queue . Singly Linked List . Doubly Linked Lists . Stack and Queue using Linked List.

MODULE III   TREES   8

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

MODULE IV   SEARCHING AND SORTING   7

Linear Search . Binary Search - 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.

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.

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 and its protocols.

˝   To learn about cryptographic techniques and algorithms for network
      security.

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) . Simple Message Transport Protocol . File
Transfer Protocol . Hyper Text Transfer Protocol . World Wide Web.

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 cryptographic techniques and algorithms for network security.

ENB1281   **ORAL COMMUNICATION**   **L   T   P   C**
                                                                      0   0   2   1

OBJECTIVES:

- To empower students with soft skills for employability.
- To help students speak effectively.
- To expose them to a range of business contexts through podcasts for learning appropriate expressions and using them effectively.
- To enable them to make effective presentations.
- To help them learn persuasive and negotiating skills.
- To train them in deliberating on current affairs efficiently by participating in group discussions.
- To prepare them for job interviews.

MODULE I   **4**
Training in soft skills-Importance of Oral Communication, rubrics for evaluation, Verbal and non-verbal communication, One-minute presentations & Just a minute (JAM) Paralinguistic features - Listening to short conversations and monologues for relevant information.

MODULE II   **6**
Role-play, Selling a product , marketing skills (Case study on advertisements)
Listening to Business English podcast, Negotiation, persuasion and marketing skills

MODULE III   **4**
Deliberation on social and scientific issues & Debates (Peer and Faculty feedback)
Viewing video samples on debates, TED Talks

MODULE IV   **4**
Pair work- Think, pair and share activity-analyzing & Problem solving
Listening for specific information and taking short notes

MODULE V   **6**
Discussion etiquette -Assigning different roles in a GD (Peer and Faculty feedback)
Goal setting, Assessing one's strengths and weaknesses & SWOC Analysis

MODULE VI   **6**
 Mock interview (Peer and Faculty feedback) - Types of Job Interview . Telephone Interview, Stress Interview (Case study)
Listening to interviews for understanding speakers'opinions

                                                                      Total Hours: 30

REFERENCES:

1. Hancock, Mark (2012). English Pronunciation in Use. Cambridge University Press, UK.
2. Anderson, Kenneth & et.al (2007). Study Speaking: A Course in Spoken English for Academic Purposes (Second Edition). Cambridge University Press, UK.
3. Hurlock, B.Elizabeth (2011). Personality Development. Tata McGraw Hill, New York.
4. Dhanavel,S.P (2015). English and Soft Skills. Orient Blackswan, Chennai.
5. Whitby, Norman (2014). Business Benchmark: Pre-Intermediate to Intermediate. Cambridge University Press, UK.

OUTCOMES:

On completion of the course, students will be able to
- Apply various soft skills to deal with any professional situation.
- Speak English intelligibly, fluently and accurately.
- Use a range of expressions appropriate to the situations.
- Make effective presentations.
- Use persuasive and negotiating skills for marketing products.
- Deliberate on current affairs with confidence.
- Participate effectively in group discussions and interviews.

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.   Implementation of linear search and binary search

2.   Array implementation of List ADT, STACK ADT, Queue ADT.

3.   Implementation of Singly linked list (addition, deletion. Insertion in all positions)

4.   Implementation of Doubly linked list (addition, deletion. Insertion in all positions)

5.   Implementation of Stack and Queues using linked list.

6.   Implementation of binary search tree.

7.   Program for tree traversal (inorder, postorder, preorder)

8.   Implementation of Quick sort, Merge sort, Shell sort.

9.   Implementation of Dijkstra˖s algorithms.

10.   Implementation of Depth First search.

11.   Implementation 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**   **L T P C**
                              (Using C or 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.

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 salesmanproblems.

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 A Taha, "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, 2011.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture - Designing for Performance", 9th Edition, Pearson Education, 2012.

2. David A.Patterson and John L.Hennessy, Morgan Kaufmann, "Computer Organization and Design: The hardware / software interface", 5th Edition, 2013.

3. John P.Hayes, "Computer Architecture and Organization", 4th Edition, McGraw- Hill, 2003.

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   8085 AND 8086 ARCHITECTURE   8

Introduction to 8085 Microprocessor, Architecture, Instruction Set, Programming the 8085, Intel 8086 Micro processor, Minimum and Maximum Mode Signals, Architecture, Memory Segmentation, Physical Memory Organization.

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

Instruction formats, addressing modes, instruction set, assembler directives, Assembly Language Programming, String Manipulations, Procedures and Macros.

MODULE III   I/O INTERFACING   7

Memory Interfacing Vs I/O Interfacing , Parallel Communication Interface, 8285 Architecture, Various Modes of Operation, Interfacing to 8085/8086, Serial Communication Interface, 8251 USART Architecture, Interfacing to 8085/8086 , Simple Applications.

MODULE IV   INTERFACING WITH ADVANCED DEVICES   7

Interrupt structure of 8086, Vector interrupt table, Interrupt service routine. Introduction to DOS and BIOS interrupts, Interfacing, Introduction to Timer/ Counter Controller 8253, Keyboard/Display Controller 8279, DMA Controller 8257 , Real Time Applications.

MODULE V   INTRODUCTION TO MICROCONTROLLERS   7

Architecture of 8051 Microcontroller, Signals, Memory Organization,

Addressing Modes and Instruction set of 8051, simple programs.

MODULE VI   8051 REAL TIME CONTROL   8

8051-I/O Ports, Interrupts, Timer/ Counter, Serial Communication, Programming Interrupts, Real Time Applications, Introduction to Embedded System..

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**   **L T P C**
                     BEHAVIORAL SKILLS   **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 skills in web designing using HTML, DHTML, and CSS.
- To develop programming knowledge using client side and server side scripting languages.
- To create and implement dynamic web applications and web sites using JSP and databases.
- To acquire programming techniques in web based languages and web services.

LIST OF EXERCISES:
1. Creation of static web applications using HTML.
2. Implement the following types of style sheets in the DHTML.

    a. Internal CSS

    b. External CSS

    c. Inline CSS

3. Implementation of dynamic Javascript web applications in DHTML (Structures - Functions . Arrays - Java Script Objects).
4. Data Binding with Tabular Data Conrol in DHTML and Javascript (Moving with a record set - Sorting table data - Binding of an image and table).
5. Enhance the webpages using jQuery implementation.
6. Simple XML implementation using HTML and Javascript. XML transformation using XSLT/XSL, Xpath, Xlink, XML namespaces and XML Schema.
7. Configure and customize HTTP Apache Tomcat Web Server.
8. Implementation of message application and database connectivity using MySQL.
9. Implementation of JSP web application using MySQL database server in NetBeans IDE.
10. Develop a J2EE Web Client to access a .NET Web Service in Microsoft Visual Studio.
11. Creation of user interface using Flash- Study.

12. Creation of simple applications using Photoshop- Study.

OUTCOMES:
The students must be able to:
- Develop programming skills on Internet based applications with appropriate web servers.
- Enable the students to know techniques involved to support real-time software development in dynamic web applications.
- Design and development of sophisticated web sites and web applications using server side programming.
- Design web services 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.

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.

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

OBJECTIVES:
- To explore the salient features and processes that characterise the rocks, soils, water and their interconnectivity with the atmosphere through bioelement cycling
- To rationalise the biological environment at the level of cell, the population, the community ,ecosystem and the biome
- To get sensitized with the impacts of human activity on the natural environment and with the methods to conserve it
- To study the impacts of human activity on water and air and to identify the steps to conserve
- To find out an unique solution for the environmental crisis in the developing and developed countries
- To   learn about the assessments of the impacts with the help of NGOs and public and to proceed to a sustainable living

.

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 radionuclides . 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,   8
                     ENVIRONMENTAL CRISIS

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   5
                     SUSTAINABILITY
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. Environmental Science (The Natural Environment and Human Impact), Andrew R. W. Jackson and Julie M. Jackson, Pearson Education Limited, Harlow, Essex, England, 2000.
2. Environmental Science (Working with the Earth), G Tyler Miller, Jr., Thomson Brooks/Cole, 2006.

REFERENCES:

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

OUTCOMES:

After the completion of the course the student should be able

- To differentiate the rock and the soil and to recognise the pivotal importance of bioelement cycling
- To examine the biological environment both at the microscopic and biome levels
- To analyse the role played by the urban and industrial development that change the pattern of land use
- To judge the level of air and water pollution
- To discriminate renewable energy from non renewable energy and to discuss about the environmental crisis prevailing
- To assess the human impacts on environment and to appreciate the sustainable living

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 anddebugging.

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 to the 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.

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 . MRPII - 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.

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 hocnetworks.

˝   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 ITB3105-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.

ITB4211	**PROJECT WORK**	**L T P C**
		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.

PROFESSIONAL ELECTIVES

SEMESTER V

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 distributedshared 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.

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 IIRfilters.

MODULE V   FIR FILTER DESIGN   8

Symmetric &Antisymteric FIR filters . Linear phase filter . Windowingtechnique . 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.

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.

ITBX30   INFORMATION CODING TECHNIQUES   L T P C
                                                       3 0 0 3

OBJECTIVES :

- To learn the concept of information and entropy of Information.
- To understand the basic Modulation and its types.
- To familiarize with text compression techniques.
- To know about video compression, H.261 and MPEG standard.

MODULE I   INFORMATION ENTROPY FUNDAMENTALS   8

Uncertainty, Information and Entropy . Source coding Theorem . Huffman coding . Shannon fano coding . Discrete Memory less channels . channel capacity . channel coding theorem . Channel capacity theorem.

MODULE II   DATA AND VOICE CODING   8

Differential Pulse Code Modulation . Adaptive Differential Pulse code Modulation . Adaptive subband coding . Delta Modulation . Adaptive Delta Modulation . Coding of speech signal at low bit rates (Vocoders, LPC).

MODULE III   BLOCK CODES   7

Definitions and Principles: Hamming weight - Hamming distance - Minimum distance decoding - Single parity codes - Hamming codes - Repetition codes - Linear block codes - Cyclic codes - Syndrome calculation - Encoder and decoder - CRC

MODULE IV   ERROR CONTROL CODING   7

Generator polynomial . Parity check polynomial . Convolutional codes . code tree trellis, state diagram - Encoding . Decoding: Sequential search and Viterbi algorithm . Principle of Turbo coding

MODULE V   COMPRESSION TECHNIQUES   8

Principles of text compression . static Huffman coding . dynamic huffman coding . arithmetic coding . image compression . graphics interchange format . tagged image file format . digitized documents . introduction to JPEG standards.

MODULE VI   AUDIO AND VIDEO CODING   7

Linear predictive coding . code excited LPC . perceptual coding - MPEG audio coders . Dolby audio coders . video compression . H.261 and MPEG video standards.

                                                                Total :   45

Text Books:
1.Simon Haykin, £Communication Systemsq John Wiley and Sons, 4th Edition 2001.

2.Fred Halsall, %Multidedia Communications: Applications, Networks, Protocols and Standards+, Perason Education Asia, 2002

REFERENCES:
1. Mark Nelson, %Data Compression Book+, BPB, 1992.

2. Watkinson J, %Compression in Video and Audio+, Focal Press, London, 1995.

OUTCOMES:
Upon completion of the course students should be able to :

- Understand the concept of information and entropy of Information.

- Understand the basic Modulation and its types.

- Gain knowledge about text compression techniques.

- Familiarized about video compression, H.261 and MPEG standard.

SEMESTER VI

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.

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.

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.

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

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.

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 SYSTEM 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+, OdReilly 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.

	L T P C
ITBX12 **ADHOC NETWORKS**	**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.

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 Architectos 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.

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.

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.

ITBX29   CRYPTOGRAPHY AND NETWORK SECURITY   L   T   P   C
                                                                        3   0   0   3

Course Objective
- To understand OSI security architecture and classical encryption techniques.
- To know the methods of conventional encryption, concepts of public key encryption and number theory.
- To describe the principles of public key cryptosystems, hash functions and digital signature.
- Understand Encryption Techniques, key Generation Techniques, authentication and Security Measures.
- To know the network security tools and applications.
- To understand the system level security used.

MODULE I   SYMMETRIC KEY CRYPTOGRAPHY   9
OSI Security Architecture - Classical Encryption techniques . Cipher Principles . Data Encryption Standard . Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES . AES Cipher . Triple DES . Placement of Encryption Function . Traffic Confidentiality- Key Distribution - Random Number Generation.

MODULE II   PUBLIC KEY CRYPTOGRAPHY   8
Principles of Public Key Cryptosystems . RSA algorithm - Key Management - Diffie-Hellman key Exchange . Elliptic Curve Architecture and Cryptography - Introduction to Number Theory

MODULE III   AUTHENTICATION AND HASH FUNCTION   8
Authentication requirements . Authentication functions . Message Authentication Codes . Hash Functions . Security of Hash Functions and MACs . MD5 message Digest algorithm - Secure Hash Algorithm . RIPEMD . HMAC Digital Signatures . Authentication Protocols . Digital Signature Standard

MODULE IV   NETWORK SECURITY   7
Authentication Applications: Kerberos . X.509 Authentication Service . Electronic Mail Security . PGP . S/MIME - IP Security . Web Security.

MODULE V   SYSTEM LEVEL SECURITY   7
Intrusion detection . password management . Viruses and related Threats . Virus Counter measures . Firewall Design Principles .

MODULE VI   APPLICATION   7
Trusted Systems. Case study on secured key Generation & Breaking Techniques.

TOTAL : 45

TEXT BOOK:

1. William Stallings, £ryptography and Network Security . Principles and Practicesq Prentice Hall of India, Third Edition, 2003.

REFERENCES:

1. Atul Kahate, £ryptography and Network Securityq Tata McGraw-Hill, 2003.
2. Bruce Schneier, £pplied Cryptographyq John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, £ecurity in Computingq Third Edition, Pearson Education, 2003.

Course Outcome:
Upon completion of the course, the students should be able to:

- apply the concepts of various cryptographic techniques in different areas.

- Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack.

- select appropriate techniques to tackle and solve problems in the discipline of information security.

- develop network security applications.

- distinguish between firewalls based on packet-filtering routers, application level gateways and circuit level gateways.

ITBX31   **PROGRAMMING IN PYTHON**   **L T P C**
                                                                             2 0 2 3

OBJECTIVES:
- To install and execute python program.
- To provide a complete knowledge about python programming language.
- To develop application using python language.

MODULE I   **FUNDAMENTALS**   **7**

Python basics . objects . sequences . strings . lists . tuples.

MODULE II   **FILES INPUT AND OUTPUT**   **7**

Mapping and set types . conditionals and loops . files input and output

MODULE III   **PYTHON IN OTHER PARADIGMS**   **8**

Errors and exceptions-function programming-object oriented programming-execution environment.

MODULE IV   **ADVANCED TOPICS**   **<u>8</u>**

Network programming-internet client programming-GUI programming.

                                                                             Total 30

LIST OF EXPERIMENTS
1. Download and install Python.
2. Write a Python program to print "Hello, World!" and save this in a file named **helloworld.py**. Make this program executable and run it like: ***./helloworld.py***
3. Write a Python program (*swap.py*) to swap values of two variables.
4. Write a program that asks for two numbers. If the sum of the numbers is greater than 100, print "That is a big number."
5. Write a python program to have a separate function for the area of a square, the area of a rectangle and the area of a circle (3.14 * radius ** 2).
6. Write a python program that prints result based on user input from the random integer between 0 and 99. If the user input is above the range print "Too High", below range print "Too Low", within the range print "That's right".

7. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero. Include a condition in your program if the user inputs a negative number.
8. Write a method fact that takes a number from the user and prints its factorial.
9. Write a function roots that computes the roots of a quadratic equation. Check for complex roots and print an error message saying that the roots are complex.
10. Draw a Digital Clock by creating a class called DigitalClock that has attributes hour, minute, second, pos and draw method. The attributes store the time in the position - the upper left corner of the rectangle face. Add extra methods to help you draw the clock, e.g. a method for drawing the face, a method for drawing the text, a method returning the time as string.

L – 30; P – 30; TOTAL HOURS 60

TEXT BOOKS:
1. Wesley J Chun, "Core Python Programming", Second Edition, Prentice hall, 2006.

REFERENCES:
1. Richard L.Halterman, "Learning to program with python", 2011.

OUTCOMES:
Upon Completion of this course the student will be able to
- Download and install python compiler.
- Write and test python programs.
- Develop applications using python.

ITBX32	OPEN SOURCE TECHNOLOGIES	L	T	P	C
		1	0	2	2

OBJECTIVES:

- To help demystify the tools in Open source technologies.
- To explain the impact of open source technology in programming.
- To expose students to open source environment and introduce them to use open source Packages.
- To develop GUI processing using Python and PHP.
- To create back end server using MySQL.

LIST OF EXERCISES:

1. Case study: Proprietary Vs Open Source tools
2. Deploy a LAMP stack in Linux
3. Create an application that uses all the LAMP stack components
4. OPEN SOURCE TOOLS AND TECHNOLOGIES:WEB SERVER: Apache Web server . Working with Web server . Configuring and using Apache Web services . Execution Environment
5. Open Source Software tools and processors . Eclipse IDE platform . Compilers.
6. Creation of Simple application using GIMP tool.
7. Demonstration of GitHub.
8. OPEN SOURCE PROGRAMMING LANGUAGES: PHP: Introduction-Programming in Web Environment and SQL database.
9. OPEN SOURCE PROGRAMMING LANGUAGES: PYTHON: Python objects-Numbers-Sequences-Strings-Lists and Tuples -Dictionaries-Conditionals and loops
10. OPEN SOURCE DATABASE: MySQL: Introduction-Setting up account-Starting,

terminating and writing your own SQL programs ,MySQL and Web.

Total Hours : 45

OUTCOMES:

Students who complete this course will be able to:

- Analyze the difference between the open source model and commercial proprietary model.

- Expertise on using a variety of open source software.

- Develop and deploy a project based purely on open source tools.

ITBX33	PRINICPLES OF COMPILER DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:
 To enable the students to

- enrich the knowledge in various phases of compiler.

- design and construct a lexical analyzer.

- expand the knowledge of parser by parsing.

- construct the syntax-directed tress

- concise and design optimization of codes.

- design a compiler for a simple programming language.

Prerequisite: Programming concepts and Data structures

MODULE I   INTRODUCTION   7
Language processor - Structure of a Compiler - Applications of Compiler Technology -

Programming language basics - Syntax Definition - Syntax-Directed translation - parsing - Lexical Analysis - symbol tables - intermediate code generation.

MODULE II   LEXICAL ANALYSIS   9

The role of lexical analyzer - Input Buffering - Specification of Tokens - Recognition of Tokens - Lexical Analyzers generator Lex, Finite Automata - From a Regular Expression to automata - Design of a Lexical Analyzer Generator

MODULE III   SYNTAX ANALYSIS   8

Introduction - Context Free Grammars -Top Down parsing - Bottom-up Parsing - Introduction to LR parsing - Construction of SLR Parsing table - Introduction to LALR Parser- Parser Generators.

MODULE IV   SYNTAX - DIRECTED TRANSLATION   7

Syntax-Directed Definitions - Construction of Syntax Trees - Syntax-Directed Translation schemes - Implementing L-Attributed SDDs.

MODULE V   INTERMEDIATE CODE GENERATION   7

Variants of syntax trees - Three-address code - Types and declarations - Translation of Expressions - Type checking - Type Conversions - Control Flow.

MODULE VI   CODE OPTIMIZATION AND CODE GENERATION   7

Issues in design of a code generator - The target language - Addresses in the target code - Flow graphs - Optimization of basic blocks - a simple code generator algorithm - Peephole Optimization - Register Allocation and Assignment - Optimal code generation.

Total : 45 Hours

TEXT BOOK:
1.   Alfred V.Aho, Monica S.Lam, Ravi Sethi and Jeffrey D.Ullman, "Compilers . Principles, Techniques and Tools", Second edition, Pearson Education, New Delhi, 2013.

REFERENCES:
1.   Raghavan V, %Principles of Compiler Design+, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009.
2.   Dick Grone, Henri E Bal, Ceriel J H Jacobs and Koen G Langendoen, %Modern Compiler Design+, John Wiley, New Delhi, 2016.
3.   Randy Allen, Ken Kennedy, %Optimizing Compilers for Modern Architectures: A

Dependence-based Approach+, Morgan Kaufmann Publishers, 2015.
4.   Dhamdhere D M, "Compiler Construction Principles and Practice", second edition, Macmillan India Ltd., New Delhi, 2002.
5.   Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", McGraw Hill, New Delhi, 2005.

OUTCOMES:
On successful completion of the course, the students will be able to
- obtains the knowledge of modern compiler & its features.

- analyze the given program using lexical analyzer

- discuss various parsing techniques.

- evaluate the syntax directed translation.

- design and conduct experiments for intermediate code generation.

- demonstrate the compilation of a program in a regular high level language.

ITBX34	SEMANTIC WEB	L T P C
		2 0 0 2

OBJECTIVES:

To enable the students to

- To understand the evolution and significance of semantic web.

- To identify and explore tools and methods to construct and implement ontologies.

- To build and implement a micro level ontology that is semantically descriptive of chosen problem domain.

- To develop and implement applications and tools based on ontology.

Prerequisite: Web Technology, Internet Technology Fundamentals.

MODULE I   INTRODUCTION TO SEMANTIC WEB   9
Overview of semantic web . source of semantic web. examining semantic web and

examples-semantic wikis-twine-FOAF project-sources of semantic data-RDF-architecture of semantic web-role of ontology in sematic web-semantic web data-Compare and Contrast semantic technologies with traditional technologies-Semantic framework-web based issues and solutions.

MODULE II   ONTOLOGY & WEB RESOURCES   12

Ontologies . Taxonomies . Topic Maps . Classifying Ontologies - Kind of Ontology resources -construction of ontology instances . Classifications and methods for building ontology -Ontology Development Life Cycle & process . Ontology-Evolution . Versioning-Structured Web Documents - XML ,JSON. Building page structures . Namespaces . Labeling . Query parsers for ontology. RDF . RDF based models. Formats - RDF grammar. fundamentals.

MODULE III   SEMANTIC WEB TOOLS AND APPLICATIONS   9

Tools for construction and designing ontology and reasoning logics for semantic web. Apache Jena Framework, Protégé . SPARQL . Alchemy API . Word Net based Applications -Case studies and Applications using Python and NLTK based Libraries.

Total : 30 Hours

TEXT BOOK:

1. Liyang Yu, A Developers Guide to the Semantic Web, Springer; 3rd Edition, 2015.

REFERENCES:

1. John Hebeler, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, Semantic Web

2. Programming, Wiley; 1 edition, 2009.

3. Grigoris Antoniou, Frank van Harmelen, A Semantic Web Primer, Second Edition

(Cooperative Information Systems) (Hardcover), MIT Press, 2008

4. Dean Allemang and James Hendler, Semantic Web for the Working Ontologist:

     Effective   Modeling in RDFS and OWL, Morgan Kaufmann; 2 edition, 2011.

OUTCOMES:

On successful completion of the course, the students will be able to

- Explore fundamentals of semantic web, models and tools.
- Understand semantic tools and techniques for representing ontology as XML and RDF files.
- Have hands on experience on various popular Semantic NLP tools and libraries.

ITBX35 **ORACLE DATABASE PROGRAMMING** **L T P C**
0 0 2 1

OBJECTIVES:

- To design and implement effective SQL queries within database applications and manipulate database data effectively.
- To demonstrate a database solution for a business or organization using Oracle Application Express (APEX).
- To implement database-driven web site with database programming with PL/SQL.
- To develop, execute and manage PL/SQL database program like procedures, functions, and database triggers.

LIST OF EXERCISES:

9. Design of database with SQL using DDL, DML, and TCL commands.
10. Implementation of Single Row Functions, JOINs, Group Functions.
11. Implementation of Constraints, Views, Sequences, Privileges and Regular Expressions.
12. SQL Functions, Triggers and Procedures.
13. Database and Websheet application creation in Oracle Application Express (APEX) using Application Builder.
14. Working on SQL Commands in Oracle Application Express - SQL Command Processor.
15. Transferring Schema and Data in APEX.
16. Database Programming with PL/SQL
    - ˝ Retrieving & Manipulating Data in PL/SQL
    - ˝ Using Explicit & Multiple Cursors
    - ˝ Program Structures to Control Execution Flow

- ˝ Creating procedures and Passing parameters
- ˝ Using dynamic SQL
- ˝ Database Event Triggers

17. Design and Implement a basic database using the Oracle Database Management and Java Programming.

18. Creating and Presenting Database Projects.

Total Hours : 30

OUTCOMES:
1. Understand the use and application of the relational database model.
2. Enhance skills in Oracle database programming.
3. Implement database applications using Java programming.
4. Design database and websheet application creation using Application Builder.
5. Expertise in relational database data management.

ITBX36	R PROGRAMMING	L	T	P	C
		1	0	1	2

OBJECTIVES:

- To understand the fundamentals of R programming.
- To analyze the data and draw graph

MODULE I   INTRODUCTION TO R PROGRAMMING   7

Introduction . R Programming Structures - Doing Math and Simulations in R

MODULE II   DATA ANALYSIS AND GRAPHICS   8

Input/ Output . Graphics - Interface R to Other Languages

LIST OF EXERCISE:

1. Store data in textual and binary format.
2. Subsetting R objects
3. Vectorized Matrix Operation
4. Apply select, filter and arrange, group_by function.
5. Control structures

Total Hours : 45

Text Book:

Norman Matloff, ‰The Art of R Programming: A Tour of Statistical Software Design, ‰No Starch Press, 2011.

OUTCOMES:

On completion of the programme students will be able to:

˝   Develop a simulation model in R programming.

˝   Analyze the data and draw various graphs.

ITBX38	ARTIFICIAL INTELLIGENCE	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   5

Computerized reasoning - Artificial Intelligence (AI) - characteristics of an AI problem - Problem representation in AI - State space representation - problem reduction.

MODULE II   SEARCH PROCESS   10

AI and search process - Brute force search techniques, Depth first, Breadth first search techniques, Hill climbing, Best first search, AND/OR graphs, A* algorithm - Constraint satisfaction.

MODULE III   AI AND GAME PLAYING   6

Major components of a game playing program - plausible move generator - static evaluation - function generator - Minimal strategy - Alpha - Beta techniques - problems in computer game playing programs.

MODULE IV   KNOWLEDGE REPRESENTATION   9

Logic, Propositional logic - Tautology - Contradiction - Normal forms - Predicate logic - Rules of inference - Resolution - Unification algorithm - Production rules - Semantic networks - Frames . Scripts - Conceptual dependency.

MODULE V   KNOWLEDGE ENGINEERING   7

Design and architecture of expert systems - Expert system life cycle - Knowledge acquisition . difficulties - strategies - major applications areas - Qualitative study of expert systems, DENDRAL, MYCIN.

MODULE VI MACHINE LEARNING   5

Frame work for learning . Inductive learning . Supervised, Unsupervised learning . Parallel distributed processing . Genetic Algorithms .

Total Hours : 45

REFERENCES:

1. Stuart Russel and Peter Norvig, %Artificial Intelligence . a modern approach+, Prentice Hall, 2003.

    2. Elaine Rich and Kevin Knight, %Artificial Intelligence+, Tata McGraw Hill, 2003.

    3. Patrick Henry Winston, %Artificial Intelligence+, Addison Wesley, 2000.

    4. Luger George F and Stubblefield William A, %Artificial Intelligence : Structures and Strategies for Complex Problem Solving+, Pearson Education, 2002.

OUTCOMES:

Upon successful completion of this course, the student shall be able to:

- Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

- Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

- Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.

- Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.

- Know various AI search algorithms (uninformed, informed, heuristic, constraint

satisfaction, genetic algorithms).

ITBX39	EXPERT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the basic concepts of expert systems.
- To know the languages and tools for building expert systems.
- To study about representing knowledge& knowledge acquisition.
- To study the various heuristics for building expert systems.

MODULE I   INTRODUCTION TO EXPERT SYSTEMS   7

Definition, Features of an expert system, Organization, Characteristics, Uses, Basic activities of expert systems, Prospector, Knowledge Representation in expert system, an overview of Artificial Intelligence.

MODULE II   RULE-BASED EXPERT SYSTEM   8

Introduction to Rule-based systems . Canonical systems, production systems for problem solving, the syntax of rules, working memory, controlling behavior of the interpreter, conflict resolution, forward and backward chaining, rules and meta-rules.

MODULE III   LANGUAGES TO BUILD AN EXPERT SYSTEM   8

Symbolic computation-Symbolic representation, Physical symbols systems, Introduction to LISP, LISP data structures, LISP programs, List processing, pattern matching. Logic Programming- Formal languages, propositional calculus, the predicate calculus, the PROLOG language, PROLOG and MBASE, PROLOGs search rules, Object-oriented analysis and design for expert systems.

MODULE IV   EXPERT SYSTEMS TOOLS   7

Overview of expert systems tools, expert system shells, high-level programming languages, constraints of production rule languages, evaluating object-oriented approaches, logic programming for expert systems, multiple-paradigm programming

environments, potential implementation problems, More maxims on expert system development, Building an Expert System-MYCIN, EMYCIN.

MODULE V   KNOWLEDGE ACQUISITION   8

Theoretical analysis of knowledge acquisition, Stages of knowledge acquisition, Ontology analysis, Expert system shells, Knowledge acquisition methods, Knowledge-based knowledge acquisition, Introduction to Machine Learning.

MODULE VI   CLASSIFICATIONS OF EXPERT SYSTEM TASKS   7

Classification of expert system tasks, heuristic matching, classification, The generality of heuristic classification, Classification versus construction, mapping tools to tasks, knowledge acquisition strategies, Managing complexity, classification problem solving.

Total Hours : 45

TEXT BOOKS:

1. Peter Jackson, "Introduction to Expert Systems", Third Edition, Pearson Education, 2003.

2. Donald A. Waterman, "A Guide to Expert Systems", Addison Wesley, 1999.

REFERENCES:

1. W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 2003.

2. Elain Rich and Kevin Knight, "Artificial Intelligence", Second Edition, Tata McGraw Hill, 1995.

OUTCOMES:

- Explain the concepts of expert systems.
- Write the rules for designing expert system
- Develop programs using LISP and PROLOG
- Analyze the knowledge acquisition in expert system
- Develop programs using machine learning concepts

- Build a new expert system using various tools

ITBX40	MONGODB FOR JAVA DEVELOPERS	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To explore NoSQL database and learn installation of MongoDB.
- To practice hands-on session on Mongo Shell
- To learn the CURD operations in MongoDB.
- To acquire knowledge in sharding and replication.

List of exercises:

Introduction and Overview

Overview, Design Goals, the Mongo Shell, JSON Intro, Installing Tools, Overview of Blog Project. Maven, Spark and Free marker Intro.

Creating, Reading and Updating Data (CRUD)

Mongo Shell, Query Operators, Update Operators and a Few Commands

Schema Design

Patterns, Case Studies & Tradeoffs

Performance

Using Indexes, Monitoring and Understanding Performance. Performance in Sharded Environments/.

Aggregation Framework

Goals, the Use of the Pipeline, Comparison with SQL Facilities.

Application Engineering

Drivers, Impact of Replication and Sharding on Design and Development.

Case Studies

Total Hours : 45

OUTCOMES:

At the end of this MongoDB course you will be able to:

- Develop an expertise in writing Java applications using MongoDB

- Perform installation, configuration and maintenance of MongoDB environment

- Get hands-on experience in creating and managing different types of indexes in MongoDB for query execution

- Develop skillsets in processing huge amounts of data using MongoDB tools

- Proficiently store unstructured data in MongoDB

- Acquire in-depth understanding of managing DB Nodes, replica set & Master-Slave concepts.

ITBX41	NETWORK SIMULATOR 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 andACK)

8. AODV/DSR

9. RTP protocol of VoIP

10. Implementation of network security algorithms

11. Network performance analysis using packet sniffer

Total Hours : 45

OUTCOMES:

On completion of the course students will be able to:

˝ Create wireless network environment and configure virtual LAN.

˝ Develop various wireless network applications.

˝ Demonstrate different wireless network protocols.

˝ Identify a suitable network security algorithms for a given scenario.

˝ Assess the performance of wireless network using packet sniffer.

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- service modeling - 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.

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.

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.

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.

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**   **L T P C**
                                   SUPPORT SYSTEM   **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.

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.

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, Satellite Telephone-The Internet.

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 . Integrated services Digital Networks (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

ITBX43   **INTERNET OF THINGS**   **L T P C**
                                                                          3 0 2 4
OBJECTIVES:

- To introduce the basics of Internet of things.
- Utilize IoT features and create applications based on IoT protocols.
- To discuss the features of cloud of things and web of things.
- Outline the embedded prototyping and design and apply the use of Devices in IoT Technology.
- To explain Real World IoT Design and compile the same.

THEORY COMPONENT

MODULE I   INTRODUCTION   8

Definitions and Functional Requirements . Motivation . Architecture - Web 3.0 View of IoT. Ubiquitous IoT Applications . Four Pillars of IoT . DNA of IoT . The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview . Communication middleware for IoT.

MODULE II   IOT PROTOCOLS   8

Protocol Standardization for IoT . Efforts . M2M and WSN Protocols . SCADA and RFID Protocols . Issues with IoT Standardization . Unified Data Standards . Protocols . IEEE 802.15.4 . BACNet Protocol . Modbus . KNX . ZigBee Architecture . Network layer . APS layer.

MODULE III   WEB OF THINGS   8

Web of Things . Web of Things versus Internet of Things . Two Pillars of the Web . Architecture Standardization for WoT. Platform Middleware for WoT . Unified Multitier WoT Architecture . WoT Portals and Business Intelligence.

MODULE IV   DESIGN PRINCIPLES OF CONNECTED DEVICES   7

Technology for design . Privacy in storing data . Internet principles for connected devices-

Prototypes and production . Changing embedded platform . Open source versus closed source.

MODULE V   PROTOTYPING EMBEDDED DEVICES   7

Prototyping embedded devices . Electronics- Sensors . Actuators . Arduino . Raspberry PI . Beagle Bone Black . Electric Imp.

MODULE VI   PROTOTYPING ONLINE COMPONENTS AND EMBEDDED CODING   8

Sketch . Iterate and Explore . Preparation of physical prototype . Getting started with API . Writing New API . Writing New API . Real Time Reactions . Other Protocols . Techniques for Writing Embedded code . Memory Management . Performance and Battery Life . Libraries and Debugging.

Total Hours : 45

LAB COMPONENT - LIST OF EXERCISES

1. Integration of Sensors and Actuators with Arduino-Traffic Control System
2. Working of Basic IoT Kit with Python Programming Networking
3. Implementation of IoT with Raspberry Pi - Raspbian OS . Blinking LED
4. Home Automation . Controlling lights using ESP8266
5. Sending Gmail notification when the door is opened or closed-sensed using Magnetic door sensor
6. Sensing the room temperature and monitoring it . using temperature sensor in ZigBee kit
7. Calculating distance using ultrasonic sensor
8. Program on RESTFUL API and XMAPP
9. IP based lighting control through Data Acquisition Card
10. Study on Industrial IoT

REFERENCES:

1. Rajkumar Buyya, Amir Vahid Dastjerdi, %Internet of Things . Principles and Paradigms+, 1st Edition, Morgan Kaufmann publishers inc., 2016.
2. Honbo Zhou , %The Internet of Things in the Cloud: A Middleware Perspective+, CRC

Press, 2012.

3. Dieter Uckelmann; Mark Harrison; Florian Michahelles , Architecting the Internet of Things, Springer, 2011.
4. Adrian McEwen & Hakim Cassimally , "Designing internet of things", Jhon Wiley and sons, 2014.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things . Key applications and Protocols", Wiley, 2012.

OUTCOMES:

Upon Completion of course the students will be able to :
- Identify and design the new models for market strategic interaction.
- Analyze various protocols for IoT.
- Analyze and compare Cloud of things and Web of things.
- Design a middleware for IoT.
- Identify the prototyping with various embedded devices.
- Analyze and design different models for embedded devices and API techniques.

ITBX44	PROGRAMMING IN HADOOP	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make the students familiar with Hadoop distributed file system and can learn how to configure Hadoop.
- To create single node and multi-node using Hadoop and to learn programming using Map Reduce paradigm.
- To provide a complete knowledge about Hadoop echo system with key components like Pig, Hive and Sqoop.
- To Install Apache Spark and explore the components in it.

Pre-Requisite: Java Programming, Database technologies

List of exercises:

1. Introduction to HDFS and Hadoop Ecosystem. Configuration and Installation of Hadoop 1.0 Single node with Name node and Data node.
2. Configuration of Hadoop 1.0 with SSH key for security for Name and Data Node with Demo of Pseudo distributed Node and Case Study of Multinode set up.
3. Study of Map reduce Java API. Simple programs in Map Reduce paradigm with java concepts.
4. Working on Input functions, mapper & reducer functions. Simple program for text extraction and title extraction.
5. Program for searching key word and extract it from the given text paragraph.
6. Program for extracting link from a HTML page using Map and Reduce.
7. Implementation of Pig using Hadoop Ecosystem for processing structured Data.
8. Implementation of Sqoop for transferring schema format to NOSQL format.
9. Implementation and configuration of Hive in Hadoop ecosystem for querying.
10. Apache Spark Installation and implementation of simple programs in it.

Total Hours : 45

OUTCOMES:
Upon Completion of this course the student will be able to

- Demonstrate single node and multi-node Hadoop 1.0 with installation and configuration.
- Compute simple programs in Hadoop using Map reduce Paradigm.
- Analyze Hadoop Ecosystem using simple components like Pig, Hive and Sqoop.
- Exploring Apache Spark and analyzing the components in it.

ITBX45	GREEN COMPUTING	L	T	P	C
		2	0	0	1

OBJECTIVES:

- To acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.

- To learn to minimize energy consumption.
- To examine technology that can reduce paper and other consumables usage.

MODULE I   GREEN COMPUTING FUNDAMENTALS, ASSETS & MODELING   7
Green IT Fundamentals: Business, IT, Environment - Green IT Strategies: Drivers, Dimensions, Goals - Green Assets: Buildings, Data Centers, Networks, and Devices - Green Business Process Management: Modeling, Optimization, and Collaboration . Green Enterprise Architecture - Green Information Systems: Design and Development Models.

MODULE II   GREEN IT FRAMEWORK & GREEN COMPLIANCE   8
Virtualizing of IT systems . Role of electric utilities, Telecommuting, Teleconferencing and Teleporting . Going paperless - Materials recycling . Green Data center . Green Grid framework . Green Compliance: Protocols, Standards, and Audits . Emergent Carbon Issues: Technologies and Future.

Total Hours : 15

TEXT BOOKS:
1. Bud E. Smith,+Green Computing Tools and Techniques for Saving Energy, Money, and Resources+, Taylor & Francis Group, CRC Press, ISBN-13: 978-1-4665-0340-3, 2014.
2. Jason Harris, %Green Computing and Green IT Best Practices, On Regulations and Industry Initiatives, Virtualization and power management, materials recycling and Tele commuting , Emereo Publishing .ISBN-13: 978-1-9215-2344-1, 2014.

REFERENCES:

1. Ishfaq Ahmed & Sanjay Ranka, %Handbook of Energy Aware and Green Computing+, CRC Press, ISBN: 978-1-4665-0116-4, 2013.
2. Greg Schulz, %The Green and Virtual Data Center+, CRC Press, ISBN-13:978-1-4200-8666-9, 2009.
3. Marty Poniatowski, %Foundation of Green IT: Consolidation, Virtualization, Efficiency, and ROI in the Data Center+, Printice Hall, ISBN: 9780-1-3704-375-0, 2009.

OUTCOMES:

- Discuss Green Computing concepts, assets and business process management.
- Outline Green IT data center framework, Green compliance in IT systems.

ITBX46	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand big data analytics
- Discuss data analytic methods
- To learn technology and tools for analytics

MODULE I   INTRODUCTION TO BIG DATA ANALYTICS   7

Big Data Overview . State of the Practice in Analytics . Data Analytics Lifecycle Overview . data analytics life cycle-discovery . Data preparation . Model planning . Model building . Communicate results . Operationalize.

MODULE II   DATA ANALYTIC METHOD   8

Introduction to R - Exploratory data analysis . Statistical methods for evaluation . Clustering . k-means . Association rules.

MODULE III   ADVANCED ANALYTICS   7

Regression . linear regression . Logistic regression . Classification . Data Visualization - Decision trees . Regression - Naives Bayes - Diagnostics of classifiers.

MODULE IV   TIME SERIES AND TEXT ANALYSIS   8

Overview of Time Series Analysis - ARIMA Model - Text Analysis - Text Analysis Steps - A Text Analysis Example - Collecting Raw Text - Representing Text - Term Frequency· Inverse Document Frequency - Categorizing Documents by Topics - Determining Sentiments.

MODULE V   TECHNOLOGY AND TOOLS   8

Analytics of unstructured data - The Hadoop Ecosystem . NoSQL - SQL Essentials - In-Database Text Analysis - Advanced SQL . MADlib.

MODULE VI   RECOMMENDATION SYSTEM   7

Recommendation System and their Types . Content Based Recommendation System . Collaborative Recommendation System.

Total Hours : 45

TEXT BOOKS:

1. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data‰, John Wiley & Sons, Inc., Indianapolis, Indiana, 2015.
   2. Rajat Mehta, ‰Big Data Analytics with Java‰, Packt Publishing Ltd, 2017.

REFERENCES:

1. Anil Maheshwari, ‰Data Analytics‰, Mc Graw Hill Education, 2017.
2. Vignesh Prajapati, ‰Big data analytics with R and Hadoop‰, Packet publishing, 2013.
3. Michael Minelli, Michele Chambers and Ambiga Dhiraj, ‰Big data, Big Analytics‰, John Wiley & Sons, Inc,2013.
4. Mike Barlow, ‰Real-time big data analytics-emerging architecture by, OdReilly Media, First Edition, 2013.

OUTCOMES:

On successful completion of the course, the students will be able to
- Discuss the basics of big data analytics
- Explain the methods of analytics
- Describe the advanced analytics methods
- Perform time series and text mining
- Setup environment using technology and tools for analytics
- Carry out the analytic projects

ITBX47   **PROGRAMMING IN SCALA**   **L   T   P   C**

0 0 2 1

OBJECTIVES:
- To explore a multiparadigm programming language equivalent to java.
- To install and set up the environment to execute the scala programs.
- To develop simple scala programs and implement in the scala environment.
- To demonstrate the scala based web frameworks.

PRE-REQUISITES
1. Basic knowledge of Object Oriented Programming systems.
2. Fundamentals of Java Programming and Internet Programming.

LIST OF EXERCISES
1. Overview of Scala and environmental setup.
2. Creation of simple programs with basic syntax, variables and data types.
3. Implementation of class and extension of class and objects.
4. Implementation of classes using access modifiers and operators.
5. Implementation of looping statements and branching statements.
6. Implementation of programs in Arrays and Collections.
7. Implementation of strings, traits, pattern matching.
8. Implementation of pattern matching with extractors.
9. Program with regular expressions and exceptional handling.
10. A case study of different web frameworks with scala.

Total Hours : 45

SOFTWARE REQUIRED
- Java Environment - Java SDK version 1.8.0_31
- Scala . Code Runner Version- 2.11.5.

OUTCOMES:
On completion of the programme students will be able to:
- Install and set the environment to run scala programs.
- Develop and implement scala programs with arrays, classes and objects.
- Implement pattern matching based programs
- Explore scale based web frameworks

ITBX48	VIRTUAL REALITY	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To make students know the basic concept and framework of virtual reality.
- To study of virtual reality systems, transformations, graphical rendering, human vision.
- To discuss VR system framework and development tools.
- To design a virtual environment and compelling virtual reality experience.

THEORY COMPONENT

MODULE I   INTRODUCTION TO VIRTUAL REALITY   10

Introduction . Goals and VR definitions . History of VR and AR . The Graphics Pipeline and OpenGL: Overview and Transformations . Rotation, Translation, Scaling, Modelview matrix, and Projection matrix . Lighting and Shading with GLSL . Stereo Rendering - Human visual system

MODULE II   VI: TRACKING SYSTEMS & VR INTERFACES   10

Orientation tracking . Tilt drift correction . Yaw drift correction . Tracking with a camera . Perspective n-point problem . Filtering . Lighthouse approach - Evaluation of VR Systems . Interactive techniques in VR . Body track . Hand gesture

MODULE III   VR DEVELOPMENT TOOLS AND FRAMEWORKS   10

Frameworks of Software Development Tools in VR . X3D standard . Vega . MultigEN . VR toolkits . VRML Programming . Augmented reality system - VR technology in Film & TV production . VR technology in physical exercises and games . Demonstration of Digital Entertainment by VR . Emerging Virtual Reality Applications.

LAB COMPONENT - LIST OF EXERCISES

1. Hello, Web GL!
2. Lighting and Shading with GLSL
3. Stereo Rendering, Depth of Field and Anaglyph
4. Build your own HMD
5. Orientation Tracking with IMUs Arduino Programming
6. Pose Tracking
7. VRML Programming
8. Work on augmented reality
9. Demo on Digital Entertainment by VR
10. Case study - Virtual Reality Applications

REFERENCES:

1. John Vince, "Virtual Reality Systems", Pearson Education, First edition, 2007.
2. Burdea, G.C. and P. Coiffet, "Virtual Reality Technology", Second edition, Wiley-IEEE Press, 2003.
3. Sherman, W.R. & A. Craig, "Understanding Virtual Reality: Interface, Application, and Design", Morgan Kaufmann, San Francisco, CA, 2003.
4. Alan B. Craig, William R. Sherman, and Jeffrey D. Will, "Developing Virtual Reality Applications-Foundations of Effective Design", Morgan Kaufmann Publisher, 2012.
5. George Mather, "Foundations of Sensation and Perception", Psychology Press; Second edition, 2009.
6. Peter Shirley, Michael Ashikhmin, and Steve Marschner, "Fundamentals of Computer Graphics", A K Peters/CRC Press; Third edition, 2009.

OUTCOMES:

- Provides students the fundamental knowledge of virtual reality required for their professional career in this field, and applied to various applications such as digital entertainment.
- Apply visual rendering and audio in VR systems in real time standards.
- Design of VR interfaces using interactive techniques.
- Analyze frameworks of Software Development & modeling Tools in VR.

ITBX49	SOFTWARE REQUIREMENTS AND SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the basic concepts of software requirements.
- To learn the software requirements management concepts.
- To learn the basic concepts of software project management and software estimation methods.
- To know the software product estimation techniques.
- To learn how to manage risks and allocate resources for software projects.

MODULE I   INDTRODUCTION TO SOFTWARE REQUIREMENTS   7

The essential software requirement - Good practices for requirements engineering - The

business analyst role - Requirements elicitation - Documenting the requirements

MODULE II   SOFTWARE REQUIREMENTS MANAGEMENT   8
Requirements management practices: Requirements management process - The requirements baseline - Requirements version control - Requirement attributes - Tracking requirements status - Resolving requirements issues - Measuring requirements effort - Managing requirements on agile projects - Why manage requirements? - Change happens - Tools for requirements engineering

MODULE III   PROJECT MANAGEMENT CONCEPT 9 RISK MANAGEMENT   8
Introduction to software project Management - Project evaluation and programme Management - An overview of project planning

MODULE IV   SOFTWARE ESTIMATION & COSTING   8
Selection of an appropriate project Approach - Software effort estimation - Activity planning

MODULE V   RISK MANAGEMENT   7
Risk management - Resource allocation - Monitoring and control - Managing contracts

MODULE VI   PEOPLE MANAGEMENT   7
Managing people in software Environments - Working in teams - Software quality

Total Hours : 45

TEXT BOOKS:
1. McConnell, S. "Software Requirements", 3rd edition, Microsoft Press, 2013.
2. Bob Hughes and Mike Cotterell, "Software Project management", 5th edition, Mc Graw Hill, 2009.

REFERENCES:

1. Adolfo Villafiorita, "Introduction to Software Project Management", CRC Press, 2014.

2. Ashfaque Ahmed, "Software Project Management: A Process-Driven Approach", CRC Press, 2012.

3. Dr. Tuhin Chattopadhyay, "How to Be a Successful Software Project Manager", Partridge Publishing, 2015.

4. Anna P. Murray, "The Complete Software Project Manager: Mastering Technology from Planning to Launch and Beyond", John Wiley & Sons. 2016.

OUTCOMES:
- Students will explain the concepts of software requirements elicitation.
- They will be able to explain how to change and control the requirements.
- Students will know the software project management and software estimation methods.
- They will have capability to prepare project plan.
- Students will be ready to identify and analyze risks.
- They will express how to manage people.

ITBX50	DATA WAREHOUSING, DATA MINING AND DATA MINING TOOLS	L	T	P	C
		3	0	2	4

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 provide knowledge on data mining tools.

MODULE I   INTRODUCTION TO DATA WAREHOUSING   7

Need for Data warehousing - Operational database systems vs Data warehouses - Data warehouse architecture . Data warehousing components - A Multidimensional data model - Need for OLAP- OLAP Operations . Types of OLAP servers.

MODULE II   DATA PREPARATION AND CONCEPT DESCRIPTION   6

Data Collection and Pre-processing . Outliers - Mining Outliers - Missing Data - Types of Data - Computing Distance - Data Summarising Using Basic Statistical Measurements - Displaying Data Graphically - Multidimensional Data Visualisation - Data Integration and Transformation - Concept hierarchy.

MODULE III   ASSOCIATION RULE MINING   7

Introduction . Basics - The Task and a Naïve Algorithm - The Apriori Algorithm - Improving the Efficiency of the Apriori Algorithm - Apriori-TID - Direct Hashing and Pruning - Dynamic Itemset Counting - Mining Frequent Patterns without Candidate Generation - Performance Evaluation of Algorithms -

MODULE IV   CLASSIFICATION   7

Decision Tree - Building a Decision Tree· The Tree Induction Algorithm- Split Algorithm Based on Information Theory - Split Algorithm Based on the Gini Index - Overfitting and Pruning - Decision Tree Rules - Decision Tree Summary - Naïve Bayes Method - Estimating Predictive Accuracy of Classification Methods . Improving Accuracy of Classification Methods - Other Evaluation Criteria for Classification Methods - Classification Software -

MODULE V   CLUSTER ANALYSIS   8

Desired Features of Cluster Analysis - Types of Cluster Analysis Methods - Partitional Methods - Hierarchical Methods - Density-Based Methods - Dealing with Large Databases - Quality and Validity of Cluster Analysis Methods - Cluster Analysis Software -

MODULE VI   ADVANCED CLUSTER ANALYSIS ANS DATA MINING TOOLS   10

Probabilistic Model-Based Clustering . Clustering High-Dimensional Data . Clustering Graph and Network Data . Clustering with Constraints . Trends and social impacts of data mining . Introduction to WEKA tool . Introduction to R.

Theory: 45

Practical Session:

1. Prepare data warehouse for mobile user.

2. Perform OLAP operations

3. Calculate overall statistics such as distribution of mobile users over gender-age groups, distribution of used smartphone brands, distribution of app-category-usage

4. Preprocess data and extract meaningful features

5. Prepare a recommendation system for online shopping

6. Clustering of music files and automatic playlist generation

Note: Use R Tool or Weka Tool.

Lab: 30

Total Hours : 45 + 30 = 75

TEXT BOOKS:

1.   Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Elsvier Inc., 2012.
2.   G.K. GUPTA, "Introduction to Data Mining with Case Studies", Third Edition, PHI Learning Private Limited, 2014.
3.   Yanchang Zhao, Yonghua Cen, "Data Mining Applications with R", Academic Press, 2014.

REFERENCES:

1.   Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining", Pearson Education,New Delhi, 2007.

2.   Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2007.

3.   Gupta K, "Introduction to Data Mining with Case Studies", PHI Learning Private Ltd, New Delhi, 2011.

4.   Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

OUTCOMES:

   On successful completion of the course, the students will be able to
   - Explain the concept of data warehousing

   - Preprocess the data

   - Discuss the association rule mining

   - Cluster and classify the given data

   - Demonstrate the data mining tools

ITBX51   **CLOUD MIDDLEWARE TOOLS**   **L   T   P   C**

OBJECTIVES:
- To understand the data centre resources in cloud middleware environment.
- To implement creation of virtual machines and accessing cloud services.
- To create virtual machines with different operating systems using open source middleware technologies.
- To design and access private, public and hybrid clouds.
- To analyze various cloud middleware tools and their functionalities.

THEORY COMPONENT

MODULE I   INTRODUCTION   7

Introduction to Physical and Virtual Machine resources . Virtualization . Hypervisor - Data Center - Cloud Services - IaaS, PaaS, SaaS, Operating systems - Virtual Appliances . vApps & AppV.

MODULE II   PRIVATE, PUBLIC AND HYBRID CLOUD   8

Private Cloud Tools - VMware workstation, VirtualBox, VMware vCenter Convertor, vApps, Open Source Cloud Middleware Tools & Technologies - Eucalpytus, OpenNebula, and Openstack Cloud IaaS, Public Cloud - Amazon EC2, Hybrid Cloud, Oracle Fussion.

LAB COMPONENT - LIST OF EXERCISES
1. Study of Physical Machine & virtual machines resources
2. Creation of Virtual Machines using VMware workstation, VirtualBox, VMware vCenter Convertor
3. Virtual Appliances - vApps & AppV
4. Creating Windows and Ubuntu virtual data centers using Eucalpytus and OpenNebula-Open Source Middleware technology.
5. Cloud service provisioning - IaaS, PaaS, SaaS
6. Openstack Cloud IaaS solution-nova, neutron, cinder, glance, swift
7. Amazon EC2
8. Hybrid cloud
9. Cloud Middleware Integration Consulting - .NET/JAVA· SOAP/REST

10. Database Middleware Automation
11. Oracle Fussion Middleware

Total Hours : 45

OUTCOMES:

- Analyze physical and virtual machines management in remote cloud servers.
- Design virtual machines using various hypervisors and cloud middleware products.
- Demonstrate Windows and Ubuntu virtual machines using open source middleware technologies.
- Identify and evaluate private, public and hybrid clouds and IaaS, PaaS, SaaS service provisioning.
- Build cloud platform for digital business.

ITBX52	BIG DATA TOOLS AND TECHNOLGIES	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To make the students familiar with Hadoop distributed file system and can learn how to configure Hadoop.
- To install and configure various tools in hadoop ecosystem.
- To provide a complete knowledge about Hadoop echo system with key components like Pig, Hive and Sqoop.
- To Install Apache Spark and explore the components in it.

List of exercises:

1. Introduction to HDFS and Hadoop Ecosystem. Configuration and Installation of Hadoop 1.0 Single node with Name node and Data node.
2. Implementation and configuration of Hive in Hadoop ecosystem for querying.
3. Implementation of Pig using Hadoop Ecosystem for processing structured Data.
4. Implementation of Sqoop for transferring schema format to NOSQL format.

5. Configure Flume and Working flume for logdata.
6. Install HDFS 2.0 and explore YARN for scheduling.
7. Apache Spark Installation and implementation of simple programs in it.
8. Connect MongoDB with Hadoop as store data from MongoDB to HDFS.
9. Connect MYSQL with Hadoop and store data form MYSQL to HDFS
10. Work With RANGER and configure Hadoop for security features.
11. Install IBM BigInsights, hortonworks HDP on virtual machines
12. Working with AWS nodes. Creation of Virtual machines in AWS and   Amazon S3.

Total Hours : 45

OUTCOMES:

Upon Completion of this course the student will be able to

- Demonstrate single node and multinode Hadoop 1.0 and 2.0 with installation and configuration.
- Compute the dataset with different tools in hadoop ecosystem.
- Analyze Hadoop Ecosystem using simple components like Pig, Hive and Sqoop.
- Exploring Apache Spark and analyzing the components in it.

ITBX54	**HYBRID APPLICATION DEVELOPMENT**	**L**	**T**	**P**	**C**
		1	**0**	**2**	**2**

OBJECTIVES:
- ″ To know the importance of hybrid applications.
- ″ To learn the fundamentals of hybrid application development.
- ″ To develop simple hybrid applications using AngularJS.

THEORETICAL STUDY

HYBRID APPLICATION DEVELOPMENT   **15**

Introduction - Computing eras & current mobile wave - Platforms, Frameworks & Tools - Hybrid frameworks, web tech, web APIs (backend) - The stack . HTML5/CSS3/AngularJS - Ionic . AngularJS and native-like . Phonegap.

JS Basics - JS Frameworks - AngularJS Intro - Ionic Framework, Why Ionic? - Ionic 1 / 2 - NodeJS / NPM - Data Binding & Filters - Module, Controller & Views . Directives . Services . Routing - Angular JS 2 changes . Components . Typescript - Working with Angular code.

Project Structure - Application Logic - Screen Templates - Ionic components - Navigation Stack - Application structure and screens - Integrating the screens - Component customization - Working with Web APIs - Integrating Device Features.

LABORATORY PRACTICE   **30**

- Developing Simple Hybrid Applications using AngularJS (4 exercises)
- Hybrid application development in AngularJS. (Students can select their own problem to develop an Application)

  Sample applications
    - Simple Conversion Apps
    - ToDo App
    - Employee Directory
    - Tourism App
    - Games

Total Hours : 45

OUTCOMES:

On completion of the course students will be able to :
- Create mobile apps with HTML, JavaScript, and CSS.
- Describe the components and structure of a hybrid application development frameworks (Ionic, phonegap, etc.) and learn how and when to apply the different components to develop a working system.

- Design complex interfaces with Ionic's UI controls.
- Build once and deploy for both iOS and Android.
- Design, implement and deploy hybrid applications using an appropriate software development environment.

REFERENCES:

1. Chris Griffith, "Mobile App Development with Ionic", O'Really Media, Inc. 2017
2. Asep Edi Kurniawan, "Mobile App Development with Angularjs and Ionic", Leanpub 2015.
3. Jeremy Wilken, "Ionic in Action: Hybrid Mobile Apps with Ionic and AngularJS", Manning Publication 2015.
4. Vinci Rufus, "AngularJS Web Application Development Blueprints", Packt Publishing 2014.

SEMESTER – VIII

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.

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.

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.

Total Hours : 45

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.

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.

Total Hours :45

GEBX01   **DISASTER MANAGEMENT**   L T P C
                                                    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 - Micellarnanoparticles.

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.

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:
The objective of this course is to impart students knowledge about the basics and applications of various appropriate technologies in civil engineering field.

MODULE I   BASICS CONCEPTS   7
Background, 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   8
                  REFERENCE TO BUILDING DESIGN**
Appropriate Building Materials, Appropriate Energy Saving Techniques, Water Conservation (Indoor), Rain Water Harvesting

**MODULE III   WATER, HEALTH AND SANITATION   8
                   MANAGEMENT**
Water Storage: Designing Dams and Pipelines, Appropriate Selection for Sanitation Technique, Sewerage, Communal Health and Waste Water Recycling

MODULE IV   WASTE MANAGEMENT   7
Types of Waste - Sources - Collections and on-site Processing -Transferring Stations - Disposal Systems - Recycling

MODULE V   ENERGY EFFICIENT TECHNIQUES   8

Green building concepts - Renewable Energy Sources - Solar . Steam and wind - Biofuels - Biogas . Electricity.

MODULE VI   TECHNOLOGY POLICY   7
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, 1st Edition, Academic Press, inc. Orlando, FL, USA, 1998.
2   Ken Darrow and Mike Saxenian, Appropriate Technology Sourcebook, Village Earth, USA, 2000.

REFERENCES:

1   Richard Heeks, Technology and Developing Countries: Practical Applications Theoretical Issues, Lead Editor, 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   INTRODUCTION 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**   **L T P C**
AND SIMULATION   **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

REFRENCES:

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 Managers 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

TEXT BOOK:

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.

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.

GEB X18 **TRANSPORT MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the transport fleet and their related activities for minimizing operational cost.
- To understand the need of maintenance and its importance.
- To understand the functions and applications of various types of transport system.

MODULE I   INTRODUCTION   7

Personnel management; objectives and functions of personnel management, psychology, sociology and their relevance to organization, personality problems. Selection process: job description, employment tests, interviewing, introduction to training objectives, advantages, methods of training, training procedure, psychological tests.

MODULE II   ORGANISATION AND MANAGEMENT   7

Forms of Ownership . principle of Transport Management . Staff administration . Recruitment and Training . welfare . health and safety. Basic principles of supervising. Organizing time and people. Driver and mechanic hiring - Driver checklist - Lists for driver and mechanic - Trip leasing - Vehicle operation and types of operations.

MODULE III   TRANSPORT SYSTEMS   9

 Introduction to various transport systems. Advantages of motor transport. Principal function of administrative, traffic, secretarial and engineering divisions. chain of responsibility, forms of ownership by state, municipality, public body and private undertakings.

MODULE IV   SCHEDULING AND FARE STRUCTURE   8

Principal features of operating costs for transport vehicles with examples of estimating

the costs. Fare structure and method of drawing up of a fare table. Various types of

fare collecting methods. Basic factors of bus scheduling. Problems on bus scheduling.

MODULE V   MOTOR VEHICLE ACT   7

Traffic signs, fitness certificate, registration requirements, permit insurance, constructional regulations, description of vehicle-tankers, tippers, delivery vans, recovery vans, power wagons and fire fighting vehicles. Spread over, running time, test for competence to drive.

MODULE VI   MAINTENANCE   7

Preventive maintenance system in transport industry, tyre maintenance procedures. Causes for uneven tyre wear; remedies, maintenance procedure for better fuel economy, Design of bus depot layout.

Total Hours: 45

TEXT BOOKS:

      1. John Duke, "Fleet Management", McGraw-Hill Co, USA, 1984.
      2. Kitchin.L.D., "Bus Operation", III edition, Illiffee and Sons Co., London, 1992

REFERENCE:

      1. Government Motor Vehicle Act, Publication on latest act to be used as on date.

OUTCOMES:

Upon completion of the course, students will
- Know about different aspects related to transport system and management.
- Features of scheduling, fixing the fares
- Know about the motor vehicle act and maintenance aspects of transport.

GEBX19   ADVANCED OPTIMIZATION TECHNIQUES   L T P C

3 0 0 3

OBJECTIVES:

- To introduce the various advanced optimization tools.

- To provide an understanding to deal with ill identified and fuzzy problems.

MODULE I   INTRODUCTION   7

Review of conventional optimization techniques - limitations - limitation of exhaustive search - need for artificial intelligence - bio mimicking methods

MODULE II   HEURISTICS METHODS   8

Introduction . Advanced methods of algorithm design: Greedy method, Backtracking method, Divide and Conquer method . Dynamic programming . Heuristics exploration algorithms . Greedy search - Local search . Hill climbing . Tabu search . Gradient search . Beam search . Simulated Annealing

MODULE III   GENETIC ALGORITHM   7

Introduction - Basics of GA . Population . Reproduction . Cross over . Mutation - genetic algorithms in search, optimization and machine learning- practical genetic algorithms

MODULE IV   ANT COLONY OPTIMIZATION   8

Introduction: Ant Colony Optimization . Meta-heuristic Optimization . History . The ACO Meta-heuristic . ACO Algorithms: Main ACO . Ant system . Ant colony system . Max-Min Ant system . Applications: Routing in telecommunication networks . Travelling salesmen . Graph Coloring . Advantages & Disadvantages

MODULE V   FUZZY LOGIC AND ANN   8

Fuzzy logic, knowledge representation and inference mechanism . Fuzzy and expert control . standard Takagi-Sugeno mathematical characterizations . Design example . Biological foundations to intelligent systems: Artificial neural networks, Back-propagation networks, Radial basis function networks, and recurrent networks.

MODULE VI   IMPLEMENTATIONS & APPLICATIONS   7

Reduction of size of an optimization problem . multilevel optimization . parallel processing . multi objective optimization . Job shop scheduling . Vehicle scheduling . Line balancing . Sensor integration.

REFERENCES:

1. SingiresuS.Rao, "Engineering optimization . Theory and practices", John Wiley and Sons, 1996.
2. Ravindran . Phillips . Solberg, "Operations Research . Principles and Practice", John Wiley and Sons, 1987.
3. Fredrick S.Hillier and G.J.Liberman, "Introduction to Operations Research", McGraw Hill Inc. 1995.
4. Kalymanoy Deb, "Optimization for Engineering Design",PHI,2003
5. Christos H. Papadimitriou, Kenneth Steiglitz, Combinatorial Optimization, PHI 2006

OUTCOMES:

At the end of the course student will be able to

1. Formulate a real life situation as an optimization the problem.

2. Identify the appropriate solution methodology and provide a solution

GEB X20	PLANT ENGINEERING	L T P C
		3 0 0 3

OBJECTIVES:

- To provide in depth knowledge on Plant Engineering
- To introduce detail engineering and P&ID
- To learn about the support to Instrumentation from other disciplines
- To study about the Installation and commissioning

MODULE I   INTRODUCTION OF PLANTS   7

General Project Cycle . Feed . Sales - Plant Description, Component / Areas of Plant, Plant Layout, Plant Interfaces, Plant Location

MODULE II   ELEMENTS OF PLANT   8

Main Elements of a Plant, Process Flow Scheme (PFD . Process Flow Diagram) P&IDc, Plant Legend Finalization.

MODULE III   DETAIL ENGINEERING   10

P& ID Development with PFDc, Major Discipline Involvement & Inter discipline Interaction, Major Instrumentation & Control Systems - Development Phase . Instrument List , I/O Count, Specification Sheets, Instrument Installation (Hook ups) , Control Philosophy . Detail Engineering.

MODULE IV SUPPORT FROM OTHER DISCIPLINE   8

Other Discipline Supports to Instrumentation . Plot Plan, Piping / Equipment Plan, Electrical Area Classification, Fire Hazardous Classification Telecommunication Systems - Control Network architecture

MODULE V   INSTALLATION AND COMMISSIONING   7

Plant Construction - Key Drawings for Construction Support Construction Activities, System Testing, Startup / Commissioning, Production.

MODULE VI CASE STUDIES   5

Case studies of Water Treatment Plant - Paper Industry . Power Plant etc.

                                                      Total Hours: 45

REFERENCES :

1.   Duncan C. Richardson, Plant Equipment and Maintenance Engineering Handbook, McGraw-Hill Education: New York, Chicago, San Francisco, Athens, London, Madrid, Mexico City, Milan, New Delhi, Singapore, Sydney, Toronto, 2014 McGraw-Hill Education

2. Gabriel Salvendy, Handbook of Industrial Engineering - Technology and operations management, John Wiley & Sons, 2001

3. Robert C Rosaler, Standard Handbook of Plant Engineering, McGraw-Hill third edition, 2004.

4. R. Keith Mobley, Plant Engineer's Handbook, Technology and Engineering, 2001

OUTCOMES:

At the end of the course, the student will be able to
- Review and correct P&IDs
- Do installation and commissioning of new plants
- Apply plant engineering in design and maintenance of water treatment plant / power plant etc

ITBX42	CLOUD FORENSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:
- Gain knowledge on fundamental concepts of cloud forensics
- Apply appropriate skills and knowledge in solving cloud forensics investigation.
- Apply theoretical and practical knowledge in forensic computing into the future.
- Familiarize the basics of Digital Forensics.
- Analyze the legal, ethical and professional issues in Cyber Crime.
- Know the technological aspects of Incident Response.

MODULE I   INTRODUCTION TO CLOUD FORENSICS   9
History of Forensics . Cloud Forensic Flaws and Risks . Rules of Cloud Forensics . Legal issues . Digital Forensic Principles . Digital Environments . Digital Forensic Methodologies - Forensics Software and Hardware tools.

MODULE II   AN OVERVIEW OF CLOUD FORENSICS INVESTIGATION   8
Router Forensics and Network Forensics . An overview of Routers . Hacking Routers . Investigating Routers . Investigating Wireless Attacks . Basics of wireless . Wireless Penetration Testing . Direct Connections to Wireless Access Point . Wireless Connect to a Wireless Access Point.

MODULE III   DIGITAL FORENSICS   9
Introduction . Evidential potential of digital devices: closed vs. open systems, evaluating digital evidence potential- Device handling: seizure issues, device identification, networked devices and contamination - Seven element security model- developmental model of digital systems- audit and logs- Evidence interpretation: Data content and context.

MODULE IV   NETWORK FORENSICS   6
Collecting Network Based Evidence - Investigating Routers - Network Protocols - Email Tracing - Internet Fraud.

MODULE V   SYSTEMS INVESTIGATION AND ETHICAL ISSUES   6
Data Analysis Techniques - Investigating Live Systems (Windows &Unix) - Investigating Hacker Tools - Ethical Issues . Cybercrime.

MODULE VI   INCIDENT AND INCIDENT RESPONSE   7
Introduction to Incident - Incident Response Methodology . Steps - Activities in Initial Response Phase after detection of an incident.

Total Hours : 45

REFERENCES:
1. Anthony Reyes, Jack Wiles, "Cybercrime and Digital Forenscis", Elsevier Publications, 2007.
2. John Sammons, "The Basics of Digital Forensics", Elsevier, 2012.
3. Linda Volonins, Reynalds Anzaldua, "Computer Forensics for dummies", Wiley Publishing 2008.
4. Norbert Zaenglein, "Disk Detective: Secret You Must Know to Recover Information From a Computer", Paladin Press, 2000.
5. Bill Nelson,Amelia Philips and Christopher Steuart, "Guide to computer forensics and investigations", course technology, Cengage Learning; 4thedition, ISBN: 1- 435-49883-6, 2009.
6. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGrawHill, 2006.

OUTCOMES:
Upon completion of this program, students will be able to:
- Have a fundamental understanding of Cloud Forensics and how resultant evidence can be applied within legal cases.
- Distinguish various types of Cloud crime, and use cloud forensic techniques to identify the digital fingerprints associated with criminal activities.
- Understand why Digital forensics is important for any modern organization. Gained theoretical knowledge in digital forensic investigations.
- Know how to apply forensic analysis tools to recover important evidence for identifying cloud crime.
- Identify and apply current practices for data discovery recovery and acquisition.
- Understand financial and accounting forensics, and explain their role in preventing various forms of fraud.

ITBX53	FORENSIC TOOL KITS	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To understand Cyber Forensics, Digital evidence and Investigation process.

- To become familiar with Computer forensics toolkits (FTK).
- To analyze the components of the Encase forensic software environment, evidence and configuration files.
- To explore methods of data storage and forensic recovery using Access Data Software.

LIST OF EXERCISES:

1. Study of computer forensic toolkits like CyberCheck Suite (C-DAC), FTK, Helix, The Coroner's Toolkit (TCT), ProDiscover.
2. Working in Windows and Linux Environment: Study of various commands in Linux like Encryption and Decryption, message digest etc.
3. Exploring Encase software.
4. Email Forensics - Tracing E. mail. Finding senders IP Address of received e. mail, tracing route of e. mail received using tools available on internet using Visual Trace Route.
5. Locate a deleted mail using Forensic Tool Kit.
6. Storage media forensics.
7. Image Analysis & Steganography using tools like Merge Streams, Image Hide, Stealth Files, Blindside, Stools.
8. Network Forensics Analysis . Capture and analyze network traffic using network traffic/data capturing/monitoring tools like NetWitness, Windump, Network Flight Recorder.
9. Digital evidence imaging using R-Drive Imag, Drive Image Pro.

Total Hours : 45

OUTCOMES:

- To do the cross validation of computer forensic case data using Encase Access Data and computer forensic tools.
- Analyze the storage media forensics and email forensics.
- The ability to quantitatively assess and measure threats and forensic challenges to information assets.
- Analyze network forensic analysis using capturing and monitoring tools.
- To protect data assets against attacks from the Internet and investigate and mitigate data risk.

ITBX55	NEXTGEN TECHNOLOGIES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concepts of Next Generation Technologies like Cloud, Big Data, IoT and Social Media and Mobility, Machine learning, Artificial Intelligence and their impact on the industry.

- To study the concepts of cloud architecture and various services, technologies offered in Cloud, Big Data (Hadoop), Data Sciences, Data analyzing techniques, Structured data, Unstructured data.
- To learn the concepts of social media and how social Media is used for business
- To understand the development of various mobile platforms, mobile apps and their operating systems.
- To discuss IoT, IPV6, and future of IoT and its uses across various industries.
- To acquire knowledge of AI . Machine Learning Algorithms and uses of AI in the various industries.

Prerequisites: Programming in Python, Java Programming, Computer Programming

MODULE I   INTRODUCTION TO NEXT GENERATION TECHNOLOGIES   7

Introduction . Next-Generation Sequencing Technology . Computing Technology - Cloud Computing, Data Science Technology - Big Data, Internet of Things (IoT), Social Media and Mobility, Machine Learning-Artificial Intelligence (AI) . Diverse applications.

MODULE II   CLOUD & BIG DATA   8

Cloud architectural overview . Cloud deployment models . Cloud service models . Cloud platforms . Managing data in the cloud . Computing in the cloud . Data Analytics in the cloud . Amazon Elastic Compute Cloud . Privacy and Security in Cloud . Data Visualization - Big data value for the enterprise . Structured and Unstructured data - Hadoop components . HDFS . Map reduce.

MODULE III   SOCIAL MEDIA   7

Digital Social Media . Microblogging . Customer Personas - Social Networks . Social Bookmarking . Social Media Marketing . Social Media Profiling - Video Sharing and Podcasts . Live Streaming . REALLY Framework . Strategy Development . Gamification.

MODULE IV   MOBILE APP DEVELOPMENT   7

Introduction . Mobile Platforms - Andriod Development Environment . XCode, Eclipse, VS2012, PhoneGAP - Multichannel and Multimodel UIs . App store, Google Play, Windows Store - Mobile device application programming interfaces . Android/iOS/Win 8 Survial and basic apps . Impact on business cases.

MODULE V   INTERNET OF THINGS (IOT)   8

Introduction to IoT and Web of Things (WoT) . Business aspects of IoT . Industry domains - Making Things Smart . M2M to IoT - Cloud Computing for IoT - IoT Communication Protocols . IoT services or attributes - Electronics- Sensors . Actuators . Arduino . Raspberry PI . Beagle Bone Black . Electric Imp.

MODULE VI   ARTIFICIAL INTELLIGENCE & MACHINE LEARNING   8

Foundations of AI & Machine Learning . Knowledge representation . Advanced search . Types of learning . Supervised . Unsupervised . Dimensionality Reduction . Machine Learning System Design . Linear model . Distance based model . Tree and Rule models . Support Vector Machines . Neural networks . Robotic Process Automation . Machine learning tools . Octave/Matlab tutorial . A case study . Photo OCR . Game playing . Speech recognition

Total Hours : 45

TEXT BOOKS:

1. Ian Foster, Dennis B.Gannon, "Cloud Computing for Science and Engineering", MIT Press, September 2017.
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, "Cloud Computing Principles and Paradigms", John Wiley & Sons, Inc., Publications, 2011.
3. Michael Minelli, Michele Chambers, Ambiga Dhiraj., "Big Data, Big Analytics, Emerging Business Intelligence and Analytic Trends for Today's Businesses", First Edition, Wiley Publications, 2013.
4. Luttrell, Regina, "Social Media: How to Engage, Share, and Connect", Rowman & Littlefield Publishers, 2016.
5. Jeff McWherter, Scott Gowell, "Professional Mobile Application Development", 2012.
6. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
7. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.

REFERENCE BOOKS:

1. Reto Meier, "Professional Android 4 Development", John Wiley and Sons, 2012.
2. Matt Neuburg, "Programming iOS 5", O'Reilly Media, Inc., 2012.
3. Adrian McEwen & Hakim Cassimally, "Designing internet of things", John Wiley and Sons, 2014.
4. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.

OUTCOMES:

- Describe the concepts of Next Generation Technologies.
- Understand cloud services, Big Data, Data science, Hadoop, and their impact on industry.
- Analyze social media and impact of social media on the business.
- Understand any of the mobile platforms, and mobile programming language.
- Develop skills on IoT technologies and their contact on industry.
- Implement AI & machine learning algorithms for an application and analyze the results.

ITBX56	GAME THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the student to the notion of a game, its solutions concepts, and other basic notions and tools of game theory.
- Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts.
- To formalize the notion of strategic thinking and rational choice by using the tools of

game theory, and to provide insights into using game theory in modeling applications.

- Integrate increasing analytical skills into increasingly complex conflicts.
- To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues.
- To introduce contemporary topics in the intersection of game theory, computer science, and economics.

MODULE I GRAPHICS SYSTEM FOR GAME THEORY 7

Coordinate Systems - Handedness and Cross Products - Points and Vectors . Transformations . Cameras - Culling and Clipping . Rasterizing - Vertex Attributes . Rendering.

MODULE II GAME DESIGN & GAME PROGRAMMING 8

Game Design - Game Writing - Narrative Theory - Story and Character Development - Game play - Creating the Game World - Level Design Human - Computer Interface design - Game Programming Fundamentals - C++ - Java - Scripting Languages.

MODULE III GAMES WITH PERFECT & IMPERFECT INFORMATION 8

Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies - Nash equilibrium - mixed strategy equilibrium . zero sum games - Games with Imperfect Information . Bayesian Games - Extensive Games with Imperfect . Information . Strategies - Beliefs and sequential equilibrium . Illustrations - Repeated Games . The Prisoner's Dilemma . Bargaining.

MODULE IV NON - COOPERATIVE GAME THEORY 7

Non-cooperative Game Theory . Self - interested agents - Games in normal form - Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal - Form Games - Computing Nash equilibrium of two - player, zero - sum games - Computing Nash equilibrium of two - player, general - sum games - Identifying dominated strategies.

MODULE V MECHANISM DESIGN 8

Aggregating Preferences - Social Choice - Formal Model . Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences - Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions.

MODULE VI GAME PRODUCTION AND BUSINESS OF GAMES 7

Game production - Project management - Game industry roles . Economics . Publisher - Developer relationship . Marketing - Intellectual Property rights - Content regulation.

Total Hours : 45

TEXT BOOKS:

1. M. J. Osborne, %An Introduction to Game Theory+ Oxford University Press, 2004.
2. David H. Eberly,   3D Game Engine Design: A Practical Approach to Real-Time

Computer Graphics , Second Edition, Morgan Kaufmann, 2010.

REFERENCES:
1. Jonathan S. Harbour, Beginning Game Programming , Course Technology, Third Edition PTR, 2009.
2. Ernest Adams and Andrew Rollings, Fundamentals of Game Design , Third Edition, Pearson Education, 2014.
3. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer , First Edition, Wiley, 2008.
4. N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani, %Algorithmic Game Theory+, Cambridge University Press, 2007.

OUTCOMES:
- Discuss the notion of a strategic game and equilibrium, and identify the characteristics of main applications of these concepts.
- Communicate game - theoretic ideas and concepts to non - specialist audiences in a language which is accessible and comprehensible.
- Discuss the game with perfect and imperfect information with the use of Nash Equilibrium for other problems.
- Model competitive real world phenomena using concepts from non-cooperative game theory.
- Identify key strategic aspects and based on these be able to connect them to appropriate game theoretic concepts given a real world situation.
- Implement a typical Virtual Business scenario using Game theory applications.

ITBX57	MACHINE LEARNING ALGORITHMS	L	T	P	C
		3	0	0	3

OBJECTIVES:
To enable the students
1. To study the components, models of machine learning.

2. To discuss the various concepts related to supervised and unsupervised learning.

3. To recognize the different types of machine learning models and how to use them.

4. To learn the theoretical and practical aspects of tree and graph models.

5. To acquire the knowledge of reinforcement learning.

6. To discuss various applications in machine learning.

MODULE I   INTRODUCTION TO MACHINE LEARNING   7
Introduction - Component of learning - examples of machine learning applications - Types of machine learning - Mathematical foundations of machine learning - Learning models - Probabilistic models - Logic models - Parametric Models - Non-Parametric Models - Theory of learning - Theory of generalization.

MODULE II   SUPERVISED LEARNING   8

Linear classification - Linear Models for Regression . Univariate linear regression Multivariate linear regression - Bayesian Linear Regression . Linear algebra review - Linear Models for Classification - Discriminant Functions - Probabilistic Generative Models - Probabilistic Discriminative Models. Learning Artificial Neural Networks - Feed-forward Network Functions - Back Propagation Network - Bayesian Neural Network - support vector machines - Ensemble methods.

MODULE III   UNSUPERVISED LEARNING   8
Nearest neighbor models . Clustering - K-means - hierarchical clustering - k-d trees - EM Algorithm- Mixtures of Gaussians - Dimensionality Reduction - Factor analysis - Principal Component Analysis (PCA) - Probabilistic PCA - Independent components analysis (ICA) - Singular Value Decomposition - meta learning.

MODULE IV   TREE AND GRAPHICAL MODELS   8
Decision trees - learning decision trees - regression trees - clustering trees - descriptive rule learning - association rule mining - Graphical Models - Undirected graphical models - Markov Random Fields - Directed Graphical Models - Bayesian Networks - Inference - Learning - Generalization - Hidden Markov Models.

MODULE V   REINFORCEMENT LEARNING   7
Passive reinforcement learning - direct utility estimation - adaptive dynamic programming - temporal-difference learning - active reinforcement learning - exploration - learning an action-utility function - Generalization in reinforcement learning - policy search - applications in game playing - applications in robot control.

MODULE VI   APPLICATIONS   7
Ranking: Priority Inbox - Ordering Email Messages by Priority - Writing a Priority Inbox - Spam Filtering - Analyzing Social Graphs - Social Network Analysis - Hacking Twitter Social Graph Data - Analyzing Twitter Networks - Case Study - Octave/Matlab.

Total Hours : 45

OUTCOMES:

On successful completion of the course, the students will be able to
1. Describe the concepts, components and models of machine learning.
2. Understand and design algorithms for supervised and unsupervised learning.
3. Develop skills by using unsupervised learning techniques.
4. Analyze the efficient tree and graphical models for solving real world problems.
5. Implement reinforcement learning algorithms for an application and analyze the results.
6. Apply the appropriate techniques in social network analysis and web security.

TEXT BOOKS:

1. Ethem Alpaydin, "Introduction to Machine Learning", Third Edition, MIT Press, 2014.

2. Alex Smola and S.V.N Vishwanathan, "Introduction to Machine Learning", Second Edition Cambridge University Press, 2010.