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 COMPUTER SCIENCE AND ENGINEERING

VISION

The vision of the Department of Computer Science and engineering is to impart quality education, inculcate professionalism and enhance the problem solving skills of the students in the domain of Computer Science and Engineering with a focus to make them industry ready, involve in possible areas of research, to pursue and have continual professional growth.

MISSION

- Equip the students with strong fundamental concepts, analytical capability, programming and problem solving skills.
- Create an ambience of education through faculty training, self learning, sound academic practices and research endeavors.
- Facilitate a research culture in the department leading to high quality publications and funded projects.
- To identify potential areas of research and create centre of excellence in those areas.
- Provide opportunities to promote organizational and leadership skills in students through various extra – curricular activities.
- Expose the students to emerging and upcoming technologies through co-curricular events.
- To make the students as for as possible industry ready to enhance their employability in the industries.
- To improve department industry collaboration through internship programme and interaction with professional society through seminar/workshops.
- Imbibe social awareness and responsibility in students to serve the society.

PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES
B.Tech. (Computer Science and Engineering)

The Program Educational Objectives of B.Tech.

- To introduce the fundamentals of science and engineering concepts essential for a computer engineer.
- To inculcate the knowledge of mathematical foundations and algorithmic principles for effective problem solving.
- To provide knowledge in computer science, modeling & design of computer based systems.
- To impart knowledge to analyze, design, test and implement software required for various applications.
- To hone personality skills, trigger social commitment and inculcate societal responsibilities.

Programme Outcomes for B.Tech (CSE)

- **PO1:** Analyse and build models applying the knowledge of mathematics, statistics, electronic, electrical and computer science discipline and solve the problem.
- **PO2:** Identify the sources of information for data collection, design and conduct the experiments and interpret the result.
- **PO3:** Think out-of-the box and solve the real time problems using their creativity in designing human friendly software systems.
- **PO4:** Comprehend computer engineering concepts ofthe new research developments and apply them to develop relevant software and hardware products.
- **PO5:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** Apply the computing knowledge to solve the socially relevant problems.
- **PO7:** Understand the impact of engineering solutions in global, economic, environmental, societal context and apply it in exploring the new developments, research trends and involve them in research.

- **PO8:** Develop professional integrity by understanding and appreciating professional, legal, ethical, cyber security and related issues and act with responsibility.
- **PO9:** Communicate, collaborate and work as a team by involving in the group projects of multi-disciplinary nature.
- **PO10:** To prepare documents as per the standards and present effectively to improve software documentation skills.
- **PO11:** Apply the hardware and software project management techniques to estimate the time and human resources required to complete computer engineering projects.
- **PO12:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

- **PSO1:** Understand, analyze and develop essential proficiency in the areas related to algorithms, system software, multimedia, web design, big data analytics, networking and apply the knowledge to solve practical problems.

- **PSO2:** Apply standard practices and strategies in hardware and software project development using open-ended programming environments for successful career and entrepreneurship.

REGULATIONS 2013 FOR B.TECH. DEGREE PROGRAMMES

(WITH AMENDMENTS INCORPORATED TILL JUNE 2016)

REGULATIONS - 2013 FOR B.TECH. DEGREE PROGRAMMES

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

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

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

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

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

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

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

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

2.0 ADMISSION

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

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

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

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

3.0 BRANCHES OF STUDY

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

B.TECH. DEGREE PROGRAMMES:

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

4.0 STRUCTURE OF THE PROGRAMME

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

i. Basic Sciences (BS)
ii. Humanities & Social Sciences (HS)
iii. Management Sciences (MS)
iv. Engineering Sciences Fundamentals (ESF)
v. Engineering Core Courses (EC)
vi. Professional Electives (PE)
vii. General Electives (GE)
viii. Workshop practice, laboratory work, industrial training, seminar presentation, project work, etc.

4.2 Each course is normally assigned certain number of credits : one

credit per lecture period per week

- one credit per tutorial period per week
- one credit for two to three periods and two credits for four periods of laboratory or practical courses
- one credit for two periods of seminar / project work per week

  one credit for two weeks of industrial training

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

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

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

5.0 DURATION OF THE PROGRAMME

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

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

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

6.0 CLASS ADVISOR AND FACULTY ADVISOR

6.1 CLASS ADVISOR

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

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

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

6.2 FACULTY ADVISOR

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

7.0 COURSE COMMITTEE

Common course offered to more than one discipline or group, shall have a "Course Committee", comprising all the faculty members teaching the common course with one of them nominated as Course Coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Dean (Academic Affairs), depending on whether all the faculty members teaching the common course belong to the same department / different departments.

8.0 CLASS COMMITTEE

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

Committees will be constituted by the respective Head of the Department of the students

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

i. The first semester Coordinator shall be the Chairman of the class committee
ii. Course coordinators of all common courses.
iii. Faculty members of all individual courses.
iv. One male and one female first semester student of each class of B.Tech, program to be nominated by the first semester coordinator.
v. All first semester class advisors and faculty advisors.

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

i. One senior faculty member preferably not teaching to the concerned class, appointed as Chairman by the Head of the Department.
ii. Faculty members of individual courses.
iii. Two students, (preferably one male and one female) of the class per group of 30 students or part thereof, to be nominated by the Head of the Department, in consultation with the faculty advisors.
iv. All faculty advisors and the class advisor of the class.
v. Head of the Department

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

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

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

9.0 REGISTRATION AND ENROLMENT

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

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

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

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

10.1 CHANGE OF A COURSE

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

10.2 WITHDRAWAL FROM A COURSE

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

11.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

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

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

12.0 CREDIT LIMIT FOR ENROLMENT & MOVEMENT TO HIGHER SEMESTER

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

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

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

13.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

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

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

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

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

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

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

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

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

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

14.0 SUBSTITUTE EXAMINATIONS

14.1 A student who has missed, for genuine reasons, a maximum of one of the four assessments of a course may be permitted to write a substitute examination. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accident, admission to a hospital due to illness, etc.

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

15.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

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

The students who do not fulfill the above attendance requirement will not be permitted to write the semester end examination and will not be permitted to

move to next semester. Such students should repeat all the courses of the semester in the next Academic year.

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

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

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

16.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

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

Letter Grade	Grade Points
S	
A	
B	
C	
D	
E	
U	
W	
AB	

"W" denotes withdrawal from the course.

"U" denotes unsuccessful performance in the course. **"AB"** denotes absence for the semester end examination.

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

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

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

16.5 After results are declared, grade sheets shall be issued to each student, which will contain the following details. The list of courses enrolled during the semester including Redo courses, if any, and the grade scored, the Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards. GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

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

$i=1$ *Where n = number of courses* n $\sum_{i=1} C_i$	

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

"W" grades will be excluded for calculating GPA .

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

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

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

However, to be eligible for First Class with Distinction, a student should not have obtained U grade in any course during his/her study and should have completed the U.G. programme within a minimum period covered by the minimum duration plus authorized break of study, if any (clause 11). To be eligible for First Class, a student should have passed the examination in all courses within the specified minimum number of semesters reckoned from his/her commencement of study plus two semesters. For this purpose, the authorized break of study will not be counted. The students who do not satisfy the above two conditions will be classified as second class. For the purpose of classification, the CGPA will be rounded to two decimal places. For the purpose of comparison of performance of students and ranking, CGPA will be considered up to three decimal places.

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

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

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

18.0 PERSONALITY AND CHARACTER DEVELOPMENT

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

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

19.0 DISCIPLINE

19.1 Every student is required to observe disciplined and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

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

20.0 ELIGIBILITY FOR THE AWARD OF DEGREE

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

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

ii. no dues to the Institution, Library, Hostels

iii. no disciplinary action pending against him/her.

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

21.0 POWER TO MODIFY

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

CURRICULUM AND SYLLABI FOR
B.TECH. COMPUTER SCIENCE AND ENGINEERING
(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
* Any one language							**25**

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.	ESF	EEB1281	Introduction to Electrical & Electronics Engineering	3	0	0	3
6.	ESF	CSB1211	Analog and Digital Communication	3	0	0	3
7.	HS	ENB1282	Written Communication	0	0	2	1
8.	ESF	EEB1282	Electrical & Electronics Engineering Lab	0	0	3	1
9.	BS	PHB1284	Physics of Engineering Materials Lab	0	0	2	1

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	CSB2101	Object Oriented Programming	3	0	0	3
4.	EC	CSB2102	Data structures	3	0	0	3
5.	EC	CSB2103	Digital Logic Design	3	1	0	4
6.	EC	CSB2104	Computer Architecture	3	0	0	3
7.	HS	ENB2181	Oral Communication	0	0	2	1
8.	EC	CSB2105	Object Oriented Programming Lab	0	0	3	1
9.	EC	CSB2106	Data Structures Lab	0	0	3	1
10.	EC	CSB2107	Digital Lab	0	0	3	1
							24

SEMESTER IV

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	BS	MAB2285	Discrete Mathematics	3	1	0	4
2.	EC	CSB2211	Database Management Systems	3	0	0	3
3.	EC	CSB2212	Operating Systems	3	0	0	3
4.	EC	CSB2213	Microprocessors and Microcontrollers	3	0	0	3
5.	EC	CSB2214	Principles of Programming	3	0	0	3
6.	BS	LSB2181	Biology for Engineers	3	0	0	3
7.	HS	ENB2282	Confidence Building & Behavioral Skill	0	0	2	1
8.	EC	CSB2215	DBMS Lab	0	0	3	1
9.	EC	CSB2216	Operating System Lab	0	0	3	1
10.	EC	CSB2217	Microprocessor and Microcontroller Lab	0	0	3	1

SEMESTER V

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	EC	CSB3101	Algorithm Design and Analysis	3	0	0	3
2.	EC	CSB3102	Object Oriented Software Engg	3	0	0	3
3.	EC	CSB3103	Computer Networks	3	0	0	3
4.	EC	CSB3104	Theory of Computation	3	0	0	3
5.	MS	MSB3181	Management of Business Organization	3	0	0	3
6.	PE		Professional Elective I	3	0	0	3
7.	HS	ENB3181	Career Building & People Skill	0	0	2	1
8.	EC	CSB3105	Algorithm analysis Lab	0	0	3	1
9.	EC	CSB3106	Case Tools Lab	0	0	3	1
10.	EC	CSB3107	Networks Lab	0	0	3	1

			SEMESTER VI				
Sl.	**Course**	**Course**	**Course Title**	**L**	**T**	**P**	**C**
No.	**Group**	**Code**					
1.	EC	CSB3211	Mobile and Pervasive Computing	3	0	0	3
2.	EC	CSB3212	Introduction to construction	3	0	0	3
3.	EC	CSB3213	Artificial Intelligence	3	0	0	3
4.	BS	GEB3201	Environmental Science and Engineering	3	0	0	3
5.	PE		Professional Elective II	3	0	0	3
6.	PE		Professional Elective III	3	0	0	3
7.	EC	CSB3214	Mobile and Pervasive Computing Lab	0	0	3	1
8.	EC	CSB3215	Compiler Techniques Lab	0	0	3	1
9.	EC	CSB3216	FOSS Lab	0	0	3	1

			SEMESTER VII				
Sl. No.	**Course Group**	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1.	EC	CSB4101	Information Security	3	0	0	3
2.	EC	CSB4102	Data Mining & Warehousing	3	0	0	3
3.	EC	CSB4103	Distributed Computing	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	CSB4104	Mini Project	0	0	3	1
8.	EC	CSB4105	Information Security Lab	0	0	3	1
9.	EC	CSB4106	Data Mining & Tools Lab	0	0	3	1
10.	EC	CSB4107	Mobile Application Development Lab	0	0	3	1
							22

			SEMESTER VIII				
Sl. No.	**Course Group**	**Course Code**	**Course Title**	**L**	**T**	**P**	
1.	PE		Professional Elective VI	3	0	0	
2.	GE		General Elective II	3	0	0	
3.	EC	CSB4211	Project	0	0	18	9
				Total Credits: 175			

PROFESSIONAL ELECTIVES

Sl. No.	Course Group	Course Code	Course Title				
1	PE	CSBX01	Network Management				
2	PE	CSBX02	High Speed Networks				
3	PE	CSBX03	Graph Theory				
4	PE	CSBX04	Mobile Ad Hoc Networks				
5	PE	CSBX05	Wireless Sensor Networks				
6	PE	CSBX07	Routing Protocols				
7	PE	CSBX08	Cloud Computing				
8	PE	CSBX09	TCP/ IP				
9	PE	CSBX10	Embedded Systems				
10	PE	CSBX11	Hacking Techniques				
	PE	CSBX12	Bio Inspired Computing				
12	PE	CSBX13	Cyber Forensics				
13	PE	CSBX14	Mobile Computing Technologies				
14	PE	CSBX15	Internet of Things				
15	PE	CSBX16	Complex Networks				
16	PE	CSBX17	Mobile Commerce				
17	PE	CSBX18	Service Oriented Architecture				
18	PE	CSBX19	Web Engineering				
19	PE	CSBX20	Internet Technologies				
20	PE	CSBX21	Game Theory				
21	PE	CSBX22	Introduction To Big Data				
22	PE	CSBX23	Xml And Web Services				
23	PE	CSBX24	Information Retrieval				

24	PE	CSBX25	Natural Language Processing
25	PE	CSBX26	Clustering Techniques
26	PE	CSBX27	Knowledge Engineering
27	PE	CSBX28	Visualization Techniques Q
28	PE	CSBX29	Data Warehousing And Business Intelligence
29	PE	CSBX30	Web Mining
30	PE	CSBX31	Content Management And Web Publishing
31	PE	CSBX32	Software Requirements Engineering
32	PE	CSBX33	Software Testing Techniques
33	PE	CSBX34	Software Agents
34	PE	CSBX35	User Interface Design
35	PE	CSBX36	Pattern Recognization
36	PE	CSBX37	Foundations On Software Quality Assurance
37	PE	CSBX38	Software Development Methodologies
38	PE	CSBX39	Computer Graphics
39	PE	CSBX40	Foundation Of Project Management
40	PE	CSBX41	Software Process Model
41	PE	CSBX42	Software Maintenance
42	PE	CSBX43	Software Design Patterns
43	PE	CSBX44	Social Network Analysis
44	PE	CSBX46	Nosql Database
45	PE	CSBX47	Multicore Architecture
46	PE	CSBX48	Virtualization Techniques
47	PE	ECB3101	Digital Signal Processing

48	PE	CSBX49	Video Analytics
49	PE	CSBX50	Multimedia And Animation

GENERAL ELECTIVES

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

SEMESTER I

MAB1181 ALGEBRA, GEOMETRY AND CALCULUS

L	T	P	C
3	1	0	4

OBJECTIVES:

The course is aimed at

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

MODULE I MATRICES 8

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

MODULE II VECTOR ALGEBRA 6

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

MODULE III THREE DIMENSIONAL ANALYTICAL GEOMETRY 8

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

MODULE IV DIFFERENTIAL GEOMETRY 7

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

MODULE V MULTI-VARIATE FUNCTIONS 8

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

MODULE VI ORDINARY DIFFERENTIAL EQUATIONS 8

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

Total Hours : 60

TEXT BOOKS:

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

REFERENCES:

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

OUTCOMES:

On completion of the course the students will be able to

- Solve Eigenvalue and Eigenvector problems.
- Solve three dimensional geometry problems.
- Use differential calculus for solving problems pertaining to engineering applications.

ENB1181 ENGLISH L T P C

3 0 0 3

OBJECTIVES:

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

MODULE I BASIC LANGUAGE SKILLS AND GRAMMAR 4

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

MODULE II LISTENING 8

Listening to BBC radio plays and VOA special lessons to teach Phonetics, accent and intonation of spoken English Appreciation and critical review of popular movies like ‘My Fair Lady’, ‘Sound of Music’. (Excerpts from the movies) - Historical/popular speeches made by Winston Churchill, Abraham Lincoln (Gettysberg’s Address), Swami Vivekananda.

MODULE III SPEAKING 8

(a) Self introduction – pair work – introducing one another – short conversations – exchanging opinions – agreement /disagreement
(b) Short presentation (extempore speech) based on visuals – Personal narrations

MODULE IV READING 8

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

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

MODULE V CREATIVE WRITING 8

(a) Writing slogans for Advertisements

(b) Writing descriptive paragraphs based on visuals

MODULE VI ENGLISH FOR ACADEMIC AND BUSINESS PURPOSES 9

a. English for academic purpose: letters to the editor, letter seeking permission for industrial visit, letter inviting a dignitary for technical symposium
b. English for Business purpose: Telephone etiquette – telephone conversations – taking and leaving phone messages.

Total Hours: 45

REFERENCES:

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

OUTCOME:

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

FRB1181 FRENCH

	L	T	P	C
	3	0	0	3

OBJECTIVES:

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

DOSSIER 0 FENÊTRE SUR… 7

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

DOSSIER 1 LES UNS, LES AUTRES…. 12

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

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

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

DOSSIER 2 ICI /AILLEURS 12

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

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

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

L'acte de parole

14

DOSSIER 3 SOLO OU DUO

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

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

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

L'acte de parole

L'examen oral

Total Hours: 45

TEXT BOOK:

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

OUTCOMES:

On completion of the course,

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

ISB1181	ARABIC	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

MODULE I PREPARATORY ARABIC **7**

Introducing Arabic Alphabets.

Listening and Reading.

Audio & Video aided listening, Tajweed listening,

Writing Arabic Alphabets (connected & unconnected).

Introducing words.

Reading simple sentences.

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

Exercises.

MODULE II FUNCTIONAL ARABIC **7**

Listening Arabic texts, stories and action verbs

Communicating Simple sentences.

Jumla' Ismiyya and Jumla' Fi'liyya

Situational Conversation:

Greetings, Introduction.

Classroom, College, Picnic.

Dining and Kitchen.

Reading skills.

Exercises

MODULE III FUNCTIONAL ARABIC **8**

Implication of effective listening.

Audio aids.

Writing Simple sentences.

Communicating ordinal and cardinal numbers.

Situational communication:

Playground, library.

Forms of plural – Sample sentences.

Introduction to tenses.

Exercises.

MODULE IV FUNCTIONAL ARABIC **8**

Communication:

Family, travel

Market, Prayer hall

Writing skills:

Note making.

Sequencing of sentences.

Developing answers from the questions.

Exercises.

MODULE V TECHNICAL ARABIC **8**

Importance of technical communication.

Reading and writing skills.

Audio & Video aided listening.

Introduction to Arabic terms related to administration.

Situation communication:

Air travel, Office administration, passport,

visa.

Exercises.

MODULE VI TECHNICAL ARABIC 7

Situation communication:

Contractual work, machineries and equipments..

Computer, internet browsing.

Banking,

Exercises.

Total Hours: 45

TEXT BOOK:

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

REFERENCES:

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

OUTCOMES:

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

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

PHB1181	PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

MODULE I PROPERTIES OF MATTER 7

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

MODULE II CRYSTAL PHYSICS 6

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

MODULE III QUANTUM PHYSICS 7

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

MODULE IV WAVE OPTICS 9

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

MODULE V LASER & FIBRE OPTICS **9**

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

MODULE VI ULTROSONICS AND NDT **7**

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

Total Hours: 45

TEXT BOOKS:

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

REFERENCES:

1. Uma Mukherji, "Engineering Physics", Narosa Publishing House, New Delhi, 2007.
2. Charles Kittel, "Introduction to solid state physics", 7th Edition, John Wiley & sons (ASIA) Pvt. Ltd, 2008.
3. Avadhanulu M.N., "Engineering Physics", 1st Edition, S.Chand & Company Ltd., New Delhi, 2007.
4. Schiff, "Quantum Mechanics", 3rd Edition, Tata McGraw-Hill Education, 2010.
5. Rajendran V. and Marikani A., "Applied Physics for Engineers", 3rd Edition, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 2003.
6. William T. Silfvast, "Laser Fundamentals", 2nd edition, Cambridge University Press, 2004.
7. Arumugam M., "Engineering Physics", 5th Edition, Anuradha Agencies, 2003.

OUTCOMES:

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

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

CHB1181	CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To make students conversant with the

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

MODULE I WATER TECHNOLOGY 8

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

MODULE II ENGINEERING MATERIALS 8

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

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

Nanomaterials: Definition – types of Nanomaterials; nanofilms, nanowires, carbon nanotubes, quantum dots and fullerenes (C_{60}) – Size and shape dependent optical, electrical, thermal and mechanical properties; Synthesis of nanomaterials – Top down and bottom up approach; Applications of nanomaterials – Catalysis, Electronics and Telecommunication, Medicines, Composites and Energy.

MODULE III ELECTROCHEMISTRY AND CORROSION 9

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

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

MODULE IV CHEMISTRY OF POLYMERS 6

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

MODULE V SPECTROSCOPY 9

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

MODULE VI GREEN CHEMISTRY 5

Introduction – Significance – Industrial applications of green chemistry; Green technology – Latest green laboratory technique for saving experimental resources and infrastructural framework; Principles of green chemistry – R4M4 model (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking, Multi-tracking) – Life cycle analysis technique (cradle to grave approach)

Total Hours: 45

TEXT BOOKS:

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

REFERENCES:

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

OUTCOMES:

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

- Estimate the degree of hardness in water; solve related problems and treatment methods for potable water.
- Select materials for specific engineering applications.
- Use electrochemistry principles to understand the mechanism of corrosion.
- Analyze trace quantity of metals using instrumental methods.
- realize the need of green practices in industries.

GEB1101 ENGINEERING GRAPHICS

	L	T	P	C
	2	**0**	**3**	**3**

OBJECTIVES:

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

MODULE I BASICS AND ENGINEERING CURVES 10

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

Conic sections: ellipse, parabola, hyperbola

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

MODULE II ORTHOGRAPHIC PROJECTION 8

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

MODULE III PROJECTION OF STRAIGHT LINES AND PLANES 10

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

MODULE IV PROJECTION OF SOLIDS 10

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

MODULE V SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 10

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

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

MODULE VI PICTORIAL PROJECTIONS 12

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

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

Total Hours: 60

TEXT BOOK:

1. N.D. Bhatt, 'Engineering Drawing' Charotar Publishing house, 46^{th} 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
3. (P) Ltd., Publication, Chennai. (2011)

OUTCOMES:

Students who complete this course will be able to:

- Draw various views of engineering components
- Graphically communicate their concepts and ideas on new designs

SSB1181	INTRODUCTION TO ECONOMICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

MODULE I INTRODUCTION 8

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

MODULE II NATIONAL INCOME DETERMINATION 7

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

MODULE III MONEY AND BANKING 7

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

MODULE IV INDUSTRY, MARKET AND TRADE 7

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

MODULE V BUDGET, POLICIES AND INDICATORS 8

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

MODULE VI ECONOMIC GROWTH AND THE ROLE OF ENGINEERS 8

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

Total Hours : 45

REFERENCES:

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

OUTCOMES:

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

PHB1182	PHYSICS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

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

LIST OF EXPERIMENTS:

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

OUTCOMES:

On completion of this course, the student will know

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

CHB1182	**CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

OBJECTIVES:

To make students conversant with the

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

LIST OF EXPERIMENTS:

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

OUTCOMES:

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

- Estimate the degree of hardness and TDS in water samples.
- Construct and calculate EMF of cell.
- Apply the concept of Beer lamberts law.

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

OBJECTIVES:

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

CIVIL ENGINEERING PRACTICE

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

MECHANICAL ENGINEERING PRACTICE

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

ELECTRICAL ENGINEERING PRACTICE

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

ELECTRONIC ENGINEERING PRACTICE

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

OUTCOMES:

Students who complete this course

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

GEB1103 COMPUTER PROGRAMMING & APPLICATIONS **L T P 2 0 2**

OBJECTIVES:

- To expose fundamental concepts of computer hardware.
- To implant the basic programming knowledge.
- To identify bugs in the code snippets thereby giving more practice.
- To give coverage on applying logic in programming.
- To focus on solving practical problems based on implementing computer programs.
- To provide the foundation of good programming skills by discussing keys issues to the design.

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
8. nested for loops – while loop – do-while loop – break and continue statement
9. Arrays – Operation with arrays
10. 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:

- Recognize the basic terminology used in computer programming.
- Apply Modular design and logic flow.
- Design programs involving decision structures, loops and functions.
- Identify and correct different types of programming errors, including data validation.
- Realize the dynamics of memory by the use of pointers.
- Build simple real time applications using the programming constructs and algorithms.

SEMESTER II

MAB1282	**ADVANCED CALCULUS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

OBJECTIVE:

The aim of the course is to

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

MODULE I DOUBLE INTEGRALS 7

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

MODULE II TRIPLE INTEGRALS AND SPECIAL FUNCTIONS 7

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

MODULE III VECTOR INTEGRATION 7

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

MODULE IV ANALYTIC FUNCTION 8

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

MODULE V COMPLEX INTEGRATION 8

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

MODULE VI PARTIAL DIFFERENTIAL EQUATIONS 8

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

Total Hours- 60

TEXT BOOKS:

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

REFERENCES:

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

OUTCOMES:

On completion of the course the students will be able to

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

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

OBJECTIVE:

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

MODULE I CONDUCTING MATERIALS 10

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

MODULE II SEMICONDUCTING MATERIALS 9

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

MODULE III DIELECTRIC MATERIALS 7

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

MODULE IV MAGNETIC MATERIALS 6

Origin of magnetic moment –Types of magnetic materials and their properties –Ferromagnetism – Domain theory of ferromagnetism, hysteresis, soft and hard magnetic materials – Anti ferromagnetic materials (qualitative) – Ferrites – Applications-Magnetic memory – Tapes & magnetic disk drives.

MODULE V SUPERCONDUCTING MATERIALS 6

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

MODULE VI OPTICAL AND NEW ENGINEERING MATERIALS 7

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

Total Hours: 45

TEXT BOOKS:

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

REFERENCES:

1. Arumugam.M, Physics II, Material Science for ECE, Anuradha Publishers, 5th Edition, 2005.
2. Jacob Millman, Christos C.Halkais, Electronic Devices and Circuits, Tata McGraw-Hill, New Delhi, 1991.
3. Charles Kittel, Introduction to solid state physics, 7th Edition, John Wiley & sons (ASIA) Pvt. Ltd.
4. Sze. S.M., Semiconductor Devices – Physics and Technology, 2nd edn. John Wiley, 2002.
5. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices – Modelling and Technology, Prentice Hall of India, 2004.
6. Donald A. Neamen, "Semiconductor Physics and Devices" 3rd Ed., Tata McGraw Hill, 2002.

OUTCOMES:

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

- choose the correct semi-conductors for electronic devices and display
- use dielectric materials for transformers and capacitors

- use ferromagnetic materials for solid state devices
- apply the concept of super conductivity for Engineering applications

SSB1182 SOCIOLOGY, ETHICS AND HUMAN VALUES L T P C

3 0 0 3

OBJECTIVES:

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

MODULE I FUNDAMENTALS OF SOCIOLOGY 7

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

MODULE II SOCIOLOGY IN INDIAN CONTEXT 7

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

MODULE III INDUSTRIAL SOCIOLOGY 7

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

MODULE IV INDUSTRIAL – SOCIETY INTERFACE 8

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

MODULE V ETHICS AND HUMAN VALUES 8

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

MODULE VI ENGINEERS AND SOCIETY 8

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

Total Hours: 45

REFERENCES:

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

OUTCOMES:

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

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

OBJECTIVES:

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

MODULE I VECTOR APPROACH TO MECHANICS 7

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

MODULE II EQUILIBRIUM OF PARTICLE 6

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

MODULE III EQUILIBRIUM OF RIGID BODY 6

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

MODULE IV PROPERTIES OF SURFACES 8

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

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

10

MODULE V LAWS OF MOTION

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

MODULE VI FRICTION **8**

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

Total Hours: 45

REFERENCES:

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

OUTCOMES:

On completion of this course student:

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

EEB1281 INTRODUCTION TO ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

To impart knowledge on

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

MODULE I DC AND AC CIRCUITS 9

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

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

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

MODULE II ELECTRICAL MACHINES AND DRIVES 8

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

MODULE III ELECTRIC POWER SYSTEMS 6

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

MODULE IV SEMICONDUCTORS 8

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

MODULE V PN JUNCTION AND SPECIAL DIODES 7

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

MODULE VI TRANSISTORS AND AMPLIFIERS 7

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

Total Hours : 45

REFERENCES:

1. William H. Hayt Jr, Jack E. Kemmerly, and Steven M. Durbin, 'Engineering Circuit Analysis', Tata McGraw Hill Publishing Co Ltd, New Delhi, 200.2
2. Vedam Subrahmanyam, "Electric Drives", McGraw-Hill Education (India) Pvt Limited, 2010.
3. Edward Hughes, "Electrical and Electronics Technology", Pearson India, 9th Edition, 2007.
4. D.P.Kothari and I.J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill Publishing Co Ltd, 2nd Edition, 2002.
5. I.J. Nagrath and D.P.Kothari, 'Power System Engineering', Tata McGraw Hill Publishing Co Ltd, 2nd Edition, 2007.
6. Ewald F.Fuchs and Mohammed A.S.Masoum, Elsevier Academic Press, 2008.
7. Indian Electricity Rules,1956.
8. Jacob Millman & Christos C.Halkias, "Electronic Devices and Circuits" Tata McGraw–Hill, 1991.
9. Floyd, "Electronic Devices: Conventional Current Version, 7/E" Pearson Education India, 2008

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

OUTCOMES:

Students who complete this course will be able to:

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

CSB1211 ANALOG AND DIGITAL COMMUNICATION L T P C

3 0 0 3

OBJECTIVES:

- To study bout the modulation techniques.
- To understand about the modulation techniques used for digital data transmission.
- To have the knowledge about the digital communication.
- To study about the spread spectrum and multiple access techniques.

MODULE I AMPLITUDE MODULATION 8

Principles of amplitude modulation –AM Waveform, spectrum and bandwidth, Modulation index and Percent modulation, Power distribution; AM modulator and Demodulators , AM transmitters – Low level , high level and Medium Level transmitters, AM receivers – TRF.

MODULE II ANGLE MODULATION 8

Principles of Angle modulation – FM and PM, phase deviation and frequency deviation, Modulation Index, phase and frequency modulators and demodulators, frequency spectrum of Angle Modulated waves. Bandwidth requirements, Power distribution and average power; Phase modulators and demodulators, Frequency Modulators and demodulators, Direct FM transmitters, Indirect FM transmitters, FM receivers: FM noise suppression, frequency vs phase modulation.

MODULE III PULSE MODULATION 8

Introduction, pulse modulation, Types , PCM – sampling, sampling rate,quantization, Signal to quantization ratio, PCM transmission system; Companding – Analog and digital companding – delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – ISI, eye pattern.

MODULE IV DIGITAL COMMUNICATION 8

Shannon limit for information capacity, Shift Keying techniques, ASK modulators and demodulators, FSK modulators and demodulators, BPSK Transmitter and receiver, – QPSK Transmitter and receiver, DPSK.

MODULE V DATA COMMUNICATION 8

Introduction, Data Communication circuits, Data Communication codes, Error Control, Serial and parallel interfaces, Data Modems and its types.

MODULE VI SPREAD SPRECTRUM TECHNIQUES 5

Introduction, Pseudo – Noise sequence, DS spread spectrum, FH Spread spectrum, processing gain, FH spread spectrum, multiple access techniques– TDMA and FDMA.

Total Hours: 45

TEXT BOOKS:

1. H Taub, D L Schilling, G Saha, “Principles of Communication Systems” 3/e, Tata McGraw Hill Publishing Company Limited, 2011.
2. S. Haykin “An Introduction to Analog And Digital Communications” John Wiley, 2009.

REFERENCES:

1. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3/e, Oxford University Press, 2009.
2. Bernard Sklar, Pabitra Kumar Rai, “Digital Communications Fundamentals and Applications” 2/e Pearson Education 2009.
3. H P Hsu, “Analog and Digital Communications”, Schaum Outline Series, Tata McGraw Hill, 2006.

OUTCOMES

- Apply different types of modulation schemes employed in communication system.
- Interpret the application of digital transmission.
- Compare the advantages and drawbacks of each modulation schemes.
- Analyze the relevant error detection and correction techniques for data transmission.

ENB1282	WRITTEN COMMUNICATION	L	T	P	C
		0	0	2	1

OBJECTIVES:

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

MODULE I WRITTEN COMMUNICATION 4

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

MODULE II CREATIVE WRITING 5

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

MODULE III CORPORATE CORRESPONDENCE 3

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

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

MODULE IV OFFICIAL LETTERS 6

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

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

MODULE V TECHNICAL WRITING I 6

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

MODULE VI TECHNICAL WRITING II 6

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

Total Hours: 30

REFERENCES:

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

OUTCOME:

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

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

OBJECTIVES:

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

LIST OF EXPERIMENTS:

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

OUTCOMES:

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

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

PHB1284	**PHYSICS OF ENGINEERING MATERIALS LABORATORY**	**L T P**	**C**
		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.

SEMESTER III

MAB 2181 TRANSFORMS AND APPLICATIONS

(Common to all B.Tech Programmes)

	L	T	P	C
	3	1	0	4

OBJECTIVES:

The course aims to

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

MODULE I LAPLACE TRANSFORM 8

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

MODULE II FOURIER SERIES 7

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

MODULE III BOUNDARY VALUE PROBLEMS 8

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

MODULE IV FOURIER TRANSFORM 7

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

MODULE V Z -TRANSFORM AND DIFFERENCE EQUATIONS 7

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

MODULE VI APPLICATIONS OF TRANSFORMS 8

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

Total Hours - 60

TEXT BOOKS:

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

REFERENCES:

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

OUTCOMES:

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

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

SSB2181 LAW FOR ENGINEERS L T P C

3 0 0 3

OBJECTIVES:

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

MODULE I INDIAN CONSTITUTION 7

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

MODULE II GOVERNANCE AND POWERS VESTED 7

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

MODULE III HUMAN RIGHTS 7

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

MODULE IV CORPORATE AND LABOUR LAWS 7

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

MODULE V CONTRACTS AND ARBITRATION 9

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

MODULE VI LAWS RELATED TO IPR 8

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

Total Hours: 45

REFERENCES:

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

OUTCOMES:

Students will be

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

CSB2101 OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To give the foundation for Object oriented analysis and design of algorithms.
- To convert the object oriented algorithms into programs using Object oriented languages
- To expose to the basics of networking and to write simple networking routines
- To have a study on technologies supporting distributed environment
- To be able to analyze real time scenarios and design object oriented applications
- To give awareness about enterprise applications

MODULE I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 7

Object oriented programming paradigm - Basic concepts of object oriented programming - Benefits of OOP - Object-oriented languages - Applications of OOP - Structure of a C++ program- Operator and control structures- Functions.

MODULE I INTRODUCTION TO JAVA 7

Java: an Introduction, Life cycle of a Java program, Java virtual machine, Programming in Java - Declaring Variables - Packages and Interfaces - Exception Handling. Java I/O streaming - Filter and pipe streams - Byte Code interpretation - Threading -Swing.

MODULE III NETWORK PROGRAMMING IN JAVA 8

Sockets - Secure sockets - Custom sockets - UDP datagrams - Multicast sockets -URL classes - Reading Data from the server - Writing data - Configuring the connection- Reading the header- Java Messaging services.

MODULE IV APPLICATIONS IN DISTRIBUTED ENVIRONMENT 8

Remote method Invocation - Activation models - RMI custom sockets - Object Serialization - RMI - IIOP implementation - CORBA - IDL technology - Naming Services - CORBA programming Models - JAR file creation.

MODULE V MULTI-TIER APPLICATION DEVELOPMENT 8

Server side programming - Servlets - Java Server Pages - Applet to Applet communication - applet to Servlet communication - JDBC - Applications on databases.

MODULE VI ENTERPRISE APPLICATIONS 7

Server Side Component Architecture - Introduction to J2EE - Session Beans-Entity Beans - Persistent Entity Beans.

Total Hours: 45

TEXT BOOKS:

1. Matt Weisfeld," Object-Oriented Thought Process", 4th Edition, Pearson Education, 2013.
2. Hortsmann & Cornell, "Core Java Advance Features VOL II", 9th Edition, Pearson Education, 2013.
3. Andrew Lee Rubinger, Bill Burke "Enterprise JavaBeans 3.1", 6th Edition, O'Reilly Publishers, 2010.

REFERENCE:

1. Patrick Naughton, "Complete Reference: JAVA 2", 8th Edition, Tata McGraw-Hill, 2011.

OUTCOMES:

Students who complete this course will be able to

- Comprehend the object oriented programming design principles
- Write and test object oriented programs for simple applications
- Handle exceptions and implement interfaces using object oriented languages
- Design and implement simple networking solutions
- Make use technologies for developing applications in distributed environment
- Simulate simple enterprise applications

CSB2102 DATA STRUCTURES L T P C
3 0 0 3

OBJECTIVES:

- To expose the basic concepts of data structures.
- Illustrate the various abstract data types and their applications.
- To express the given data in the form of trees.
- To expose the different types of searching algorithms.
- To introduce the different sorting algorithms.
- To have an over view of the fundamentals of graphs.

MODULE I INTRODUCTION TO DATA STRUCTURES 7

Data and Information - Data Structure Types - Concept of Data Types - Abstract Data Types- Pointers - Structures - Unions - Arrays - Multidimensional Arrays.

MODULE II LISTS, STACKS AND QUEUES 7

List ADT - Stack ADT - Queue ADT - Array Implementation of Stack - Array Implementation of Queue - Singly Linked List - Double Linked List - Stack and Queue using Linked List - Circular Queue.

MODULE III TREES 8

Basic Terms - Binary Trees - Complete Binary Tree - Search Tree ADT - Binary Search Tree - AVL Trees - Expression Trees - Tree Traversals - B Tree - Threaded Binary Tree.

MODULE IV SEARCHING AND HASHING 8

Introduction to Search - Linear Search - Binary Search - Hashing fundamentals - Hash Function - Separate Chaining - Open Addressing - Linear Probing - Priority Queue - Heaps - Binary Heaps.

MODULE V SORTING 7

Preliminaries - Insertion Sort- Selection Sort - Shellsort - Bubble Sort – Heapsort - Mergesort- Quicksort - External sorting- Radix Sort.

MODULE VI GRAPHS 8

Graph fundamentals - Terminologies of Graphs - Graph Representation - Graph Traversals - Topological Sort - Shortest Path Algorithm - Dijkstra's Algorithm -Spanning Trees - Prim's Algorithm - Kruskal's Algorithm - Depth First Search- Breadth First Search - Undirected Graphs - Biconnectivity.

Total Hours: 45

TEXT BOOKS:

1. Ashok N. Kamthane, "Introduction to Data Structures in C", 2nd Edition, Wiley Publications, 2008.
2. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy: Data Structure and Algorithmic Puzzles", 2nd Edition, Create Space Independent Publishing Platform, 2011.

REFERENCE:

1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia, 2002.

OUTCOMES:

Students who complete this course will be able to:

- Students who complete this course will be able to:
- Analyze a given problem and recommend suitable data structure.
- Apply the various searching algorithms for the given data.
- Apply and compare the different sorting algorithms for the given data.
- Represent data of given scenario in trees structures and graph structure.
- Write suitable shortest path algorithm for the given case study.
- Identify and address the challenges of graph, sorting and searching algorithms in real time scenario.

CSB2103 DIGITAL LOGIC DESIGN **L T P C**
3 1 0 4

OBJECTIVES:

- To expose Boolean algebra, Boolean functions and realization of functions with basic gates.
- To design combinational and sequential circuits.
- To implement the K-map method for logical operation
- Use the concepts of state and state transition for analysis and design of sequential circuits
- Use the functionality of flip-flops for analysis and design of sequential circuits
- To learn programming in HDL for designing larger systems.

MODULE I BOOLEAN ALGEBRA AND LOGIC GATES 7

Review of Binary Number Systems - Binary Arithmetic - Binary Codes - Boolean Algebra and Theorems - Boolean Functions - Canonical and standard forms.

MODULE II GATE-LEVEL MINIMIZATION 8

Logic operations-Digital Logic Gates-The K-Map method-Two variable-Three variable-Four Variable -Product of sums simplification - Don't care conditions-NAND and NOR implementation - Other two-level implementations - Exclusive-OR function-Introduction to HDL.

MODULE III COMBINATIONAL LOGIC 8

Combinational circuits - analysis and design procedures -Adder, Subtractor, Encoder/decoder - Three state devices, Priority Encoder, Mux/Demux, Code converters, Comparators-HDL models of combinational circuits.

MODULE IV SYNCHRONOUS SEQUENTIAL LOGIC 8

Introduction-Sequential Circuits - Latches and Flip Flops - Analysis of clocked sequential circuits- Synthesizable HDL models of sequential circuits - State Reduction and State Assignment - Design procedure.

MODULE V REGISTERS, COUNTERS, MEMORIES 6

Registers-Shift Registers -Ripple Counters - Synchronous Counters-Other Counters-HDL for Registers and Counters-Memory and Programmable Logic.

MODULE VI DESIGN AT THE REGISTER TRANSFER LEVEL 8

Introduction-Register Transfer Level Notation-Register transfer level in HDL-ASMs-Sequential Binary multiplier-Control Logic-HDL description of Binary Multiplier-Design with Multiplexers.

Total Hours - 60

TEXT BOOK:

1. M. Morris Mano and Michael D.Ciletti, "Digital Design with an introduction to the Verilog HDL", 5th Edition, Pearson Education, 2012.

REFERENCES:

1. Charles H.Roth Jr, "Fundamentals of Logic Design", 5th Edition, Jaico Publishing House, Mumbai, 2003.
2. Donald D. Givone, "Digital Principles and Design", 13th reprint, Tata McGraw Hill, 2003.

OUTCOMES:

Students who complete this course will be able to:

- A student who successfully fulfills the course requirements will have demonstrated:. .
- Define different number systems, binary addition and subtraction, 2’s complement representation and operations with this representation.
- Apply the different switching algebra theorems and apply them for logic functions.
- Demonstrate the use of Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- Define the following combinational circuits: buses, encoders/decoders, (de)multiplexers, exclusive-ORs, comparators, arithmetic-logic units; and to be able to build simple applications.
- derive the state-machine analysis or synthesis and to perform simple projects with a few flip-flops.\
- Apply the Hardware Design language to design digital circuits.

CSB2104 COMPUTER ARCHITECTURE **L T P C**
3 0 0 3

OBJECTIVES:

- To explain the basic structure, operation of a digital computer and instruction sets.
- To illustrate the basic principles of arithmetic and logic unit.
- To describe the concept of pipelining and data transfer.
- 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 the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.

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 - Addressing modes - Assembly language - Basic I/O operations - Stacks and queues.

MODULE II ARITHMETIC UNIT **9**

Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division - Floating point numbers and operations.

MODULE III BASIC PROCESSING UNIT **7**

Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control - Micro programmed control.

MODULE IV PIPELINING **8**

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

MODULE V MEMORY SYSTEM 7

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 7

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

Total Hours: 45

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer organization", 5^{th} Edition, McGraw Hill, 2002.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture - Designing for Performance", 9^{th} Edition, Pearson Education, 2012.
2. John P.Hayes, "Computer Architecture and Organization", 3^{rd} Edition, McGraw Hill, 1998.

OUTCOMES:

Students who complete this course will be able to:

- Write assembly language program using various addressing modes.
- Describe the organization of the control unit, Arithmetic and Logical unit, Memory unit and I/O unit.
- Appraise the advantages and disadvantages of the various memory systems.
- Demonstrate the working of central processing unit and RISC and CISC Architecture
- Describe the operations and language f the register transfer, micro operations and input- output organization
- Implement the organization of memory and memory management hardware

ENB2181 ORAL COMMUNICATION L T P C

0 0 2 1

OBJECTIVES:

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

MODULE I 8

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

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

iii. Prepared presentations and extempore presentations.

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

v. Recording presentations and feedback - Peer and faculty evaluation.

MODULE II 2

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

MODULE III 4

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

4

MODULE IV

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

MODULE V **6**

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

MODULE VI **6**

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

Total Hours: 30

REFERENCES:

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

OUTCOME:

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

CSB2105	OBJECT ORIENTED PROGRAMMING LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To implement the basic concepts of object oriented programming using java.
- Have the ability to write a computer program to solve specified problems.
- Be able to use the Java SDK environment to create, debug and run simple Java programs.
- Be aware of the important topics and principles of software development
- To understand fundamentals of object-oriented programming in classes,invoking methods and functions.
- Learn to create packages, interfaces and threads using java and oops concepts.

LIST OF EXPERIMENTS:

1. Simple java program with Control statements.
2. Getting input from user console.
3. Classes, Object and Constructors.
4. Method overloading.
5. Inheritance.
6. Final variable, method and class.
7. Creating packages.
8. User-defined interfaces.
9. Pre-defined interfaces.
10. Simple and Multiple threads.
11. Exception handling in java.
12. Graphics class.
13. File handling.
14. Web Page creation using Applet.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Differentiate the object-oriented approach from procedural approach in Programming.
- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
- Demonstrate the use of various OOPs concepts with the help of programs.
- Design and analyze a computer program to solve real world problems based on the object-oriented principles.
- Develop simple GUI interfaces for a computer program to interact with users.

CSB2106 DATA STRUCTURES LAB **L T P C**
0 0 3 1

OBJECTIVES:

- To illustrate basic ADTs such as arrays and linked lists.
- To design operations on stacks, queues, trees and graphs.
- To implement the operations on stack, queues, trees and graphs for the given data set.
- To develop algorithms for linear and binary searching.
- Identify and implement the suitable sorting algorithm for the given data.
- To represent the data in the form of graph and design the traversal algorithm for the given scenario.

LIST OF EXPERIMENTS:

1. Study of List ADT: - Simple exercises, implementation of Stacks, Queues, Circular Queues.
2. Study of Singly Linked List: - Operations on Singly Linked List, implementation of Stacks, Queues.
3. Study of Doubly Linked List: - Operations on Doubly Linked List.
4. Applications of Linked Lists such as Polynomial addition.
5. Applications of Stacks and Queues such as infix to postfix expression conversion and evaluation.
6. Binary tree implementation - Applications such as expression tree traversal (inorder, preorder & postorder).
7. Binary search tree - insertion traversal and deletion operations.
8. Implementation of search algorithms - linear search and Binary Search.
9. Implementation of sorting algorithms (selection sort, bubble sort, quick sort, Heap sort).
10. Representation of graph and traversal algorithm.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Design appropriate data structures to solve a given problem.
- Implement operations on arrays, linked lists, stacks and queues.
- Compare linear and binary search for a given data.
- Suggest and implement a suitable sorting algorithm for the given data
- Design the graph for the given data and suggest a shortest path for the given scenario
- Apply data structure to solve real time problems.

CSB2107 **DIGITAL LAB** **L T P C**
0 0 0 1

OBJECTIVES:

To learn different types of digital logic gates and truth table.

- To expose the design and implementation of circuit diagrams.
- To test the combinational, sequential, synchronous and asynchronous circuits using the concerned IC chips.
- Evaluate and simplify logical functions using Boolean algebra
- Analyze and design combinatorial circuits.
- Analyze and design modular combinatorial logic circuits containing decoders, multiplexers, demultiplexers

LIST OF EXPERIMENTS:

1. Verify the truth table of AND, OR, NOT, EX-OR, gate.
2. Verification of NAND, OR, EX-OR, NOR using 7400 IC.
3. Design a hardware circuit to perform the operation of half &full adder.
4. Design a hardware circuit to perform the operation of full subtractor.
5. Verify the truth table of RS, D, T, JK Flip Flop.
6. Study asynchronous counter in up & down mode.
7. To study multiplexer and demultiplexer.
8. To study decade counter.
9. To design D/A, A/D converter.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Examine the operation of the logic gates.
- Design simple combinational/sequential circuits.
- Apply simple synchronous/asynchronous circuits in real life problems
- Implement functions with NAND-NAND and NOR-NOR logic
- Simplify combinatorial circuits using Karnaugh maps.
- Represent logical functions in Canonical form and with AND, OR, NOT, XOR, NAND, NOR logic gates

SEMESTER IV

MAB2285	DISCRETE MATHEMATICS	L T P C
		3 1 0 4

OBJECTIVES:

The aim of this course is to

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

MODULE I PROPOSITIONAL CALCULUS 8

Propositions - Logical connectives - Compound propositions - Conditional and biconditional propositions - Truth tables - Tautologies and contradictions - Contrapositive - Logical equivalences and implications - DeMorgan's Laws - Normal forms - Principal conjunctive and disjunctive normal forms - Rules of inference - Arguments - Validity of arguments.

MODULE II PREDICATE CALCULUS 8

Predicates - Statement function - Variables - Free and bound variables - Quantifiers - Universe of discourse - Logical equivalences and implications for quantified statements - Theory of inference - The rules of universal specification and generalization - Validity of arguments.

MODULE III GRAPHS 7

Graphs and graph models - Graph terminology and special types of graphs - Presenting graphs and graph isomorphism - Connectivity - Euler and Hamilton paths.

MODULE IV GROUPS 7

Algebraic systems - Semi groups and monoids - Groups - Subgroups and homomorphisms - Cosets and Lagrange's theorem.

MODULE V RINGS AND FIELDS 7

Rings - Some special classes of rings - Subrings - Field and subfields - Ideals - Quotient Rings - Homomorphism.

MODULE VI LATTICES AND BOOLEAN ALGEBRA 8

Partial ordering - Posets - Lattices as Posets - Properties of lattices-Lattices as algebraic systems - Sub-lattices - Direct product and homomorphism - Special lattices - Boolean algebra.

Total Hours : 60

TEXT BOOKS:

1. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill Pub. Co. Ltd, New Delhi, 2003.
2. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 5^{th} Edition, Tata McGraw - Hill Pub. Co. Ltd., New Delhi, 2003.

REFERENCES:

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4^{th} Edition, Pearson Education Asia, Delhi, 2002.
2. Richard Johnsonbaugh, "Discrete Mathematics", 5^{th} Edition, Pearson Education Asia, New Delhi, 2002.
3. C.L.Liu, "Elements of Discrete Mathematics" Tata McGraw - Hill Pub. Co. Ltd., New Delhi, 2003.

OUTCOMES:

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

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

CSB2211 DATABASE MANAGEMENT SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

- Understand the role of a database management system in an organization.
- Understand basic database concepts, including the structure and operation of the relational data model.
- Construct simple and moderately advanced database queries using Structured Query Language (SQL).
- Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- Design and implement a small database project using Microsoft Access.
- Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, Backup and recovery, and data object locking and protocols.

MODULE I INTRODUCTION 9

Introduction - An example - Characteristics of Database approach - Actors on the screen; Workers behind the scene - Advantages of using DBMS approach - A brief history of database applications , when not to use a DBMS - Data models, schemas and instances - Three-schema architecture and data independence - Database languages and interfaces - The database system environment - Centralized and client-server architectures - Classification of Database Management systems.

MODULE II RELATIONAL MODEL AND RELATIONAL ALGEBRA 9

Relational Model Concepts; Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions and dealing with constraint violations - SQL Data Definition and Data Types - Specifying basic constraints in SQL - Basic Retrieval queries in SQL - Insert, Delete and Update statements in SQL - Additional features of SQL - More Complex SQL Retrieval Queries: Specifying constraints as Assertion and Trigger - Views (Virtual Tables) in SQL - Schema change statements in SQL. Unary Relational Operations: SELECT and PROJECT - Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION - Additional Relational Operations - Examples of Queries in Relational Algebra - The Tuple Relational Calculus - The Domain Relational Calculus.

MODULE III ENTITY-RELATIONSHIP MODEL 9

Using High-Level Conceptual Data Models for Database Design - An Example

Database Application - Entity Types, Entity Sets, Attributes and Keys - Relationship types, Relationship Sets, Roles and Structural Constraints - Weak Entity Types - Refining the ER Design -ER Diagrams, Naming Conventions and Design Issues - Relationship types of degree higher than two.

MODULE IV DATABASE DESIGN 6

Informal Design Guidelines for Relation Schemas - Functional Dependencies -Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms - Boyce-Codd Normal Form.

MODULE V RELATIONAL DATABASE 6

Properties of Relational Decompositions - Algorithms for Relational Database Schema Design - Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form - Inclusion Dependencies - Other Dependencies and Normal Forms.

MODULE VI TRANSACTION MANAGEMENT 6

The ACID Properties - Transactions and Schedules - Concurrent Execution of Transactions -Lock - Based Concurrency Control - Performance of locking - Transaction support in SQL - Introduction to crash recovery- 2PL, Serializability and Recoverability-Lock Management - Introduction to ARIES - The log - Other recovery-related structures-The write-ahead log protocol-Check pointing- Recovering from a System Crash- Media Recovery-Other approaches and interaction with concurrency control.

Total Hours: 45

TEXT BOOKS:

1. Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Addison-Wesley, 2011
2. Raghu Ramakrishnan and Johannes Gehrke,"Database Management Systems", 3rd Edition, McGraw-Hill, 2003.

REFERENCES:

1. Silberschatz, Korth and Sudharshan, "Data Base System Concepts", 5th Edition, Mc-GrawHill, 2006.

2. C.J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

OUTCOMES:

Students who complete this course will be able to:

- Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.
- Define the terminology, features, classifications, and characteristics embodied in database systems.
- Demonstrate an understanding of the relational data model.
- Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.

CSB2212	**OPERATING SYSTEM**	**L T P C**
		3 0 0 3

OBJECTIVES:

- To know the objectives, functions and architecture of operating systems.
- To understand process management concepts.
- To study the functions of process concurrency and synchronization .
- To provide a knowledge about how the memory management is done with the help of operating systems.
- To learn the techniques for managing the I/O devices and files.
- To illustrate the design and architecture of Linux operating system.

MODULE I OVERVIEW OF OPERATING SYSTEMS 6

Operating Systems Objectives and Functions - Evolution of the Operating systems - Operating System Structures.

MODULE II PROCESS MANAGEMENT & SCHEDULING 6

Process Life cycle - Process control - Threads - Multi Threads - Scheduling criteria - Types of scheduling - Scheduling Algorithms.

MODULE III PROCESS SYNCHRONIZATION 6

Concurrent process - Principles of Concurrency - IPC - Semaphores –

Deadlock - Deadlock Prevention, Avoidance, Detection and recovery.

MODULE IV MEMORY MANAGEMENT 7

Introduction - Partitions - Paging - Segmentation - Segmentation and paging - Need for virtual memory management - Demand Paging - Page fault and page replacement policies.

MODULE V I/O MANAGEMENT AND DISK SCHEDULING 10

Organization of I/O functions - Evolution of I/O Functions - Logical Structure of I/O functions - I/O Buffering and Blocking - Disk I/O - Disk Scheduling algorithms - File Management: Principles - File management Techniques - File directories - File System Architecture - File allocation.

MODULE VI LINUX OPERATING SYSTEM AND ARCHITECTURE: 10

Introduction to LINUX System, Kernel-Architecture System Concepts-Data Structures, System Call Interface, Processes and Signal, POSIX thread concepts, IPC Mechanism (Pipes, FIFOs, Semaphore, Shared Memory, Message Queues and Sockets) -Memory Management, Interrupt Handling, Timers

Total Hours: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter B galvin , Greg Gagne, "Operating System Concepts", 7th Edition, John Wiley & Sons Inc, 2008.

REFERENCES:

1. Mauerer, Wolfgang , "Professional Linux® Kernel Architecture", John Wiley & Sons, Wrox, 2008.
2. Deitel H M, "Operating Systems", 3rd Edition, Pearson education India, New Delhi, 2007.
3. Jim Mauro and Richard McDougall, "Solaris Internals: Solaris 10 and Open Solaris Kernel Architecture", 2nd Edition, Sun Microsystems Press/Prentice Hall, 2007.
4. Dhamdhere D M, "Operating Systems", 1st reprint, Tata McGraw Hill, New Delhi, 2006.
5. Mark Mitchell, Jeffery Oldham, "Advanced Linux Programming ", 1st Edition, Sams Publication, June 21, 2001.

OUTCOMES:

Students who complete this course will be able to:

- State the functioning of operating systems.
- Compare the performance of various process scheduling algorithms.
- Analyze the implementation of processes and problems related to process synchronization.
- Find how to manage the resources like memory, I/O devices and files.
- Compare the functioning of various operating systems.
- Appraise the functioning of the Linux Operating system.

CSB2213 MICRO PROCESSORS AND MICRO CONTROLLERS **L T P C**
3 0 0 3

OBJECTIVES:

- To expose students to hardware details of 8-bit and 16-bit microprocessors.
- To provide in depth knowledge about assembly language programming
- To have a look on programming interface cards
- To programming with interfacing of microprocessors and microcontrollers.
- To describe 8051 architecture and its programming.
- To outline the simulators/emulator used for implementing real time applications

MODULE I 8086 ARCHITECTURE 9

Introduction to 8085 microprocessor- 8086 architecture-Functional diagram - Register organization, Memory segmentation - Programming model- Memory addresses- Physical memory organization- Signal description of 8086-Common function signals- Interrupts of 8086.

MODULE II INSTRUCTION SET AND ASSEMBLY LANGUAGE 8

Instruction formats-Addressing modes-Instruction set-Assembler directives-Macros-Simple programs involving logical-Branch and call instructions-sorting-Evaluating arithmetic expressions-String manipulations.

MODULE III I/O INTERFACE 8

8255 PPI various mode of operation and interfacing to 8086-Interfacing keyboard-Display-Stepper motor interfacing-D/A and A/D converter.Memory interfacing to 8086-Vector interrupt table-Interrupt service routine.

MODULE IV COMMUNICATION INTERFACE 6

Introduction to DOS and BIOS interrupts grated Services Architecture -Serial communication standards-Serial data transfer schemes-8251 USART Architecture and interface.

6

MODULE V INTRODUCTION TO MICROCONTROLLER

Overview of 8051 micro controller-Architecture-I/O ports-memory organization-Addressing modes and instruction set of 8051-Simple program- Programming 8051 timers and counters.

MODULE VI THE AVR RISC MICROCONTROLLER ARCHITECTURE 8

Introduction-AVR Family architecture-Register file-The ALU-Memory access and instruction execution-I/O Memory-EEPROM-I/O Ports-Timers-UART-Interrupt structure.

Total Hours: 45

TEXT BOOKS:

1. Kenneth.J.Ayala," The 8051 micro controller", 3rd Edition, Cengage learning, 2010.

REFERENCES:

1. K.Ray and K.M.Bhurchandani, "Advanced Microprocessors and peripherals", 2nd Edition,Tata Mc-GrawHill, 2006.
2. Ajay.V.Deshmukh, "Micro controllers and application", Tata Mc-GrawHill, 6th reprint, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Have in depth knowledge on instruction sets of 8086 and 8051.
- Develop assembly language programs in 8085 and 8086.
- Describe various programming interface devices used for programming.
- Design interfaces for peripheral devices and interfacing to 8085/8086.
- Design and simulate real time applications using simulators and emulators.
- Develop applications using microcontrollers.

CSB2214 PRINCIPLES OF PROGRAMMING LANGUAGES L T P C
3 0 0 3

OBJECTIVES:

- To summarize the principles and components of programming language design.
- Expound on the compilation process of the language.
- To identify the syntax and semantics for a language
- To learn the various paradigms of programming languages.
- To expound on the basic data and control structures in programming languages
- Exemplify the features of a programming language and identify its suitability for the given task

.MODULE I INTRODUCTION 6

Concepts of programming languages-Programming domains-Language Evaluation Criteria- Influences on Language design- Language categories-Programming Paradigms - Imperative- Object Oriented- functional Programming - Logic Programming.

MODULE II SYNTAX AND SEMANTICS 8

Programming Language Implementation - Compilation and Virtual Machines, programming environment-Formal methods of describing syntax - BNF, EBNF for common programming languages features-Parse trees-Ambiguous grammars-Attribute grammars-Denotational semantics and axiomatic semantics.

MODULE III DATA TYPES, EXPRESSIONS AND STATEMENTS 9

Primitive, character, user defined, array, associative, record, union, pointer and reference types - Names - Variable-concept of binding- Type checking-Type compatibility- Named constants, Variable initialization- Arithmetic, relational and Boolean expressions-Short circuit evaluation Mixed mode assignment-Assignment Statements-Control Structures - Statement Level, Compound Statements-Selection-Iteration-Unconditional Statements- Guarded command.

MODULE IV SUBPROGRAMS AND BLOCKS 8

Fundamentals of sub-programs-Scope and lifetime of variable - Static and Dynamic scope- Design issues of subprograms and operations-Local referencing environments-Parameter passing methods-Overloaded sub-programs-Generic sub-programs-Design issues for functions- user defined overloaded operators- Co routines.

MODULE V ABSTRACT DATA TYPES 7

Abstractions and encapsulation- Design issues-C++ parameterized ADT-Object oriented programming in small talk, C++, Java, C#, Ada 95-Concurrency- Subprogram level concurrency-Semaphores-Monitors-Massage passing- Java threads- C# threads.

MODULE VI FUNCTIONAL PROGRAMMING LANGUAGES 7

Introduction-Fundamentals of FPL, LISP, ML, Haskell- Application of Functional Programming Languages and comparison of functional and imperative Languages-Exceptions-Exception Propagation- Exception handler in Ada, C++ and Java.

Total Hours: 45

REFERENCES:

1. Robert .W. Sebesta,"Concepts of Programming Languages", 10th Edition, Addison-Wesley, 2012.
2. Kenneth C. Louden & Kenneth A. Lambert,"Programming Languages principles and practice", 3rd Edition, Thomson, 2012.
3. Terrance W.Pratt, Marvin V.Zelkowitz, T.V.Gopal,"Programming Languages Design and Implementation", 1st Edition, Pearson Education, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Distinguish programming language features based on their static and dynamic semantics.
- Master using the appropriate data structure for the given scenario
- Use the correct control structure for the given problem and trace its execution Path
- Trace the lifetime of a given variable and debug it
- Compare and contrast the objected oriented and functional programming paradigms .
- Solve problems using a range of programming paradigms and assess the
- Effectiveness of each paradigm for a particular problem.

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.
- 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 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", 8th Edition, Cummins Pub, 2008.
3. Scott Freeman," Biological Sciences", Prentice Hall, 2002.

OUTCOMES:

Students who complete this course will be able to:

- Understand the engineering of life processes.
- Capable of pursuing tissue engineering, biomedical engineering and biotechnology at master level programme.
- Apply the knowledge of biology for engineering applications.

ENB2282 CONFIDENCE BUILDING AND BEHAVIORAL SKILLS

L T P C

(Common to all Branches) 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.

Total Hours: 30

OUTCOMES:

The students should be able to:

- Develop verbal communication skills.
- Debate with other students confidently.
- Communicate effectively their ideas.

CSB2215 **DBMS LAB** **L T P C**

0 0 3 1

OBJECTIVES:

- ✓ To develop conceptual understanding of database management system
- ✓ To understand how a real world problem can be mapped to schemas
- ✓ Able to create database with different types of integrity constraints and use the SQL commands such as DDL, DML, DCL, TCL to access data from database objects.
- ✓ Able to access and manipulate data using PL/SQL blocks.
- ✓ To develop understanding of different applications and constructs of SQL PL/SQL
- Able to connect database to front end using JDBC and ODBC driver.

SQL:

1. Creating, altering and dropping tables with integrity constraints.
2. Retrieving and modifying data from a database.
3. Retrieving data from database using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING clause.
4. Use of scalar and aggregate functions.
5. Retrieving data from a database using Equi, Non Equi, Outer and Self Join.
6. Using sub queries, row id and row num for retrieving data.
7. Use of views, indexes and sequences.

PL/SQL:

1. Introduction to PL/SQL, using output from server.
2. Use of implicit & explicit cursors in data handling.
3. Exception handling - Oracle defined and User defined.
4. Use of stored procedures & functions in data manipulation.
5. Use of trigger in data manipulation.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using VB

CSB2216 **OPERATING SYSTEM LAB** **L T P C**

0 0 3 1

OBJECTIVES:

- To give basic knowledge about Unix environment
- To train in writing simple system call routines
- To simulate various unix commands and study their functionalities
- To expose to various job scheduling algorithms
- To educate upon Inter Process Communication
- To distinguish between different memory management techniques

LIST OF EXPERIMENTS

1. Write programs using the following system calls of UNIX operating system: fork, exec,getpid, exit, wait, close, stat, opendir, readdir.
2. Write programs using the I/O system calls of UNIX operating system (open, read, write)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/ print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Given the list of processes, their CPU burst times and arrival times, display/ print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
6. Developing Application using Inter Process Communication
7. Implement the Producer - Consumer problem using semaphores (using

UNIX system calls).

8. Implement memory management schemes
9. Implement any file allocation technique (Linked, Indexed or Contiguous)

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Distinguish amongst various operating systems
- Execute system call routines and enumerate their purpose
- Analyze a real world problem and propose suitable scheduling algorithm
- Demonstrate Inter Process Communication in Unix environment
- Recommend suitable memory management technique for a given scenario
- Suggest a solution for synchronization problems

CSB2217	**MICROPROCESSOR AND MICRO CONTROLLER LAB**	**L T P C** **0 0 3 1**

OBJECTIVES:

- To develop an in-depth understanding of the architecture and operation of Microprocessors and Microcontrollers.
- To provide adequate knowledge on assembly language programming for different processors (8085, 8086, 8051).
- To expose the students to hardware details of various programming interfacing devices.
- To develop programs using various operation modes of interfacing devices with processors.
- To simulate the real time application programs using simulators and emulators.
- To implement simple control applications using 8051 microcontroller.

LIST OF EXPERIMENTS

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.
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.
10. 8051 Microcontroller based experiments-Simple control applications.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Develop simple programs in arithmetic, input output operations.
- Implement the interfacing of the hardware with peripheral devices/systems.
- Design programs on various programming interface devices with processor.
- Work on with simulators and emulators to implement real time application.
- Develop real time applications using 8051 microcontroller
- Design microprocessor based system for any real time problem

SEMESTER V

CSB3101 ALGORITHM DESIGN AND ANALYSIS L T P C
3 0 0 3

OBJECTIVES:

Demonstrate how an algorithm has been applied in a number of different domains.

- Expound on the good principles of algorithm design
- Illustrate on methods to analyze algorithms and estimate their worst-case and average-case behavior;
- Exemplify knowledge of fundamental data structures and expound on the manner in which these data structures can best be implemented;
- Demonstrate capability to describe formal concepts of measures of complexity and algorithms analysis.
- Demonstrate application of theoretical knowledge of algorithms and data structure in practice

MODULE I BASIS OF ALGORITHM ANALYSIS 7

Introduction - Stable Matching Problem - Computational Tractability - Asymptotic Order of Growth Notation - Implementing the Stable Matching Algorithm using Lists and Arrays - A Survey of Common Running Times- A More Complex Data Structure: Priority Queues.

MODULE II GRAPHS 7

Basic Definitions and Applications - Graph Connectivity and Graph Traversal - Implementing Graph Traversal using Queues and Stacks - Testing Bipartiteness: An Application of Breadth-First Search Connectivity in Directed Graphs - Directed Acyclic Graphs and Topological Ordering.

MODULE III GREEDY ALGORITHMS 8

Interval Scheduling: The Greedy Algorithm Stays Ahead - Scheduling to Minimize Lateness: An Exchange Argument - Optimal Caching: A More Complex Exchange Argument - Shortest Paths in a Graph - The Minimum Spanning Tree Problem -

Implementing Kruskal's Algorithm: The Union-Find Data Structure - Clustering - Huffman Codes and the Problem of Data Compression.

MODULE IV DIVIDE AND CONQUER 7

A First Recurrence: The Merge sort Algorithm - Further Recurrence Relations - Counting Inversions - Finding the Closest Pair of Points - Integer Multiplication - Convolutions and The Fast Fourier Transform.

MODULE V DYNAMIC PROGRAMMING 8

Weighted Interval Scheduling: A Recursive Procedure - Weighted Interval Scheduling: Iterating over - Sub-Problems - Segmented Least Squares: Multi-way Choices - Subset Sums and Knapsacks: Adding a Variable - RNA Secondary Structure: Dynamic Programming Over Intervals - Sequence Alignment - Sequence Alignment in Linear Space - Shortest Paths in a Graph - Shortest Paths and Distance Vector Protocols.

MODULE VI NP AND COMPUTATIONAL COMPLEXITY 8

Polynomial-time Reductions - Efficient Certification and the Definition of NP - NP-Complete Problems - Sequencing Problems - Partitioning Problems - Graph Coloring - Numerical Problems - co-NP and the Asymmetry of NP - A Partial Taxonomy of Hard Problems.

Total Hours: 45

TEXT BOOK:

1. Michael T. Goodrich and Roberto Tamassia, "Algorithm Design", 1st Edition, John Wiley & Sons, Inc. 2002.

REFERENCE:

1. TH Cormen, CE Leiserson, and RL Rivest, "Introduction to Algorithms", 2nd Edition, MIT Press/ McGraw- Hill, 2001.

OUTCOMES:

Students who complete this course will be able to:

- Analyze algorithms and estimate their complexity.
- Describe, apply and analyze the complexity of divide and conquer, greedy, and dynamic programming algorithms.
- Differentiate divide and conquer problems from recursive methods
- Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.

- Describe the classes P, NP, and NP-Complete and be able to prove that a certain problems are NP-Complete.
- Assess the computational complexity for NP hard and NP complete problems
- Show how algorithms and data structures are applied in problems in computer science engineering.

CSB3102	OBJECT ORIENTED SOFTWARE ENGINEERING	L T P C 3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of software engineering and software life cycle models.
- To provide an insight into the concepts of modeling and notations of the different UML diagrams.
- To expose the techniques for requirement gathering design and specification.
- To emphasize the importance of testing.
- To state the basic strategy behind planning a project and tracking its progress.
- To learn about the software configuration management

MODULE I INTRODUCTION TO SOFTWARE ENGINEERING 7

Software engineering concepts- Software engineering development activities-Software life cycle models- Standards for developing life cycle models-Modeling with UML.

MODULE II REQUIREMENT ELICITATION 7

Introduction- Overview of requirements elicitation- Requirement elicitation concepts- Requirement elicitation activities - Managing requirement elicitation.

MODULE III ANALYSIS AND SYSTEM DESIGN 8

Overview of Analysis- Analysis concepts- Analysis activities- Managing analysis, System design concepts - System design activities - Managing system design.

MODULE IV OBJECT DESIGN AND SPECIFIYING INTERFACE 9

Overview of object design- Reuse concepts- Reuse activities-Managing reuse-Overview of interface specification- Interface specification concepts- Interface specification activities- Managing object design.

MODULE V IMPLEMENTATION AND TESTING 7

Overview of mapping- Mapping models to Code- Mapping Object Model to Database Schema- Overview of testing- Testing concepts- Testing activities-Managing testing.

MODULE VI SOFTWARE CONFIGURATION MANAGEMENT 7

Managing and controlling Changes- Managing and controlling versions- Types of maintenance- Maintenance log and defect reports- Reverse and re-engineering.

Total Hours: 45

TEXT BOOKS:

1. Stephan R. Schach, "Object oriented and classical software engineering", 8th Edition, Tata McGraw Hill, 2010.
2. Bernd Bruegge, "Object oriented software engineering", 3rd Edition, Pearson Education, 2009.

REFERENCES:

1. Timothy C. Lethbridge, Robert Laganiere, "Object-Oriented Software Engineering - A practical software development using UML and Java", 3rd Edition, Tata McGraw-Hill, 2006.
2. S.K.Kataria, Rajiv Chopra, "Object Oriented Software Engineering", 3rd Edition, 2013.

OUTCOMES:

Students who complete this course will be able to:

- Compare the different life cycle models and select appropriate one for a real time project.
- Illustrate the different UML diagram using various tools.
- Identify the different roles, responsibilities and artifacts produced during the different phases of software development process.
- Analyze the testing, risk and change management strategies.
- Demonstrate the ability to communicate effectively in writing.
- Analyze programming language concepts, particularly object-oriented concepts.

CSB3103 COMPUTER NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To grasp the principles of data communication.
- To introduce the layering concepts in computer networks
- To introduce the functions of each layer
- To give the students experience working in programming teams
- To have knowledge in different applications that use computer networks
- To expose students to emerging technologies and their potential impact
.

MODULE I INTRODUCTION TO COMPUTER NETWORKS 8

Need for Networking - Service Description -Connectionless and Connection-Oriented Services - Circuit and Packet Switching - Access Networks and Physical Media - Wireless Links and Characteristics - Queuing Delay and Packet Loss - Internet Protocol stack - OSI Reference Model - Service Models - History of Computer Networking and the Internet.

MODULE II LINK LAYER 7

Layer Services - Error Detection and Correction Techniques - Multiple Access Protocols - Link Layer Addressing - ARP - DHCP - Ethernet - Hubs, Bridges, and Switches -PPP - ATM Networks - MPLS. Ring Topology - Physical Ring - Logical Ring.

MODULE III NETWORK LAYER 8

Forwarding and Routing - Network Service Models - Virtual Circuit and Datagram Networks - Router - Internet Protocol (IP) - IPv4 and IPv6 - ICMP - Link State Routing - Distance Vector Routing - Hierarchical Routing - RIP - OSPF - BGP - Broadcast and Multicast Routing - MPLS - Mobile IP - IPsec.

MODULE IV TRANSPORT LAYER 8

Transport Layer Services - Multiplexing and Demultiplexing - UDP - Reliable Data Transfer - Go-Back-N and Selective Repeat. Connection-Oriented Transport: TCP - Segment Structure - RTT estimation - Flow Control - Connection Management - Congestion Control - TCP Delay Modeling - SSL and TLS.

MODULE V APPLICATION LAYER 7

Principles of Network Applications - The Web and HTTP - FTP - Electronic Mail - SMTP - Mail Message Formats and MIME - DNS - Socket Programming with TCP and UDP.

MODULE VI MULTIMEDIA NETWORKING 7

Internet Telephony - RTP - RTCP - RTSP. Network Security: Principles of Cryptography - Firewalls - Application Gateway - Attacks and Countermeasures. Integrated and Differentiated Services: Intserv - Diffserv.

Total Hours: 45

TEXT BOOK:

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 3rd Edition, Pearson Education, 2006.

REFERENCES:

1. Andrew S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2003.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", 4th Edition, Elsevier, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Master the terminology and concepts of the OSI reference model and the TCP/IP reference model.
- Describe the concepts of protocols, network interfaces, and performance issues in local area networks and wide area networks.
- Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
- Identify deficiencies in existing Networking protocols
- Develop socket programming with TCP and UDP.
- Get the knowledge on how to secure their protocols and Services

CSB3104 THEORY OF COMPUTATION L T P C
3 0 0 3

OBJECTIVES:

The learning objectives of this course are to:

- Identify the type of problems that can be solved using computation
- Describe the models through which computation can be expressed.
- Enhance students' ability to conduct mathematical proofs for computation.
- Demonstrate the key notions, such as algorithm, computability, decidability, and complexity through problem solving.
- Describe the challenges of theoretical computer science and its contribution to other sciences.

MODULE I INTRODUCTION TO AUTOMATA 7

Why study Automata Theory- Introduction to Formal Proof - Additional Forms of Proof-Inductive Proofs- The Central Concepts of Automata Theory.

MODULE II FINITE AUTOMATA 9

An Informal Picture of Finite Automata- Deterministic Finite Automata-Nondeterministic Finite Automata- Finite Automata With Epsilon Transitions-Equivalence and Minimization of Automata.

MODULE III REGULAR EXPRESSIONS 8

Regular Expressions- Finite Automata and Regular Expressions-Pumping Lemma of regular languages- Properties of regular languages.

MODULE IV CONTEXT-FREE GRAMMARS AND LANGUAGES 8

Context-Free Grammars- Parse Trees- Ambiguity in Grammars and Languages- Normal Forms of Context Free Grammars- Pumping Lemma of Context Free Languages.

MODULE V PUSH DOWN AUTOMATA 7

Definition of the Pushdown Automaton - The Languages of a PDA

Equivalence of PDA's and CFG's- Deterministic Pushdown Automata

MODULE VI TURING MACHINES 6

The Turing Machine- Programming Techniques for Turing Machines- Extensions to the Basic Turing Machine- Turing Machines and Computers.

Total Hours: 45

TEXT BOOKS:

1. John Hopcroft, Rajeev Motwani & Jeffry Ullman "Introduction to Automata Theory, Languages & Computation", 3rd Edition, Pearson Education, 2012.
2. John C Martin, "Introduction to Languages and Automata Theory", 3rd Reprint Edition, Tata McGraw-Hill, 2008.

REFERENCES:

1. Michael Sipser, "Introduction to the Theory of Computation", 3rd Edition, PWS Publishing Company, 2013.
2. George Tourlakis, "Theory of Computation", 1st Edition, John Wiley & Sons, 2012.
3. Kamala Krithivasan & R. Rama, "Introduction to Formal Languages, Automata Theory and Computation", 1st Edition, Pearson Education, 2009.

OUTCOMES:

Students who complete this course will be able to:

- Apply mathematical proof to real time computation problem.
- Solve simple problems in RE's, DFA's, NFA's, Turing machines, and Grammars.
- Prove/disprove the basic results of the Theory of Computation.
- Describe the Grammars of Context Free Languages.
- Analyze the core concepts relating to the theory of computation and computational models including (but not limited to) decidability and intractability.
- Develop abstract models to simulate complex systems

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

OBJECTIVES:

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

MODULE I PRINCIPLES OF MANAGEMENT 7

Functions of management - Planning - Organizing - Staffing - Direction - Motivation - Communication - Coordination - Control, organizational structures - Line - Line and staff - Matrix type, functional relationships - Span of control, Management by Objectives (MBO) - Forms of Industrial ownership.

MODULE II OPERATIONS MANAGEMENT 8

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

MODULE III MATERIALS MANAGEMENT 8

Materials Planning - Types of inventory, Purchasing function - Source selection - Negotiation - Ordering, Stores management - Functions - Types of stores - Overview of inventory control, Introduction to newer concepts: MRP-I - MRP-II - ERP - JIT.

MODULE IV HUMAN RESOURCE MANAGEMENT 7

Human Resource Management - Objectives - Role of Human Resource Manager - Manpower planning - Selection and placement - Training - Motivation - Performance assessment - Introduction to grievances handling and labour welfare.

MODULE V MARKETING MANAGEMENT 7

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

MODULE VI FINANCIAL MANAGEMENT 8

Financial management functions - Introduction to financial accounts, financial performance - Profit and loss account statement - Balance sheet, budgetary control - Meaning - Uses - limitations - Types of costs - Basics of depreciation methods -Break-even analysis - Meaning - Assumption - Uses and limitations, working capital - Meaning and relevance - Use of operating ratios.

Total Hours: 45

REFERENCES:

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

OUTCOMES:

After doing the course,

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

ENB3181 CAREER BUILDING & PEOPLE SKILLS L T P C

(Common to all branches) 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.

Total Hours: 30

OUTCOMES:

Students who complete this course will be able to:

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

CSB3105 ALGORITHM ANALYSIS LAB L T P C

0 0 3 1

OBJECTIVES:

- Demonstrate familiarity with major algorithms and the important data structures
- Illustrate, implement and compare fundamental data structures.
- Analyze asymptotic performance of algorithms
- Apply algorithm design paradigms
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

LIST OF EXPERIMENTS

1. Writing a simple program of analyzing the complexity of the algorithm.
2. Comparing of any two searching algorithms with respect to time complexity.
3. Using suitable data structure represent a graph and write algorithm to traverse the graph (BFS, DFS)
4. Design and implement prim's algorithm to construct a minimum spanning tree and analyze the same for its complexity.
5. Design and implement Kruskal's algorithm to construct a minimum spanning tree and analyze the same for its complexity.
6. Using divide and conquer concept design and analyze an algorithm to implement Quick sort.
7. Design and implement an algorithm for Merge sort and compute its time and space complexity.
8. Implement priority queue using heapsort
9. Implement Dijkstra's algorithm using priority queues
10. Implement a backtracking algorithm for Knapsack problem

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Compute the time and space complexity of the algorithm.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Differentiate search algorithms and explain the situation when the algorithm must be applied.
- Implement various traversing techniques and construct graph and tree from the given data to manipulate the complexity of the algorithm.
- Design and implement various sorting methodologies to analyze the algorithm.
- Compare between different data structures and pick an appropriate data structure for a design situation.

CSB3106	CASE TOOLS LAB	L T P C
		0 0 3 1

OBJECTIVES:

- To expose software engineering methodologies using CASE tools.
- To explore concepts of UML(Unified Modeling Language).
- To learn how to test the developed software using Rational Rose.
- To review the integration of various components of UML for the developed software.
- To write test cases for various applications.
- To emphasize the importance of a case tool software in software project development.

LIST OF EXPERIMENTS:

The following analysis can be designed for each experiment

1. Problem Analysis – Identify project scope, requirement and Objectives
2. Software Requirement Analysis –It defines the individual Phases of the project.
3. Data Modelling- use case diagrams and activity diagrams, build and test.
4. Class diagrams with the functions defined, sequence diagrams and add interface to class diagrams.
5. Software Development and Debugging.
6. Software Testing Prepare test plan and perform validation testing.
7. Remote computer monitoring (using virtualization tools)
8. Create and launch an app.
9. Expert system for medical purpose.
10. Platform assignment system for the trains in a railway station
11. E-mail Client system.
12. Expert Systems for launching IoT at home.
13. Design an infrastructure model for large storage of an online selling website.
14. Design laboratory that operate remotely and that’s secured through some i/o devices. .

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Recalls the process to be followed in the software development life cycle.
- Construct Use case diagram, Class diagram, Sequence diagram and collaboration diagram.
-
- Test the software, memory usage of the software and validate the text box using Rational Rose.
- Design a project using CASE tools for socially relevant and real time problems.
- Manage a project from beginning to end
- Compare and contrast the fitness of existing CASE Tools to the needs of specific software development context

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CSB3107	NETWORKS LAB	L T P C
		0 0 3 1

OBJECTIVES:

- To expose networking concepts using simple programs
- To illustrate communication between two entities using various constructs
- To emulate client server architecture using different protocols.
- To demonstrate the error handling mechanisms in networks
- To illustrate different routing protocols and algorithms for reliable data transfer.
- To enable a student to design middleware/software on top of the existing network protocols.

LIST OF EXPERIMENTS:

1. Write a socket Program for Echo / Ping / Talk commands.
2. Create a socket (TCP) between two computers and enable file transfer between them.
3. Write a program to implement Remote Command Execution
4. Write a program to implement CRC and Hamming code for error handling.
5. Write a code simulating Sliding Window Protocols.
6. A Client Server application for chat.
7. Write a program for File Transfer in client-server architecture using following methods.
    a. USING RS232C
    b. TCP/IP
8. Perform implementation of routing algorithms to select the network path with its optimum and economical during data transfer.
    a. Shortest path routing
    b. Flooding
    c. Link State
    d. Hierarchical

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Apply basic concept of TCP/IP protocol and implement it.
- Simulate network protocols to check the functionality of different routing algorithms for efficient data transfer without data loss.
- Build error check and control mechanisms in communication
- Develop simple security mechanisms in the networking applications
- Build real time application using client server architecture.
- Design applications for communication using the networking paradigms

SEMESTER VI

		L T P C
CSB3211	**MOBILE AND PERVASIVE COMPUTING**	**3 0 0 3**

OBJECTIVES:

- To expose the usage of ubiquitous computing technology.
- To explore challenges, privacy and security issues faced in ubiquitous devices.
- To illustrate how effectively process sensor data is used in adhoc sensor networks.
- To focus on moving from the graphical user interface to the ubiquitous computing user interface.
- To establish the role of design process, tools and issues in context aware computing.
- To trace how the issues of security, privacy and trust management takes place for pervasive environment.

MODULE I INTRODUCTION TO MOBILE AND PERVASIVE COMPUTING 8

Founding Contributions to Ubiquitous Computing - Tabs, Pads, and Liveboards - From Distributed Computing to Pervasive Computing - Research Areas that make up pervasive computing - Modern Directions in Ubiquitous Computing.

MODULE II MOBILE AND PERVASIVE COMPUTING DEVELOPMENT 8

Ubicomp Systems Topics and Challenges-Creating Ubicomp Systems - Implementing Ubicomp Systems -Evaluating and Documenting Ubicomp Systems - Understanding Privacy and Security-Technical Solutions for Ubicomp Privacy.

MODULE III WIRELESS ADHOC SENSOR NETWORKS 7

Wireless pervasive network basics- Designing the topology - Analysing the power, receiving signal strength - IEEE 802.11 standard MAC protocols - Wireless Adhoc and sensor network protocol for pervasive computing: AODV, DSR, DSDV, LEACH - Wireless transport layer protocols for pervasive computing: TCP, UDP, Multimedia data protocols: RTP, RTCP.

MODULE IV INTERFACES FOR UBIQUITOUS COMPUTING 8

From Graphical User Interfaces to Context Data - Interaction Design - System design - Design patterns -Classes of User Interface - Input Technologies - Interface Usability Metrics.

MODULE V CONTEXT-AWARE COMPUTING 7

Context-Aware Computing -Feature - Context-Aware Applications - Environmental Controls- Designing and Implementing Context-Aware Applications - Design Process - Tools - Issues-Context Ambiguity.

MODULE VI SECURITY, PRIVACY AND TRUST MANAGEMENT 7

Agents, Control policies, credentials and action types, Trust negotiation and management for Pervasive Computing, Securing Pervasive Computing Environments, Privacy issues, Enhancing privacy for pervasive environments.

Total Hours: 45

TEXT BOOKS:

1. John Krumm,"Ubiquitous Computing fundamentals", Taylor & Francis Group, CRC Press, 2010.
2. Adam Greenfield,"Everyware: The Dawning Age of Ubiquitous Computing",1st Edition, New Riders, 2006.
3. Adelstein et al., "Fundamentals of Mobile and Pervasive Computing", Tata McGraw Hill Publishers, 2005
4. Yang et al., "Handbook of Mobile and Pervasive Computing: Status and perspective", CRC Press, 2012.

OUTCOMES:

Students who complete this course will be able to:

- Differentiate pervasive way of computing from everyday computing.
- Demonstrate ubiquitous computing in various devices and real time applications.
- Recognize the knowledge about various sensor network protocols.
- Analyze the working of technologies related to graphical and user interface.
- Illustrate how contexts can help building privacy statements.
- Apply the resolution and techniques to solve the issues in pervasive environments.

CSB3212	INTRODUCTION TO COMPILER CONSTRUCTION	L T P C
		3 0 0 3

OBJECTIVES:

- To enrich the knowledge on need and application of compiler in real time applications.
- To throw light on different steps involved in various phases of a compiler.
- To illustrate various bottom up and top down parsing techniques.
- To study on Lexical analyzer generator, LEX and parser generator, YACC
- To expose the concepts of optimization techniques for code generation.
- To expose the use of different compiler construction and automated tools in developing a new compilers for real time application.

MODULE I LEXICAL ANLAYSIS 6

Language processors - The structure of a Compilers - The evolution of programming languages- The science of building a compiler- Applications of Compiler technology- Programming language basics- Lexical analysis: The Role of Lexical Analyzer- Input Buffering- Specifications of Tokens- Recognition of Tokens.

MODULE II SYNTAX ANALYSIS 8

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 8

Syntax-Directed definitions- Evaluation order for SDDs- Applications of Syntax-directed translation- Syntax-directed translation schemes.

MODULE IV INTERMEDIATE CODE GENERATION 8

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 CODE GENERATION AND RUN TIME ENVIRONMENTS 7

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- Run time storage environment- storage organization-stack allocation of space-Access to non local data on the heap management-introduction to garbage collection.

MODULE VI CODE OPTIMIZATION 8

Principle sources of optimization- Peephole optimization-introduction to global data flow analysis –compiler construction tools -Study of automated tools.

Total Hours: 45

TEXT BOOK:

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman ,"Compilers- Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2008.

REFERENCES:

1. Parag Himanshu Dave and Himanshu Bhalchandra Dave, "Compilers: Principles and Practice", 1st Edition, Pearson Education, 2012.
2. Keith Cooper and Linda Torczon, "Engineering a Compiler", 2nd Edition, Morgan Kauffman Publications, 2011.

OUTCOMES:

Students who complete this course will be able to:

- Identify the basic steps involved in various phases of compilers.
- Compare and contrast various issues in bottom up and top down parsers.
- Design and develop lexical and syntax analyzer using latest compiler tools.
- Generate intermediate code representation for a given set of program instructions.
- Apply the code and loop optimization techniques in intermediate code generation.
- Acquire knowledge on existing compiler construction and automated tools.

CSB3213	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To expose to the fundamentals of artificial intelligence
- To have a detailed study on various searching techniques
- To inculcate the ability to represent knowledge using logical reasoning
- To have a detailed study on various learning algorithms
- To give the basic foundation for natural language processing
- To explore the role of artificial intelligence in real world applications

MODULE I DEFINITION AND RUDIMENTARY METHODS 7

Definition of Artificial Intelligence - Strong AI Vs Weak AI - Early history of AI - Recent history of AI to present - Intelligent Agents - Agents and environments - Application and methods - Neural Computing - Genetic Algoirthms - Fuzzy Logic - Uninformed search strategies - Avoiding repeated states - Searching with partial information.

MODULE II SEARCHING TECHNIQUES 8

Informed search and exploration - Informed search strategies - Heuristic function - Local search algorithms and optimistic problems - Local search in continuous spaces - Online search agents and unknown environments - Constraint satisfaction problems (CSP) - Backtracking search and Local search for CSP - Structure of problems - Adversarial Search - Games - Optimal decisions in games - Alpha - Beta Pruning - Imperfect real-time decision - Games that include an element of chance.

MODULE III KNOWLEDGE REPRESENTATION 8

First order logic - Representation revisited - Syntax and semantics for first order logic - Using first order logic - Knowledge engineering in first order logic - Inference in First order logic - Prepositional versus first order logic - Unification and lifting - Forward chaining - Backward chaining - Resolution - Knowledge representation - Ontological

Engineering - Categories and objects - Actions - Simulation and events - Mental events and mental objects.

MODULE IV LEARNING 8

Learning from observations - Forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning - Logical formulation of learning - Explanation based learning - Learning using relevant information - Inductive logic programming - Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Reinforcement learning - Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

MODULE V APPLICATIONS NATURAL LANGUAGE PROCESSING AND INFORMATION RETRIEVAL 7

Communication - Communication as action - Formal grammar for a fragment of English - Syntactic analysis - Augmented grammars - Semantic interpretation - Ambiguity and disambiguation - Discourse understanding - Grammar induction - Probabilistic language processing - Probabilistic language models - Information retrieval - Information Extraction - Machine translation.

MODULE VI APPLICATIONS - GAMING AI IN THE AND TWENTY FIRST CENTURY 7

Checkers - From Samuel to Schaeffer - Heuristic methods - Rote learning and Generalization - Chess: programming methods - Contributions of computer chess to Artificial Intelligence - Other Games - AI in the 21st Century.

Total Hours: 45

TEXT BOOK:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence - A Modern Approach", 3rd Edition, Pearson Education / Prentice Hall of India, 2009.

REFERENCES:

1. Stephen Lucci, Danny Kopec," Artificial Intelligence in the 21st Century", Mercury Learning and Information, 2012.
2. Kevin Warwick, "Artificial Intelligence: The Basics", Routledge Publications, 2011.

OUTCOMES:

Students who complete this course will be able to:

- Summarize the fundamentals of artificial intelligence
- Choose and implement appropriate searching algorithms and compare their performances
- Analyze and represent the knowledge for a given scenario
- Design and implement simple learning algorithms
- Assimilate the basic natural language techniques
- Work in teams to propose models for solving real world problems using artificial intelligence

GE B3201 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

3 0 0 3

OBJECTIVE:

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

MODULE I PHYSICAL ENVIRONMENT 8

Earth's surface - the Interior of Earth - Plate Tectonics - Composition of the Crust: Rocks - formation & types, Soils - formation & components - Soil profile.

Atmosphere - Structure & composition - Weather & climate - Tropospheric airflow.

Hydrosphere - Water budget - Hydrological cycle - Rainwater & precipitation, River Water & solids, Lake Water & stratification, Seawater & solids, soil moisture & groundwater.

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

MODULE II BIOLOGICAL ENVIRONMENT 7

Cellular basis of life - Prokaryotes & eukaryotes - Cell respiration - Photosynthesis - DNA & RNA - Genetically modified life.

Population dynamics - Population - Population growth - Survival & growth curves - Population regulation - Future of human population.

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

Ecosystem & Biomes - Food Chains & food webs - Biomagnifications - Ecological pyramids - Trophic levels - Energy flow in ecosystem - Ecosystem stability - Terrestrial & aquatic biomes.

MODULE III IMPACTS ON NATURAL RESOURCES & CONSERVATION 9

Biological resources - Nature & 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 & Industrial development - deforestation, salinisation, soil erosion, and desertification - Modern Agriculture & Impacts.

Major extractive industries - Metals & ores - Building materials - Peat - Fossil fuels (coal, oil, natural gas).

Waste management - Types of solid wastes - Disposal options -Reduce, recovery & reuse - Waste minimization, cleaner production technology.

MODULE IV IMPACTS ON WATER & AIR AND CONSERVATION 8

Water pollution - Organic oxygen demanding wastes - Anthropogenic phosphate & eutrophication - Ground water contamination - Usage of fertilizer and pesticides- Acid rain - acid mine discharges - Toxic metals - Organochlorines - Endocrine disrupting substances- treatment process - Rain water harvesting and watershed management- Manmade radionuclide's - Thermal pollution.

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

MODULE V IMPACTS ON ENERGY AND CONSERVATION, ENVIRONMENTAL CRISIS 8

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

Environment crisis - State of environment in developed and developing countries- Managing environmental challenges for future - Disaster management, floods, earthquake, cyclone and landslides.

MODULE VI ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABILITY 5

Environmental Impact Assessment - Impacts: magnitude & significance - Steps in EIA - methods - Precautionary principle & polluter pays principle - Role of NGOs & Public -

Value education -Environment protection act (air, water, wild life) and forest Conservation act.

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

Total Hours: 45

TEXT BOOKS:

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

REFERENCES:

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

OUTCOMES:

Students who complete this course will be able to:

- Gain basic scientific knowledge on the environment.
- Human impacts on various elements of environment and assessment tools.

CSB3214 MOBILE AND PERVASIVE COMPUTING LAB

	L	T	P	C
	0	0	3	1

OBJECTIVE

- To explain the basics of wireless systems.
- To implement pervasive computing constructs from a routing perspective.
- To implement pervasive computing constructs from data management perspective.
- To explain pervasive computing constructs from security and privacy perspective.
- To expose and user fundamentals of programming for mobile devices.
- To apply event-driven programming and graphical user interfaces for mobile devices.

Lab Activities:

- Creating a wireless pervasive network
- Creation of the network
- Designing the topology
- Analysing the power, receiving signal strength
- Implementing and simulating various IEEE 802.11 standard MAC protocols
- Implementing the wireless adhoc and sensor network protocol for pervasive computing
- AODV
- DSR
- DSDV
- LEACH
- Implementing wireless transport layer protocols for pervasive computing
- TCP
- UDP
- Multimedia data protocols

- RTP
- RTCP
- Security protocols for pervasive computing
- Privacy preservation of Data
- Horizontal and vertical partitioning
- Application development
- Mini project (Any one domain)
- Sensor network
- Context awareness
- Privacy
- Security

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Describe pervasive wireless environment.
- Analyze the pervasive wireless environment from security and privacy perspective.
- Demonstrate the pervasive wireless environment from data management perspective.
- Implement pervasive applications for security and privacy.
- Apply fundamentals of programming for mobile devices.
- Develop graphical user interfaces for mobile devices.

CSB3215	COMPILER TECHNIQUES LAB	L	T	P	C
		0	0	3	1

OBJECTIVES:

- To expose the working of lexical analyzer.
- To describe the functioning of syntax analyzer for different context free grammar.
- To illustrate tools like LEX /FLEX and YACC/Bison to design lexical analyzer and produce a parser for a given grammar.
- To introduce concept of code optimization of three address code for different programming statements.
- To show various methods for converting three address code to assembly level program.
- To conceptualize a compiler for a simple language.

.LIST OF EXPERIMENTS:

1. Implement a lexical analyzer in "C".
2. Use LEX tool to implement a lexical analyzer.
3. Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
4. Use YACC and LEX to implement a parser for the same grammar as given in problem.
5. Write semantic rules to the YACC program in problem 5 and implement a calculator that takes an expression with digits, + and * and computes and prints its value.
6. Implement the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
7. Implement the back end of the compiler which takes the three address code generated.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- To implement lexical analyzer for the given source program.
- To implement syntax analyzer for the given context free grammar.
- To Gain Expertise on lexical analysis and parser tools.
- To generate optimized three address code for different programming statements.
- To convert three address code to assembly level program.
- Design and implement a simple compiler and demonstrate its working.

CSB3216	**FOSS LAB**	**L**	**T**	**P**	**C**
		1	**0**	**2**	**1**

OBJECTIVES:

- To help demystify the tools in Open source technologies.
- To explain the impact of open source technology in programming.
- To expose students to FOSS environment and introduce them to use open source Packages.
- Version Control System setup and usage using RCS, CVS, SVN
- Set up the complete network interface usinf ifconfig command liek setting gateway, DNS, IP tables, etc
- To develop GUI processing using Python.

Lab Activities:

- Case study: Proprietary Vs Open Source tools
- Mapping from Proprietary tools to Open source tools - An Analysis
- Deploy a LAMP stack in Linux
- Application analysis and comparison
- Create a simple application for text processing regular expression using Java
    - in Linux
- Use grep tool to simulate the same operations
- Compare the impact of using the proprietary tools and specialized open source
- component
- Simulate the cut command
- Estimate the lines of code in the proprietary tool
- Create an application that uses all the LAMP stack components
- Apache server
- MySQL database
- PHP script must be used to create a simple application and this must be
- deployed and tested
- GUI processing using Python

- Open source applications for research - Case study
- Take any one application domain like Data mining, Network security
- Run a simple task in that tool
- Deploy it
- Compare the experience with that of a proprietary tool
- Social Computing
- Implement the power saving steps in Linux to conserve energy
- Use Power TOP tool to visualize power consumption of a system
- Indic Language computing tools

Total Hours : 45

OUTCOMES:

Students who complete this course will be able to:

- Analyze the differences between the open source model and the commercial proprietary model.
- Expertise on using a variety of open source software.
- Develop and deploy a project based purely on open source tools.
- Implement the power saving steps in Linux to conserve energy.
- Use Power TOP tool to visualize power consumption of a system
- Learn the Indic Language computing tools

SEMESTER VII

CSB4101	**INFORMATION SECURITY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

- To explore varied security considerations associated with storage, processing and communication of information.
- To introduce the available cryptographic mechanism.
- To expose different facets of securing information.
- To create awareness of legal and ethical issues associated with information security.
- To demonstrate various aspect of information security management including planning, process, policy, procedure and security model as well as hardware and software technologies to safeguard organizational assets.

MODULE I INTRODUCTION 7

Security problem in computing - Secure system characteristics - What to secure -How to secure- Cost of Security - Introduction to Information security, CIA triad - Security Models, Attacks and Defense.

MODULE II PRINCIPLES 8

Identification - Authentication - Authorization - Access Control - Auditing - Accountability.

MODULE III CRYPTOGRAPHY FUNDAMENTALS 7

History of Cryptography - Cryptographic Algorithms: Symmetric Key Cryptography, Asymmetric Key Cryptography and Hash functions - Digital Signatures.

MODULE IV OPERATIONS SECURITY AND PHYSICAL SECURITY 8

Operational security overview: identifying critical information, analyzing threats, analyzing vulnerabilities, determining risks, and planning countermeasures - Laws of OPSEC.

Physical security overview - physical security controls and mitigation: deterrent, detective, and preventive measures.

MODULE V NETWORK AND OPERATING SYSTEM SECURITY 8

Network security overview - Design and segmentation aspect of networks – Firewalls - Intrusion Detection Systems- VPNs - Securing WiFi - Tools for OS security - Hardening - Anti-malware tools, software firewalls, and host-based intrusion detection systems.

MODULE VI APPLICATION SECURITY, LEGAL AND ETHICAL

CONSIDERATIONS 7

Application Security: Vulnerabilities common to the software development process- Database Security - Web Security.

Legal and Ethical Aspects: Protecting Programs and Data - Information and the Law - Software Failures - Computer Crime - Privacy - Ethical Issues.

Total Hours:45

TEXTBOOKS:

1. Jason Andress,"The Basics of Information Security: Understanding the Fundamentals of InfoSec in Theory and Practice", 1st Edition, Syngress Press, 2011.
2. Charles B. Pfleeger, and Shari Lawrence Pfleeger, "Security in Computing", 4th Edition, Prentice Hall, 2006.

REFERENCE:

1. Mark Stamp, "Information Security: Principles and Practices", 2nd Edition, Wiley Publications, 2011.

OUTCOMES:

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

- Identify the different types of threats to information security.
- Assess the different information security threats and take necessary action using tools.
- Recognize the legal and ethical aspects when taking decisions pertaining to information handling.
- Show how to maintain and protect information system.
- Use current techniques and tools to provide security to information systems.
- Tackle challenging security risks using the knowledge of information security.

CSB4102 DATA MINING AND WAREHOUSING

	L	T	P	C
	3	**0**	**0**	**3**

OBJECTIVES:

- To illustrate the basic concepts and techniques of Data Mining.
- Interpret the contribution of data warehousing and data mining to the decision support level of organization
- Categorize and carefully differentiate between situations for applying different data mining techniques
- Assess the strengths and weaknesses of the data mining algorithms
- Provide an overview on the data mining environments and application.
- Expound on the concept, structure and major issues of data warehousing;

MODULE I INTRODUCTION 7

Introduction - Data warehouse delivery method - System process - typical process flow within a Data warehouse - Data warehousing Components - Building a Data warehouse - Mapping the Data Warehouse to a Multiprocessor Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools - Metadata - reporting - Query tools and Applications - Online Analytical Processing (OLAP) - OLAP and Multidimensional Data Analysis.

MODULE II DATA MINING AND ASSOCIATION RULE 7

Data Mining: - Data Mining Functionalities - Data Preprocessing - Data Cleaning - Data Integration and Transformation - Data Reduction - Hierarchy Generation - Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules - Association Mining to Correlation Analysis - Constraint- Based Association Mining.

MODULE III CLASSIFICATION AND PREDICTION 7

Classification and Prediction: - Issues Regarding Classification and Prediction - Classification by Decision Tree Introduction - Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines - Associative Classification - Lazy Learners - Other Classification Methods - Prediction - Accuracy and Error Measures - Evaluating the Accuracy of a Classifier or Predictor - Ensemble Methods - Model Section.

7

MODULE IV CLUSTER ANALYSIS

Cluster Analysis: - Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical methods - Density-Based Methods - Grid-Based Methods - Model-Based Clustering Methods - Clustering High-Dimensional Data - Constraint - Based Cluster Analysis - Outlier Analysis.

MODULE V MULTIDIMENSIONAL ANALYSIS   8

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects - Spatial Data Mining - Multimedia Data Mining - Text Mining - Mining the World Wide Web.

MODULE VI MINING ENVIRONMENT - CASE STUDY   9

Data Mining Environment: Case studies in building business environment, Application of data warehousing and Data mining in Government, National Data ware houses - Case studies.

Total Hours: 45

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 2nd Edition, Elsevier, 2008.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", 10th reprint, Tata McGraw - Hill, 2007.

REFERENCES:

1. K.P. Soman, Shyam Diwakar and V.Ajay, "Insight into Data mining Theory and Practice", 2nd print, Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, PHI, 2006.

OUTCOMES:

Students who complete this course will be able to:

- Evaluate emerging standards for data mining and apply them to practical scenarios.
- Illustrate the issues and challenges in data cleaning and processing with simple examples
- Perform basic data mining operations and apply standard data mining algorithms for association rule mining, clustering and classification and solve real time problems.
- Explain the issues and challenges in multimedia data mining
- Show with examples how data mining and warehousing techniques can impact the organizations.
- Review the various latest research activities going on in the field of Data Mining.

CSB4103 DISTRIBUTED COMPUTING

	L	T	P	C
	3	0	0	3

OBJECTIVES:

- To expose to the fundamental principles common to the design and implementation of programs that run on two or more interconnected computer systems.
- To describe distributed computing paradigms in the form of abstract models and algorithms.
- To analyze the key issues related to multi-level interoperability across a distributed infrastructure and across multiple heterogeneous resources.
- Illustrate the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of this solutions.
- To interpret how various design principles and features affect software design based on specific application problems.
- To recognize and analyze the failure detection algorithms for fault tolerance and how recovery from failure can be carried out.

MODULE I DISTRIBUTED COMPUTING PARADIGMS 8

Distributed Computing Systems: Definition - System Models - Advantages of Distributed Systems - Strengths and weaknesses of Distributed computing - Design Challenges - Distributed Computing Environment - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols.

MODULE II COMMUNICATION 8

Interprocess Communication Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study - Message Passing: Fundamental Concept - Features - Issues - Synchronization - Buffering - Message Encoding and Decoding - Process addressing - Failure Handling - Remote Procedure Calls: RPC Model -

Transparency - Implementation - Stub Generation - RPC Messages - Marshaling - Communication Protocols - Client-Server Binding - Lightweight RPC.

MODULE III MEMORY 8

Distributed shared Memory - Basic Concept - General Architecture - Advantages - Design Issues - Structuring Approaches - Consistency Models - Replacement Strategy - Thrashing - Synchronization Mechanisms: Clock Synchronization - Event ordering - Mutual Exclusion - Deadlock - Election Algorithms.

MODULE IV RESOURCE MANAGEMENT 7

Resource Management: Basic Concept - Features - Task Assignment approach - Load Balancing Approach - Load-Sharing Approach - Process Management: Basic Concept - Process Migration - Threads.

MODULE V FILE SYSTEMS 7

Distributed File Systems: Uses - Services - Features - File Models - Accessing Models - Sharing Semantics - Caching Schemes - File Replication - Fault Tolerance - Atomic Transactions - Design Principles.

MODULE VI NAMING AND SECURITY 7

Naming Systems: Features - Fundamental Terminologies and Concepts - System Oriented Names - Object Locating Mechanisms - Human Oriented Names - Name Caches - Naming and Security - Case Studies: V-System - Mach.

Total Hours: 45

TEXT BOOKS:

1. A.D. Kshemkalyani, M. Singhal, "Distributed Computing: Principles, Algorithms and Systems", Paperback Edition, Cambridge University Press, 2011.
2. Pradeep K. Sinha, "Distributed Operating Systems - Concepts, Systems and Applications", 3rd Edition, Prentice Hall India, New Delhi, 2008.

REFERENCES:

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd Edition ,Pearson Education , 2002.
2. Andrew S Tanenbaum , Maartenvan Steen, "Distributed Systems - Principles and Pardigms",2nd Edition, Pearson Education, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Describe the principles underlying the functioning of distributed systems.
- Trace the importance of resource management replication and security in distributed systems.
- Apply algorithms and techniques to distributed system environment.
- Build distributed system environment using various methods, strategies, and techniques presented in the course.
- Improve the performance and reliability of distributed programs analyzing various factors.
- Describe

- Describe and distinguish synchronization and concurrency control for a parallel or distributed computing system.

CSB4105	INFORMATION SECURITY LAB	L T P C
		0 0 3 1

OBJECTIVES:

- To expose the basics of network communication.
- To develop cryptographic algorithms.
- To provide server client communication.
- To evaluate the performance of various cryptographic algorithms.
- To study and implement simple security algorithm.
- To identify attacks in the network communication.

LIST OF EXPERIMENTS:

1. Using Sniffers for monitoring network communication (Ethereal)
2. Understanding of cryptographic algorithms and implementation of the same in C or C++
3. Using open SSI for web server - browser communication
4. Using GNU PGP
5. Performance evaluation of various cryptographic algorithms
6. Using IPTABLES on Linux and setting the filtering rules
7. Configuring S/MIME for e-mail communication
8. Understanding the buffer overflow and format string attacks
9. Using NMAP for ports monitoring

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Solve the issues occurs in the network communication through algorithms.
- Design and implement various cryptographic algorithms.
- Implement and analyze the working of simple security algorithm.
- Establish browser and email communication.
- Monitor flow of information in the network
- Identify the vulnerabilities.

CSB4106	**DATA MINING AND TOOLS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1**

OBJECTIVES:

- To show the importance of preprocessing in Data mining and Data warehousing.
- To demonstrate the need for Data Mining and advantages to the business and scientific world.
- To implement Data Mining techniques various scenarios and the scope of their applicability.

LIST OF EXPERIMENTS:

(Can be implemented in any one open source Data mining Tool)

1. To perform various commands given in PL/SQL in Oracle 8.0(For brushing up.)
2. To perform the correlation analysis between for the given data set.
3. To perform the attribute relevance analysis on the given data.
4. To perform the information gain for a particular attribute in the given data.
5. To perform the experiment to predict the class using the Bayesian classification.
6. To perform various data mining algorithms like
    - clustering,
    - Association rule mining
    - classification

Using the dataset from the UCI repository

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Collect different types of data apply preprocessing techniques.
- Predict the class of data by suitable data mining techniques.
- Solve real time problems based on data mining concepts using data mining tools.

CSB4107 MOBILE APPLICATION DEVELOPMENT LAB

L	T	P	C
0	0	3	1

OBJECTIVES:

- Trace the need for building applications for mobile devices.
- To code, run, and debug a variety of applications in the Mobile devices.

LIST OF EXPERIMENTS

1. To develop basic input/ output design
2. To develop Forms in the mobile devices
3. Connect applications to Databases in the device
4. Develop simple multimedia mobile applications
5. Develop Messaging systems
6. Use the Web access for developing applications
7. Establish Client server communication
8. An Application development - Mini project

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Assess mobile platform technology for the development of mobile applications.
- Interpret the expectations of user in the context of mobile applications
- Design user Interfaces and forms for mobile applications.
- Implement the database connectivity with the mobile application.
- Simulate simple wireless mobile applications.
- Design, develop, test and demonstrate a working application for a mobile device.

LIST OF PROFESSIONAL ELECTIVE COURSES

CSBX01	**NETWORK MANAGEMENT**	**L T P**	**C**
		0 0	**3**

OBJECTIVES:

- To introduce the importance and meaning of Network Management.
- To introduce the methods and instruments for managing the Network.
- To expose the role of SNMP and the protocols used by SNMP.
- Appreciate the need for interoperable network management
- Introduce the concepts and architecture behind standards based network management
- Instigate the concepts and terminology associated with SNMP and TMN
- Describe the Advanced Information Processing Techniques such as Distributed Object Technologies, Software Agents and Internet Technologies used for network management

PREQUISITES:

- COMPUTER NETWORKS.
- OPERATING SYSTEM.

MODULE I INTRODUCTION 7

Data and telecommunication Network- TCP/IP based Network- Communication Protocol and standards- Networks- Systems and services- Network Management Goals- Organization and Functions- Architecture and Management Perspectives- Review of Information Network and Technology.

MODULE II SNMP v1 NETWORK MANAGEMENT 7

Standards Models and languages- Organization and Information models-Communication and Functional Models.

MODULE III SNMP v2 AND v3 MANAGEMENT, REMOTEMONITORING 8

SNMPv2 Architecture- Structure Management information- SNMPv2 Protocol-SNMPv3 Architecture- Structure Management information- Application- User Based Security model- Remote Monitoring.

MODULE IV NETWORK MANAGEMENT TOOLS 8

System Utilities for management- Network Statistics- MIB Engineering- NMS design Network Management system-TMN and Application Management.

MODULE V NETWORK MANAGEMENT APPLICATION 8

Configuration Management- Fault Management- Performance Management - Security Management- Accounting Management- Report Management

MODULE VI BROADBAND NETWORK MANAGEMENT 7

WAN- Wired and optical access network- Broadband home networks.

Total Hours: 45

TEXT BOOK:

1. Mani Subramanian, "Network Management Principles and practice", 2nd Edition, Addison Wesley New York, 2010.

REFERENCE:

1. William Stallings, "SNMP, SNMPv2, SNMPv3, RMON 1 and 2", 3rd Edition, Pearson Education, 2009.

OUTCOMES:

Students who complete this course will be able to:

- Apply SNMP for Managing Network.
- Analyze the relationship of MIB on managed elements
- Acquire the knowledge about network management standards (OSI and TCP/IP)
- Acquire the knowledge about various network management tools and the skill to use them in monitoring a network
- Analyze the challenges faced by Network managers
- Evaluate various commercial network management systems and open network Management systems.
- Analyze and interpret the data provided by an NMS and take suitable actions.

CSBX02	**HIGH SPEED NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

- To introduce the state-of-the-art in network protocols, architectures and applications.
- To analyze existing network protocols and networks.
- To develop new protocols in networking.
- To expose how networking research is done.
- To investigate novel ideas in the area of Networking via term-long research projects.

PREQUISITES:

COMPUTER NETWORKS

MODULE I ISDN AND FRAME RELAY 7

Introduction to High Speed networks - Basics: OSI/ISO reference model - ISDN: Conceptual view - Standards - Transmission structure - BISDN - Frame Relay: Frame mode protocol architecture - Call control - LAPF - Congestion - Traffic rate management -Explicit congestion avoidance - Implicit congestion control.

MODULE II ASYNCHRONOUS TRANSFER MODE 7

Asynchronous transfer mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories - AAL - Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic Control - ABR traffic Management - ABR rate control, RM cell formats, ABR Capacity allocations - GFR traffic management.

MODULE III CONGESTION CONTROL AND QOS IN IP NETWORKS 7

Networks: - The Need for Flow and Error Control - Link Control Mechanisms - ARQ Performance - TCP Flow Control - TCP Congestion Control - Performance of TCP Over ATM - Integrated Services Architecture - Queuing Discipline - Random Early Detection - Differentiated Services - Resource Reservation : RSVP - Multi protocol Label Switching - Real Time Transport Protocol.

MODULE IV WDM OPTICAL NETWORKS 8

Introduction to Optical Networks - Wavelength Division Multiplexing (WDM) – Introduction to broadcast and select networks - Switch architectures - Channel accessing - Wavelength routed networks - switch architectures - Routing and wavelength assignment - Virtual topology design - IP over ATM over WDM - IP over WDM.

MODULE V HIGH SPEED LAN 8

Fast Ethernet - Switched fast Ethernet - Gigabit Ethernet - FDDI: Network configuration - Physical Interface - Frame transmission and reception.

MODULE VI SONET 8

SONET: Introduction - Layers - Frames - STS multiplexing - SONET networks - Virtual tributaries - Payload mappings - Packet over SONET - Generic Framing Procedure - Transport services - SONET over WDM - Traffic Grooming.

Total Hours: 45

TEXT BOOKS:

1. William Stallings, "ISDN and Broadband ISDN with Frame Relay and ATM", 4th Edition, Prentice-Hall of India, 2004.
2. William Stallings, "High Speed Networks and Internets", 2nd Edition, Pearson Education, 2002.
3. C. Siva Ram Murthy and Mohan Gurusamy, "WDM Optical Networks: Concepts, Design and Algorithms", Prentice-Hall of India, 2002.
4. Fred Halsall, "Multimedia Communications - Applications, Networks, Protocols", 1st Edition, Pearson Edition, 2001.

REFERENCES:

1. Behrouz A Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill, 2006.
2. Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks: A Practical Perspective", 2nd Edition, Morgan Kaufmann, 2004.

OUTCOMES:

Students who complete this course will be able to:

- Solve numerical or analytical problems pertaining to the high-speed networking technologies.
- Evaluate various technologies and identify the most suitable one to meet the given set of requirements for a hypothetical corporate network.

- Develop necessary background to manage projects involving high-speed networking technologies.

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CSBX03 GRAPH THEORY

	L	T	P	C
	3	0	0	3

OBJECTIVES:

- To cover the fundamental concepts of Graph Theory.
- To provide in depth coverage on Famous problems in Graph Theory.
- To throw light on the applications of Graph theory in computing.

PREQUISITES:
BASIC MATHEMATICAL KNOWLEDGE OG GRAPH

MODULE I INTRODUCTION 9

Graph - Finite and Infinite graphs - Incidence and Degree - Isolated vertex, pendant vertex and Null graphs. Paths and Circuits: Isomorphism - sub-graphs - walks, paths and circuits - Connected and disconnected graphs- Euler Graphs. Operations on Graphs - More on Euler Graphs - Hamiltonian Paths and circuits - Relation of graphs and theoretical computing.

MODULE II TREES AND FUNDAMENTAL CIRCUITS 8

Trees - Some Properties of Trees - Pendant vertices in a Tree - Distance and centers in a Tree. Spanning Trees - Fundamental circuits - Spanning trees in a weighted graph - Application in terms of data structures

MODULE III CUT SETS AND CUT VERTICES 8

Cut sets - Properties of a cut set - all cut sets in a graph. Fundamental circuits and cut sets - Connectivity and Separability - Relevance of cut sets to computing.

MODULE IV PLANAR GRAPHS 6

Planar graphs - Kuratowski's two graphs - Representation of a planar graph - Planar graph application in real life

MODULE V MATRIX REPRESENTATION OF GRAPHS 8

Incidence Matrix - Circuit matrix - Fundamental circuit matrix and Rank of circuit matrix - Cut set matrix - Relationship among Af, Bf and Cf - Path matrix - Computational implication of graph representations.

MODULE VI ALGORITHMS 6

Connectedness and Components - Spanning tree - Finding all Spanning Trees of a Graph - Cut Vertices and Separability - Directed Circuits - Case studies.

Total Hours: 45

REFERENCES:

1. Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", PHI, Reprint 2011.
2. Arumugam.S and Dr.Ramachandran.S, "Invitation to Graph Theory", SciTech Publishing House, 2006.
3. Harary.F, "Graph Theory", 1st Edition, Narosa Publishing House, 2011.

OUTCOMES:

Students who complete this course will be able to:

- Recognize the relevance of graph theory in computer based applications.
- Describe the fundamental concepts of graph theory.
- Apply the basics of graph theory in different real time scenarios.

CSBX04 MOBILE AD HOC NETWORKS

	L	T	P	C
	3	0	0	3

OBJECTIVES:

- To have an overview of the fundamentals of wireless networking .
- To have a broad overview of the state of mobile ad hoc networking.
- To discuss the issues in designing the routing protocols.
- To have an over view of the architecture model of multicasting protocols.
- To introduce the current and emerging applications of Adhoc Networks.
- To analyze the physical networking and architectural issues of mobile ad hoc networks.

PREQUISITE:
COMPUTER NETWORKS

MODULE I INTRODUCTION 7

Introduction - Fundamentals of wireless communication technology -Origin of Ad hoc: Packet radio networks - Technical challenges - Architecture of PRNETs - Components of packet radios - Adhoc wireless networks -Types of Ad hoc mobile communications - Types of mobile host movements - Challenges facing Ad hoc mobile networks - Ad hoc wireless internet.

MODULE II ROUTING PROTOCOLS 7

Introduction - Issues in designing a routing protocol for Ad hoc wireless networks - Classifications of routing protocols - Table-Driven routing protocols - Destination Sequenced Distance Vector (DSDV) - Source-Initiated On-Demand approaches - Ad hoc On-Demand Distance Vector Routing (AODV) - Dynamic Source Routing (DSR) - Temporally Ordered Routing Algorithm (TORA)-Zone Routing Protocol (ZRP) .

MODULE III MULTICASTING PROTOCOLS 7

Introduction - Issues in designing a multicast routing protocol - Operation of multicast routing protocols - An architecture reference model for multicast routing protocols - Classifications of multicast routing protocols.

MODULE IV TRANSPORT LAYER PROTOCOLS 7

Introduction - Issues in designing a transport layer protocol for Ad hoc wireless networks - Design goals of a transport layer protocol for Ad hoc wireless networks -Classification of transport layer solutions - TCP over Ad hoc wireless networks.

MODULE V ENERGY MANAGEMENT 7

Introduction - Need for energy management in Ad hoc wireless networks - Classification of energy management schemes - Battery management schemes - Transmission power management schemes - System power management schemes.

MODULE VI QOS AND SECURITY IN MANET 10

Introduction - Issues and challenges in providing QoS in Ad hoc wireless networks - Classifications of QoS solutions - MAC layer solutions - Network layer solutions - QoS frameworks for Ad hoc wireless networks energy management in Ad hoc wireless networks - Security in Ad hoc wireless networks - Network security requirements - Issues and challenges in security provisioning - Network security attacks - Key management - Secure routing in Ad hoc wireless networks.

Total Hours: 45

TEXT BOOKS:

1. C.Siva Ram Murthy and B.S.Manoj, "Ad hoc Wireless Networks Architectures and protocols", 2nd Edition, Pearson Education, 2007.
2. Charles E. Perkins," Ad hoc Networking", 1st Edition, Addison Wesley, 2000.

REFERENCES:

1. C.K. Toh, "Ad Hoc Mobile Wireless Networks: Protocols and Systems", 1st Edition, Prentice-Hall of India, 2001.
2. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, "Mobile Ad Hoc Networking", Wiley-IEEE press, 2004.
3. Mohammad Ilyas, "The Handbook of Adhoc Wireless Networks", CRC press, 2002.

OUTCOMES:

Students who complete this course will be able to:

- Identify and address the issues in wireless networks
- Identify and address the challenges in Adhoc wireless internet.
- Describe the platform architectures that are suitable for mobile adhoc networks.
- Calculate the power management and energy management in Adhoc wireless Networks.
- Identify the parameters involved in measuring the QoS of Adhoc wireless Networks.
- Analyze the solutions for security threats to ad hoc networks

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CSBX05 WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the basics of wireless sensor network.
- To illustrate the physical layer functions of wireless sensor network architecture.
- To provide a knowledge about various routing protocols under MAC layer of wireless sensor network architecture.
- To study the network layer routing protocols.
- To know the need for localization algorithms for finding the location.
- To find the applications where wireless sensor networks could be used.
- .

PREQUISITES:
COMPUTER NETWORKS

MODULE I INTRODUCTION 6

Challenges and Constraints - Applications - Node architecture – Operating Systems : Tiny OS.

MODULE II PHYSICAL LAYER 6

Basic components - Source Encoding - Channel Encoding - Modulation – Signal Propagation

MODULE III MEDIUM ACCESS CONTROL LAYER 12

Contention free, contention based medium access - Wireless MAC protocol : Carrier Sense Multiple Access (CSMA), IEEE 802.11, IEEE 802.15.14 and Zigbee - Characteristics of MAC protocols - Contention Free MAC protocol : Low Energy Adaptive Clustering Hierarchy (LEACH) , Traffic Adaptive Medium Access(TAMA), Light weight Medium Access Control(LMAC) - Contention Based MAC Protocol : SMAC, TMAC, PMAC, WiseMAC.

MODULE IV NETWORK LAYER 10

Data Centric routing: Directed Diffusion , Rumor routing - Proactive Routing : DSDV - Reactive Routing : Adhoc On Demand Distance Vector, Dynamic Source Routing - Location Based Routing.

MODULE V LOCALIZATION **6**

Ranging techniques - Range based localization - Range free localization

MODULE VI APPLICATIONS **5**

Traffic control - Health care - Pipeline monitoring

Total Hours: 45

REFERENCES

1. Waltenegus Dargie and Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice (Wireless Communications and Mobile Computing)", 1st Edition, Wiley publications, 2010.
2. Holger Kerl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Network", John Wiley and Sons, 2011.
3. Kazem, Sohraby, Daniel Minoli, Taieb Zanti, "Wireless Sensor Network: Technology, Protocols and Application", 1st Edition, John Wiley and Sons, 2007.
4. 4.N. P. Mahalik, "Sensor Networks and Configuration: Fundamentals, Standards, Platforms and Applications", Springer, 2007.
5. B. Krishnamachari, "Networking Wireless Sensors", Cambridge University Press, 2006.

OUTCOMES:

Students who complete this course will be able to:

- State the functionalities of each layer in wireless sensor network architecture.
- Find the application where MAC layer routing protocol and network layer routing protocol being used.
- Decide which localization algorithm could be used for finding the location of a target.
- know how wireless sensor network could be used in remote area applications.
- Find the suitable operating system and simulator for implementing the wireless sensor net work.
- Distinguish the difference between various wireless networks.

CSBX07	ROUTING PROTOCOLS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn network routing basics and foundations.
- To demonstrate routing in IP networks and router architectures.
- To illustrate the steps involved in various routing algorithms.
- To study the difference between distance vector routing and link state routing.
- To gain knowledge on various issues in routing algorithms.
- To introduce into next generation routing protocol.

PREQUISITES:

COMPUTER NETWORKS

MODULE I INTRODUCTION TO NETWORKING AND NETWORK ROUTING 7

Addressing and Internet Service: An Overview- Network Routing: An Overview-IP Addressing- On Architectures- Service Architecture- Protocol Stack Architecture- Router Architecture- Network Topology Architecture.

MODULE II ROUTING ALGORITHMS: SHORTEST PATH AND WIDEST PATH 8

Bellman-Ford Algorithm and the Distance Vector Approach- Dijkstra's Algorithm-Comparison of the Bellman-Ford Algorithm and Dijkstra's Algorithm-Shortest Path Computation with Candidate Path Caching- Widest Path Computation with Candidate Path Caching- Widest Path Algorithm- K- Shortest Paths Algorithm.

MODULE III ROUTING PROTOCOLS: FRAMEWORK AND PRINCIPLES 7

IP Routing Protocol- Routing Algorithm and Routing Information- Representation and Protocol Messages- Distance Vector Routing Protocol- Link State Routing Protocol-Path Vector Routing Protocol- Link Cost.

MODULE IV IP ROUTING AND DISTANCE VECTOR PROTOCOL FAMILY 8

Routers- Networks and Routing Information: Some Basics- Static Routes-Routing Information Protocol Version 1 (RIPv1) - Routing Information Protocol Version 2 (RIPv2)- Interior Gateway Routing Protocol (IGRP)- Enhanced Interior Gateway Routing Protocol (EIGRP)- Route Redistribution.

MODULE V OSPF AND INTEGRATED IS-IS AND ROUTER ARCHITECTURE 7

OSPF: Protocol Features- OSPF Packet Format- Examples of Router LSAs and Network LSAs-Integrated IS-IS: Key Features- Similarities and Differences Between IS-IS and OSPF. Router Architectures: Functions of a Router- Types of Routers- Elements of a Router- Packet Flow- Packet Processing: Fast Path versus Slow Path- Router Architectures.

MODULE VI BGP 8

BGP: A Brief Overview- Basic Terminology- BGP Operations: Message Operations- BGP Timers- BGP Configuration Initialization- Two Faces of BGP: External BGP and Internal BGP- Path Attributes- BGP Decision Process-Internal BGP Scalability- Significance of Route Flap Dampening- BGP Additional Features- Finite State Machine of a BGP Connection.

Total Hours: 45

REFERENCES:

1. 1.Deepankar Medhi, Kartikeyan Ramasam , "Network Routing - Algorithms, Protocols, Architecture", Morgan Kauffman Series Publication,2007.
2. Subir Kumar Sarkar, T G Basavaraju and C Puttamadappa, "Ad Hoc Mobile Wireless Networks - Principles, Protocols and Applications", 2nd Edition, Auerbach publications, 2008.
3. 3.Dharma Prakash Agrawal and Carlos De Morais Cordeiro, "Adhoc and Sensor Networks - Theory and Applications", 2nd Edition, World Scientific publication, 2011.

OUTCOMES:

Students who complete this course will be able to:

- Recall the fundamentals and requirements for packet routing in computer communication networks.
- Compare and contrast the functions of different routing protocols.
- Analyze various issues in existing routing protocols.
- Design an internal architecture, in order to overcome the issues in existing routing protocols
- Enhance the services of existing routing protocol.
- Build a new routing protocol for real time applications.

CSBX08	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the importance of virtualization in distributed computing.
- To learn cloud service models and deployment models.
- To comprehend the technical capabilities and business benefits of cloud computing.
- To collaborate with web based applications.
- Identify security implications in cloud computing
- Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon.

PREREQUISITE:

COMPUTER NETWORKS

MODULE I VIRTUALIZATION 7

Virtualization : Virtualization and cloud computing - Need of virtualization - Cost, administration , fast deployment , reduce infrastructure cost - Limitations - Types of hardware virtualization: Full virtualization - Partial virtualization - Para virtualization - Desktop virtualization: Software virtualization - Memory virtualization - Storage virtualization - Data virtualization - Network virtualization-Thin client.

MODULE II CLOUD INTRODUCTION - ARCHITECTURAL INFLUENCES 7

Cloud Computing Overview - Origins of Cloud computing - Cloud components-Essential characteristics - On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity - Architectural influences - High-performance computing , Utility and Enterprise grid computing, Autonomic computing , Service consolidation , Horizontal scaling, Web services, High scalability architecture.

MODULE III CLOUD SCENARIOS AND DEPLOYMENT MODEL 7

Cloud Scenarios - Benefits: Scalability , simplicity , vendors ,security - limitations - application development - security concerns - privacy concern with a third party - security level of third party - security benefits - Regularity issues: Government policies - Cloud deployment model : Public clouds - Private clouds - Community clouds - Hybrid clouds - Advantages of Cloud computing.

MODULE IV CLOUD ARCHITECTURE MODELS 7

Cloud architecture: Cloud delivery model - Software as a Service (SaaS): SaaS service providers - Google App Engine, Salesforce.com and google platfrom - Benefits - Operational benefits - Economic benefits - Evaluating

SaaS - Platform as a Service (PaaS): PaaS service providers - Right Scale - Salesforce.com - Rackspace - Force.com - Services and Benefits - Infrastructure as a Service (IaaS): IaaS service providers - Amazon EC2 , GoGrid - Microsoft soft implementation and support - Amazon EC service level agreement - Recent developments - Benefits.

MODULE V CLOUD COLLABORATION 8

Collaborating on Calendars, Schedules and Task Management - Exploring Online Scheduling Applications - Exploring Online Planning and Task Management - Collaborating on Event Management - Collaborating on Contact Management - Collaborating on Project Management - Collaborating on Word Processing - Collaborating on Databases - Storing and Sharing Files.

MODULE VI CLOUD SERVICES 9

Collaborating via Web-Based Communication Tools - Evaluating Web Mail Services - Evaluating Web Conference Tools - Collaborating via Social Networks and Groupware - Collaborating via Blogs and Wikis.

Total Hours: 45

TEXT BOOKS:

1. Anthony T.Velte, Toby J. Velte Robert Elsenpeter, "Cloud Computing a Practical Approach", 1st Edition, TATA McGraw- Hill, 2010.
2. Michael Miller Que, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", 1st Edition, Que Publishing, 2008.

REFERENCE:

1. Haley Beard ,"Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud With SLAs", Emereo Publishing Limited, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Describe the architecture and taxonomy of parallel and distributed computing.
- Explain virtualization and their role in elastic computing.

- Analyze the advantages and disadvantages of Infrastructure, Platform, and Software as a Service (IaaS, PaaS, SaaS) abstractions, and Public and Private Clouds.
- Describe the service oriented architecture and their influences
- Compare different performance metrics for evaluating cloud applications.
- Work with online cloud services and collaborate with online documents and web based applications.

CSBX09	TCP/IP	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the current architecture and operation of the Internet.
- To give an insight into IPV4 and IPV6 addressing concepts
- To provide a concise overview of TCP/IP protocol suite.
- To give an emphasis on the TCP congestion control algorithms and strategies used.
- To obtain an in depth knowledge about the timers that governs TCP/IP.
- To outline the tools used for packet analysis.

PREQUISITE:

COMPUTER NETWORKS

MODULE I INTRODUCTION 7

Architectural principles-The Architecture and Protocols of the TCP/IP Suite-Internet Address Architecture- Expressing IP Addresses- Basic IP Address Structure- Special-Use Addresses- Allocation - Unicast Address Assignment-Attacks Involving IP Addresses-ARP-RARP.

MODULE II INTERNET PROTOCOL - IPV4 8

IPv4 Addressing Concepts and Issues - IP Classful Addressing - IP Subnet Addressing - Subnetting Concepts- IP Subnetting Practical Subnet Design and Address Determination Example- IP Classless Addressing: Classless Inter-Domain Routing -Supernetting.

Internet Protocol Datagram Encapsulation and Formatting-IP Datagram Size, Fragmentation and Reassembly - IP Routing and Multicasting.

MODULE III INTERNET PROTOCOL - IPV6 AND SUPPORT 8

IPv6 Overview, Changes and Transition-IPv6 Addressing-IPv6 Datagram Encapsulation and Formatting- IPv6 Datagram Size, Fragmentation, Reassembly, and Routing-ICMP-IPV6 Neighbor Discovery Protocol.

MODULE IV TRANSMISSION CONTROL PROTOCOL 7

Introduction to TCP - TCP header and encapsulation-connection establishment and termination-TCP options-path MTU discovery with TCP-TCP state transitions. -Timeout and Retransmission- Setting the Retransmission Timeout-Timer-Based Retransmission-Fast Retransmit- Retransmission with Selective Acknowledgments - Spurious Timeouts and Retransmissions - Packet Reordering and Duplication -Destination Metrics-Repacketization -Attacks Involving TCP Retransmission.

MODULE V TCP WINDOW MANAGEMENT AND CONGESTION CONTROL 8

Interactive Communication -Delayed Acknowledgments -Nagle Algorithm - Flow Control and Window management - Urgent Mechanism - Attacks Involving Window Management -TCP Congestion Control -The Classic Algorithms-Evolution of the Standard Algorithms - Handling Spurious RTOs-the Eifel Response Algorithm - Sharing Congestion State - TCP Friendliness TCP in High-Speed Environments - Delay-Based Congestion Control-Active Queue Management and ECN- Attacks Involving TCP Congestion Control

MODULE VI TCP TIMERS 7

TCP Persist Timer - Silly Window Syndrome - Keep alive Timer - Window Scale Option - Analyzing TCP/IP traffic - Packet Analysis - TCP/IP Diagnostic Tools and Utilities.

Total Hours: 45

TEXT BOOKS:

1. Kevin R.Fall, W.Richard Stevens, "TCP/IP Illustrated, Volume 1: The Protocols, 2nd Edition, Pearson Education, 2011.
2. Charles M. Kozierok "The TCP/IP Guide -A Comprehensive, Illustrated Internet Protocols Reference", 2005.

REFERENCES:

1. Douglas E. Comer, "Internetworking with TCP/IP Principles, Protocols, and Architecture", 5th edition, Volume-1, Prentice Hall, 2006.
2. Adrian Farrel, "The Internet and its Protocols- A Comparative Approach", 1st Edition, Morgan Kaufmann, 2004.
3. W.Richard Stevens "TCP/IP Illustrated, The Protocols", Volume I, 2nd Edition, Pearson Education, 2012.
4. Behrouz A.Forouzan, "TCP/IP Protocol Suite", 3rd Edition, Tata McGraw Hill-2006.
5. Pete Loshin "IPv6 Theory, Protocol and Practice”, 2nd Edition, Morgon Kaufmann, December, 2003.

OUTCOMES:

Students who complete this course will be able to:

- Apply IP addressing and sub netting concepts.
- Analyze the major networking protocols and select protocols based on the application.
- Compare IPv4 and IPv6 addressing.
- Categorize the different TCP congestion control mechanisms.
- Explore the latest trends in networking including IPV6.
- Analyze the working of TCP/IP using appropriate tools.

CSBX10 EMBEDDED SYSTEMS

	L	T	P	C
	3	**0**	**0**	**3**

OBJECTIVES:

- To introduce the basic of embedded systems.
- To have knowledge about devices, communication buses and protocols.
- To study the procedures for development and testing.
- To provide an outline of performance analysis of embedded system.
- To introduce on Real time Operating system.
- To have a look on basic design using real time operating system.

PREQUISITE:

· MICROPROCESSOR AND MICROCONTROLLER
· DIGITAL SIGNAL PROCESSING

MODULE I INTRODUCTION TO EMBEDDED SYSTEMS 6

Definitions - Embedded hardware components - Embedded Software - System on Chip(SoC) - VLSI Circuits - Fundamentals of Embedded System Design.

MODULE II DEVICES, COMMUNICATION BUSES AND PROTOCOLS 8

I/O Devices - Device I/O Types and Examples - Synchronous Communication-Iso-Synchronous Communication - Asynchronous Communication - Serial Bus Communication Protocols - Parallel Bus Communication Protocols.

MODULE III DEVELOPMENT AND TESTING 8

Embedded Software Development Process - Development Tools - Hardware and Software Design Issues - Techniques and Tools for Testing, Simulation and Debugging - Design Examples and Case Studies of Program Modeling and Programming with RTOS.

MODULE IV PERFORMANCE ANALYSIS OF EMBEDDED SYSTEMS 7

Real Time Performance Analysis - Applications of Queuing Theory - Input/ Output Performance - Analysis of Memory Requirements - Metrics - Fault Tolerance - Inherent Uncertainly - Performance optimization Techniques.

MODULE V REAL-TIME OPERATING SYSTEMS   8

Tasks and Task States - Tasks and Data - Semaphores and Shared Data - Message Queues - Mailboxes and Pipes - Timer Functions - Events - Memory Management - Interrupt Routines in an RTOS Environment.

MODULE VI BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM 8

Principles, Semaphores and Queues - Hard Real- Time Scheduling Considerations - Saving Memory and Power- An example RTOS like uC-OS (Open Source) - Embedded Software Development Tools: Host and Target machines - Linker/Locators for Embedded Software -Getting Embedded Software into the Target System - Debugging Techniques: Testing on Host Machine- Using Laboratory Tools- An Example System.

Total Hours: 45

TEXT BOOKS:

1. Phillip A. Laplante, Seppo J. Ovaska, "Real-Time Systems Design and Analysis: Tools for the Practitioner", 4th Edition, Wiley-IEEE Press, 2011.
2. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", 2nd Edition, McGraw-Hill Education (India), 2009.
3. Kai Qian, David Den Haring, Li Cao, "Embedded Software Development with C", Springer, 2009.

REFERENCES:

1. Tero Karvinen, Kimmo Karvinen, "Make: Arduino Bots and Gadgets: Six Embedded Projects with Open Source Hardware and Software", 1st Edition, Maker Media Inc, 2011.
2. James W. Grenning, Test Driven Development for Embedded C", 1st Edition, Pragmatic Bookshelf, 2011.
3. Arnold S. Berger, "Embedded Systems Design: An Introduction to Processes, Tools and Techniques", CMP Books, 2002.
4. Wayne Wolf, "Computers as Components, Principles of Embedded Computing System Design", 2nd Edition, Elsevier, 2005.

OUTCOMES:

Students who complete this course will be able to:

- Possess the basic outline of embedded system.
- In depth knowledge on building blocks of embedded system.
- Apply and examine the embedded programming concepts.
- Analyze a real time scenario, design an embedded system and analyze its

performance.

- Describe real time operating system
- Design real time embedded systems using the concepts of RTOS

CSBX11	HACKING TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To attain an insight into the field of hacking and related techniques
- To give a detailed account of various types of system vulnerabilities and their attacking mechanisms.
- To discuss about security tools and testing applications for vulnerability and authentication flaws.

PREQUISITE:

COMPUTER NETWORKS

MODULE I INTRODUCTION TO HACKING 7

Introduction to Hacking-Types of Hacking-Hacking windows - Network hacking-Web hacking - Password hacking.

MODULE II WEB APPLICATION 7

Problem factors - Defense mechanisms - Handling user access - User input-Handling attackers - Managing the application - Web application technologies-The HTTP protocol - Web functionality - Encoding schemes.

MODULE III VARIOUS ATTACKING MECHANISM 8

Mapping the application - Bypassing client side control -- Attacking authentication - Attacking session management -- Attacking access control - Attacking path traversal - Attacking application logic - Attacking other users - XSS - Redirection attacks - HTTP header injection - Frame injection- Request forgery- JSON hijacking - Session fixation - Local privacy attacks -Advanced exploiting techniques -Its prevention.

MODULE IV VULNERABILITIES 8

Burp proxy - Automating bespoke attacks - Uses for bespoke automation - Enumerating valid identifier - Fuzzing common vulnerabilities, Its prevention-Exploiting information disclosure - Exploiting error message, Its prevention - Attacking compiled application - Buffered overflow attacks - Integer and format string vulnerabilities, Its prevention - Architectural attacks - Tiered architecture - Shared hosting and Application service providers, Its prevention - Server attack - Vulnerable application configuration and Software - Source code vulnerabilities - Different languages, Its prevention.

MODULE V HACKERS METHODOLOGY 8

Hacker's toolkit - Web browsers - Integrated testing suites - Vulnerability scanners - Nikto-hydra-custom Scripts - Hacker's methodology - Mapping application content - Analyzing application-testing - Client side controls - Authentication mechanism - Session management mechanism - Access controls - Input based vulnerabilities- Logic flaws- Sharing hosting vulnerabilities- Web server vulnerabilities- Miscellaneous checks.

MODULE VI CASE STUDY 7

System hacking- Case study: DNS High Jinx- Pwning the internet-Hacking windows- Hacking unix-Infrastructure hacking- Case study: Read It and WEP-Wireless hacking- Application and data hacking-Case study: Session Riding.

Total Hours: 45

TEXTBOOKS:

1. Dafydd Stuttard, Marcus Pinto,"The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws", 2nd Edition, 2011.
2. Stuart McClure, Joel Scambray, George Kurtz,"Hacking Exposed 6 -Network Security Secrets and Solutions", 6th Edition, Tata McGraw-hill edition, 2009.
3. Kenneth C.Brancik, "Insider Computer Fraud", 1st Edition, Auerbach Publications Taylor & Francis Group,2008.

OUTCOMES:

Students who complete this course will be able to:

- Identify the system vulnerabilities and their hacking mechanism
- Comprehend authentication mechanisms used to test and guard against the vulnerabilities.
- Express detailed insight into various hacking techniques through case studies.

CSBX12	BIO INSPIRED COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To describe the techniques associated with biologically inspired neural networks, genetic algorithms and neuromorphic systems.
- To gain knowledge about adaptive and self-organizing computational systems.
- To analyze how complex and functional high-level phenomena can emerge from low-level interactions.
- To illustrate natural models of the computational processes.
- To derive the computational processes by applying genetic algorithm.
- To discuss natural computational systems that solves some of the real time problems.

PREQUISITE:

- LINEAR PROGRAMMING
- MATHEMATICAL FOUNDATION

MODULE I LIFE AND INFORMATION 8

What is Life - The Logical Mechanisms of Life - What is so cool about computation - Universal Computation and Computability - Simulations and Realizations-Imitation of Life - Computational Beauty of Nature (fractals, L-systems, chaos) Bio-inspired computing - Natural computing-Biology through the lens of computer science.

MODULE II COMPLEX SYSTEMS AND ARTIFICIAL LIFE 8

Complex Networks -Controllability of complex networks -Self-Organization and Emergent Complex Behavior - Cellular Automata - Boolean Networks - Development and Morphogenesis-Open-ended evolution & results.

MODULE III EVOLUTIONARY ALGORITHMS 8

Evolution and Adaptation - Von Neumann and Natural Selection -Systems and Biocomplexity - Self-Similarity and L-Systems- Modeling Evolution: Evolutionary Computation.

MODULE IV COLLECTIVE BEHAVIOR AND SWARM INTELLIGENCE 7

Social Insects, Stigmergy and Swarm Intelligence - Competition and Cooperation - Communication and Multi-Agent simulation - Turing's Tape, Self-Reproduction Collective Intelligence.

MODULE V IMMUNOCOMPUTING 7

A distributed design for computational intelligence -Engineering Application - Dynamical Systems and Attractor Behavior - Cellular Automata and the Edge of Chaos - The Adaptive Immune System and Artificial Immune Systems.

MODULE VI GENETIC ALGORITHMS 7

Genetic Algorithms - Genetic Programming-Information transmission: From emergent computation to the gene - Ant Clustering Algorithm -Temporal Networks.

Total Hours: 45

TEXT BOOKS:

1. 1.Nunes de Castro, Leandro, "Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications", Chapman & Hall, 2006.
2. Mitchell.M," Complexity: A Guided Tour", Oxford University Press, 2009.

REFERENCES:

1. Nunes de Castro, Leandro and Fernando J. Von Zuben,"Recent Developments in Biologically Inspired Computing", MIT Press, 2005.
2. Forbes. N, "Imitation of Life: How Biology is Inspiring Computing", 1st Edition, MIT Press, 2004.

OUTCOMES:

Students who complete this course will be able to:

- Explore how biological systems exploit natural processes.
- Describe how complex and functional high-level phenomena can emerge from low-level interactions.
- Compare and Contrast of the collective Behavior of the swarm intelligence.
- Design experiments to investigate empirically bio-inspired systems.
- Simulate nature-inspired evolutionary computation, genetic algorithm techniques for solving optimization problems.
- Make use of bio-inspired computing techniques in real time scenario.

CSBX13 **CYBER FORENSICS** **L T P C**

3 0 0 3

OBJECTIVES:

- To expose to types of computer systems and basics of cyber crime
- To have a study on types of forensics
- To educate on evidence collection and preservation
- To classify the various hacking techniques
- To give an overview of varied intrusions and malwares
- To make aware of existing cyber laws set forth by the Government

PREQUISUTE:

COMPUTER NETWORKS

MODULE I INTRODUCTION **7**

Main frame systems, Desktop systems - Multiprocessor systems - Distributed systems - Clustered systems - Real time systems - Hand held Systems. Important Technical Terminologies-Weapons of cyber crime -Types of cyber crime -Credit card and cyber crime-Web hacking.

MODULE II COMPUTER AND DIGITAL FORENSICS **8**

Computer Forensics and Digital Detective Work-Cell Phone Forensics - Email and Webmail Forensics-Legal Ethical and Testimony Topics-Ethical and Professional Responsibility in Testimony-Computer Forensics and Digital Detective Work.

MODULE III EVIDENCE **8**

Preparing for evidence collection and preservation- Tools, Environments, Equipment and Certifications, Policies and Procedures-Data, PDA and cell phone forensics.

MODULE IV FORENSICS EXAMINATION AND HACKING TECHNIQUES **9**

Forensics Examination of computers, digital and electronic media - Operating Systems and data transmission basics for digital investigations-Overview of security threats-Hacking Techniques-Password Cracking-Insecure Network Connection-Email Security-PGP and SMIME.

MODULE V DETECTING INTRUSIONS MALWARE AND LEGAL ETHICAL **7**

Detecting Intrusions Malware and Fraud-Tracking down those Who Intend to do harm-Fraud and Forensics Accounting Investigation-Legal Ethical and Testimony Topics-Ethical and Professional Responsibility in Testimony.

MODULE VI CRYPTOGRAPHY AND CYBER LAWS 6

Cryptography -Futuristic crime- Cyber laws of different countries- Social Networking site bane or boon- Search and seizure.

Total Hours: 45

TEXT BOOKS:

1. Sujit Mukharjee,Sitanchu Mohan Ray,Bivas,Chittarjee, "Your Ultimate Cyber Crime Protection Guide", Power Publishers, 2012.
2. Reynaldo Anzaldua,Linda Volonino,Jana Godwin,"Computer Forensics: Principles and Practices", 1st Edition ,Textbook Solution,2007.

REFERENCE:

1. Keith John Jones, Richard Bejtlich, Curtis W. Rose, "Real Digital Forensics. Mit DVD: Computer Security and Incident Response", 7th Edition, Addison Wesley Professional, 2006.

OUTCOMES:

Students who complete this course will be able to:

- Distinguish different types of computer systems and related cyber crimes
- Analyze different types of forensics and suggest appropriate course of action
- Critique upon evidence collection and preservation processes
- Study a real-time scenario and propose suitable cyber security measures
- Define ethical and professional responsibility in cyber forensics
- Brief upon cyber laws prevailing across the globe.

CSBX14	MOBILE COMPUTING TECHNOLOGIES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To serve as an advanced element of learning in the field of wireless communication.
- To throw light on the architecture of different mobile devices.
- To expose the concepts and services of different layers of wireless devices.
- To gain knowledge on different database issues in mobile wireless device.
- To discover the various applications of mobile communication.
- To develop skills of finding solutions and building software for mobile computing applications

PREQUISITE:
COMPUTER NETWORKS

MODULE I MOBILE COMMUNICATIONS 6

Introduction to Mobile Communications and Computing: Mobile Computing (MC) - Introduction to MC- Novel applications- Limitations and architecture. GSM: Mobile services- System architecture- Radio interface- Protocols-Localization and calling- Handover- security and new data services.

MODULE II MEDIUM ACCESS CONTROL 8

Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals)- SDMA- FDMA- TDMA- CDMA.

MODULE III MOBILE NETWORK LAYER 8

Mobile IP (Goals- assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations) - Dynamic Host Configuration Protocol (DHCP).

MODULE IV MOBILE TRANSPORT LAYER 8

Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ fast recovery- Transmission /time-out freezing- Selective retransmission-Transaction oriented TCP.

MODULE V DATABASE ISSUES **9**

Hoarding techniques- Caching invalidation mechanisms- client server computing with adaptation- Power-aware and context-aware computing-Transactional models- Query processing- Recovery and quality of service issues. Data Dissemination: Communications asymmetry- Classification of new data delivery mechanisms- Push-based mechanisms- Pull-based mechanisms- Hybrid mechanisms- Selective tuning (indexing) techniques.

MODULE VI MANET **6**

Mobile Ad hoc Networks (MANETs): Overview- Properties of a MANET-Spectrum of MANET applications- Routing and various routing algorithms-Security in MANETs.

Wireless Application Protocol-WAP. (Introduction,protocol architecture, and treatment of protocols of all layers)- Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

Total Hours: 45

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", 2nd Edition, Addison-Wesley, 2008.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley Publications, 2008.

REFERENCES:

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Cambridge University Press, 2004.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill professional, 2007.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", 2nd Edition, Springer, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Describe the concept of mobile computing and architecture of mobile communication.
- Compare and contrast the architecture and protocol of various wireless devices.
- Monitor the services at different layers of wireless devices.

- Implement the concepts of mobile computing and compare its performance with conventional wired network applications.
- Provide solutions in real time wireless applications to overcome database issues.
- Apply the concepts of mobile transactions in real time applications.

CSBX15 **Internet of Things** **L T P C**

3 0 0 3

OBJECTIVES:

- Comprehend the design concepts and principles of IoT
- Understand the role of electronics and embedded computing in IoT
- Attain exposure to varied software and hardware platforms for realization of IoT

PREQUISITE:
COMPUTER NETWORKS.

MODULE I IoT FUNDAMENTALS AND APPLICATIONS 9

Definitions – Technological Aspects - Design Principles of Connected Devices - Fundamentals of IPv6 – Addressing and Protocols relevant to IoT - Smart Cities and Environments – Smart Metering – Applications in Security – Healthcare – Retail – Industrial Control –Smart Farming and Agriculture.

MODULE II IoT Prototyping Concepts 9

Cost vs Ease of Prototyping – Prototyping and Production – Open Source vs Closed Source – Electronics and Embedded Computing Fundamentals : Sensors - Actuators - Microcontrollers – System on Chips – Platform considerations.

MODULE III Physical Design 9

Physical Design : Sketch- Iterate-Explore – Non-Digital Methods- Laser Cutting – 3D Printing – CNC Milling – Repurposing and Recycling.

MODULE IV IoT Technology Platforms 9
Raspberry Pi – Raspbian - Arduino – Case Studies: Healthcare, Smart Cities, Analytics.

MODULE V Software Design Principles 9
IoT Connectivity Considerations – IoT and Cloud Access - REST – MQTT – CoAP – XMPP IOT.

Total Hours: 45

TEXT BOOKS:

1. 1. Adrian McEwen and Hakim Cassimally , “Designing the Internet of Things”, Wiley, 2013.
2. Cuno Pfister, "Getting Started with the Internet of Things”,1st Edition, Shroff, 2011.

REFERENCE:

1. Donlad Norris, “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black”, Tab Electronics, 2015

OUTCOMES:

Students who complete this course will be able to

- Discuss IoT concepts and design principles in detail.
- Design simple IoT devices for different application domains
- Compare and choose appropriate software and hardware platform for realization of IoT devices

CSBX16 COMPLEX NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn basic concepts of graph theory
- To have an idea about different models and structure of complex networks
- To study various applications of complex networks
- Introduces the fundamental concepts, principles and methods in the interdisciplinary field of network Science.
- To know the Structure of reaction and protein of interaction networks
- To study about graphic structures of networks, mathematical models of networks

PREQUISITE:

- Computer Networks
- Graph theory

MODULE I INTRODUCTION 5

Introduction : Graph theory - scale free processes and fractal structures.

MODULE II MODELS OF COMPLEX NETWORKS 8

Models of complex networks - Adjacency relations in networks - Metric and topological structure of the network.

MODULE III FRAGMENTS OF COMPLEX NETWORKS 8

Fragments in complex networks - Accounting for all parts of sub graphs - Communicability functions in networks - Centrality measures - Global network invariants.

MODULE IV NETWORK CLASSES 8

Expansion and network classes - Community structure of networks - Network bipartivity - Random models of networks.

MODULE V OPTIMIZATION 8

Optimization of network structure - Thermodynamic models on networks - Searching in networks - Biological networks and network motifs.

MODULE VI GENETIC NETWORKS 8

Genetic networks - Protein residue networks - Protein - Protein interaction networks - Structure of reaction networks.

Total Hours: 45

REFERENCES:

1. Reuven Cohen ,Shlomo Havlin, "Complex Networks: Structure, Robustness and Function", Cambridge University Press, 2010.
2. Ernesto Estrada ,"The Structure of Complex Networks: Theory and Applications", 1^{st} Edition, Oxford University Press, 2011.
3. Maarten van Steen , "Graph Theory and Complex Networks: An Introduction", Maarten Van Steen Publishers, 2010.

OUTCOMES:

Students who complete this course will be able to:

- Analyze the basic concepts of complex networks.
- Define various models and optimization procedure for networks.
- Define and calculate basic network graphic metrics.
- Describe structural features of socio-technical networks.
- Relate graphic properties to network functions and evolution.
- Relate local properties to global emerging patterns.
- Explore new angles to explore network collective behaviours.
- Visualize networks to highlight structural and global features.

CSBX17	MOBILE COMMERCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Introduce the new technologies, applications, service and models of mobile commerce.
- To explore the knowledge in management of mobile commerce services.
- Put forth the emerging issues in mobile commerce and management of services.
- Introduce the concept of knowledge management in mobile commerce.
- Explore the modeling of mobile services.
- Apply the knowledge in Quality of Services in mobile application

PREQUISITE:

COMPUTER NETWORKS

MODULE I M-COMMERCE 5

Introduction to m-commerce: Emerging applications - Different players in m-commerce - M-commerce life cycle Mobile financial services - Mobile entertainment services and proactive service management.

MODULE II MANAGEMENT OF MOBILE COMMERCE SERVICES 8

Content development and distribution to hand-held devices - Content caching, pricing of mobile commerce services.

MODULE III EMERGING ISSUES IN MOBILE COMMERCE 8

The role of emerging wireless LANs and 3G/4G wireless networks - Personalized content management - Implementation challenges in m-commerce - Futuristic m-commerce services.

MODULE IV KNOWLEDGE MANAGEMENT IN A MOBILE COMPUTING 8

Knowledge Management in a mobile computing context-Query formation and Information retrievel-Knowledge discovery in mobile business data-Modelling the dynamics of mobile data services markets.

MODULE V MOBILE MESSAGE AND DATA SERVICES 8

Modelling the dynamics of mobile data services-Short message service and applications-Multimedia message peer-Mobile banking-Agent based secured E-Payment system.

8

MODULE VI QUALITY OF SERVICE IN MOBILE APPLICATION

Quality of service oriented medium access control for ATM and mobile applications.

Total Hours : 45

REFERENCES:

1. Brian Mennecke and Troy Strader, "Mobile Commerce: Technology, Theory an Applications", Idea Group, 2003.
2. Nansi Shi, "Mobile Commerce Applications", IGI Global, 2004.

OUTCOMES:

Students who complete this course will be able to:

- Trace the M-commerce concepts and technologies.
- Describe the emerging models of developing M-commerce applications.
- Describe the content development and pricing of M-commerce services.
- Apply the knowledge management in mobile commerce.
- List the various applications of mobile messages and data services.
- Analysis the different organizational roles during the development of M-commerce initiatives.

CSBX18	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study architecture for application development
- To summarize the importance of SOA in Application Integration
- To Illustrate SOA, Service-Orientation and Web Services.
- To learn web service and SOA related tools
- To explore how to build SOA with Web Services.
- To design service oriented design process.

PREQUISITE:

DISTRIBUTED COMPUTING

MODULE I INTRODUCTION TO SOA **6**

Introduction - Fundamental SOA - Contemporary SOA -Misperceptions about SOA - Benefits of SOA - Pitfalls of SOA - Evolution of SOA - Web Services & Primitive SOA.

MODULE II ACTIVITY MANAGEMENT & COMPOSITION **8**

Service Classification - Business Process Management - SOA & Organization-
Message Exchange Patterns - Service Life Cycle - Service Activity - Coordination - Business Activities - Orchestration - SOA and Performance - Reusability, Compensability, Modularity.

MODULE III MESSAGING AND SECURITY **8**

SOA and Security - Addressing - Reliable Messaging - Correlation - Policies - Metadata Exchange - Security - Notification and Eventing.

MODULE IV PRINCIPLES OF SERVICE ORIENTATION **8**

Anatomy of SOA - Principles of SO - Interrelation - SO and Object orientation - Service Layers - Configuration Scenarios - SOA Delivery Strategies.

MODULE V SERVICE ORIENTED DESIGN **8**

Introduction to SO Design - XML Schema Language Basics - WSDL - SOAP-Service Interface Design Tools - Composing SOA - Core SOA Standards - Service Design Guidelines - WS-BPEL Language - WS-Coordination overview-Business Process Design
.

MODULE VI WS EXTENSIONS & SOA PLATFORMS 7

WS-Addressing Language Basics - WS-Reliable Messaging Language - WS-Policy Language - WS-Metadata Language - WS-Security Language - SOA Platform - Case Study.

Total Hours : 45

REFERENCES:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology & Design", Pearson Education, 2008.
2. Nicolai M. Josuttis,"SOA in Practice: The Art of Distributed System Design", O'Reilly Publications, 2009.
3. Thomas Erl, "SOA Principles of Service Design", Prentice Hall, 2008.
4. Thomas Erl, "SOA Design Patterns", 2nd Edition, Prentice Hall, 2009.
5. Eric Newcomer, Greg Lomow, "Understanding Soa with Web Services", 2nd Edition, Pearson Education, 2009.
6. Paul. C. Brown, "Implementing SOA Total Architecture in Practice", Pearson Education, 2009.
7. Shankar Kambhampaty, "Service Oriented Architecture for Enterprise Applications", 1st Edition, Wiley India Private Limited, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Describe the Service Orientation principles and business modeling.
- Explore the underlying technology for service design.
- Create design standards for SOA - based solutions.
- Make use of web service principles and techniques, design web services and give a solution for design issues.
- Develop Web services using J2EE and .NET technologies.
- Apply Web Service concepts to real time problems

CSBX19	WEB ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide students with conceptual and practical knowledge to develop web applications.
- To expose the students with various modeling activities for web apps.
- To provide an overview on web metrics, quality and Web resource management.
- To gain knowledge on the development of web applications tools and its deployment.
- To address the testing strategies for web applications and security measures involved.
- To get familiarized on the technological issues related to web application development

PREQUISITE:

OBJECT ORIENTED SOFTWARE ENGINEERNG

MODULE I INTRODUCTION TO WEB ENGINEERING 8

The Web - Web Applications - Web Engineering - Agility - Web E- Framework-Principles for framework adaption - Components of Web Engineering - Web Engineering Process - Communication in Web E - Framework.

MODULE II PLANNING, MODELLING AND ANALYSIS OF WEB APPS 8

Understanding Scope - Refining Framework Activities - Building a Web E-Team- Risk Management-Schedule Development-Quality and Change Management - Modeling Activity-Analysis Modeling of Web Apps.

MODULE III WEB APPLICATION DESIGN 8

Design Goals - Design Process - Interaction Design - Principles and Guidelines-Design Steps - Design Issues - Aesthetics - Information Design - Structuring Information Space - Functional Design.

MODULE IV DEVELOPMENT AND DEPLOYMENT 7

Development in Web E-Process - Development Principles - Development Concepts - Deployment of Web Apps - Design Patterns - Web App Patterns - Pattern Repositories - Case Study.

MODULE V TESTING AND CHANGE MANAGEMENT 7

Testing Concepts and Process - Content Testing - UI and Usability Testing - Compatibility Testing - Component Level Testing -Navigation Testing -Configuration Testing - Security and Performance Testing - ChangeManagement.

MODULE VI TECHNOLOGIES AND TOOLS 7

Technological Issues - Development tools and technologies - Evolving Web Technologies - Web 2.0 - HTML5- LAMP- Ruby-Security of Web Apps - Future of Web Apps.

Total Hours: 45

TEXT BOOKS:

1. Roger Pressman and David Lowe, "Web Engineering: A Practitioner's Approach", McGraw-Hill, 2009.
2. James Governor, Dion Hinchcliffe, and Duane Nickull, "Web 2.0 Architectures: What Entrepreneurs and Information Architects Need to Know", 1st Edition, O'Reilly, 2009.

REFERENCES:

1. H. M. Deitel, P. J. Deitel, and A. B. Goldberg, Internet and World Wide Web How to Program, 4th Edition, Pearson Education Inc., 2008.
2. H. M. Deitel, et al., XML How to Program, 1st Edition, Pearson Education Inc., 2001.
3. G. Kappel, B. Pröll, S. Reich, and W. Retschitzegger," Web Engineering - The Discipline of Systematic Development of Web Applications", John Wiley & Sons, 2006.

OUTCOMES: Students who complete this course will be able to:

- Perform analysis modeling and design modeling for web applications.
- Identify candidate tools and technologies for developing web applications.
- Integrate design patterns for the development of web applications.
- Perform modeling and testing for web applications.
- Handle security tools in web environment.
- Identify the various security risks in a Web application

CSBX20 INTERNET TECHNOLOGIES

	L	T	P	C
	3	**0**	**0**	**3**

OBJECTIVES:

- To expose the working of internet technology from the end user's and developer's point of view
- Showcase the technologies used in development of web pages
- Highlight the theories and principles underlying effective web page design.
- Outline the processes that process the web content from the developer's end
- Throw light on proprietary and open source frameworks used in the operation of the web
- Discuss the semantic web technologies and their usage

PREQUISITE:

COMPUTER NETWORKS

MODULE I INTRODUCTION TO INTERNET 6

Internet Standards - World Wide Web - Client-Side Vs Server Side - Web Basics - Web 1.0 - Web 2.0 - Web 3.0 - Internet of Things.

MODULE II HTML 5 AND CSS3 9

HTML5 Basic - Headings - Linking - Images - Lists - Table - Forms- Meta Elements - Semantic tags - Page Structure Elements - CSS3 Rules - Types of Style Sheets - Positioning Elements - Box Models - Text Flow.

MODULE III SCRIPTING LANGUAGES 8

Basics - Dialogs - Memory Concepts - Arithmetic - Control Structures - Functions - Arrays - Objects - Simple Web Applications - Event Handling

MODULE IV SERVER SIDE PROGRAMMING 7

Servlets - Deployment of Simple Servlets - Web Server (Java Web Server / Tomcat / WebLogic) - HTTP GET - HTTP POST - Session Tracking - Cookies-JDBC - N-Tier Applications.

MODULE V XML FUNDAMENTALS 8

XML Basics - Structuring Data - XML Namespaces - Document Type Definitions (DTDs) - W3C XML Schema Documents - XML Vocabularies - Extensible Style sheet Language and XSLT -Document Object Model (DOM).

MODULE VI DEVELOPMENT TOOLS AND TECHNOLOGIES 7

Ajax - JSON - LAMP - SQL - LINQ - MySQL Basics - Perl Basics – Python Basics - PHP Basics.

Total Hours: 45

TEXT BOOKS:

1. Paul Deitel, Harvey Deitel and Abbey Deite, "Internet & World Wide Web: How to Program", 5th Edition, Prentice Hal, 2011.
2. Jennifer Niederst Robbins, "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics", 4th Edition, O'Reilly Media, 2012.

REFERENCE:

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites", 2nd Edition, O'Reilly Media, 2012.

OUTCOMES:

Students who complete this course will be able to:

- Trace the key developments in the web from the initial era to the current era
- Design web pages according to the end user requirements making use of HTML, style sheets and scripts and also incorporate multimedia support in it.
- Implement a simple web site using the client/server model for various applications and have the capability to test and document the solutions developed.
- Using high-level tools, write a web service client that accesses a commercial web service
- Describe the various tools used in web technology
- Demonstrate competency in selecting an appropriate web technology solution for a given scenario.

CSBX21	GAME THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- ✓ Translate the basic of a “game” into a wide range of conflicts .
- ✓ Analyze conflict dynamics from the standpoint of rationality
- ✓ Evaluate conflict dynamics from the standpoint of the self interests of the “Players”
- ✓ Integrate increasing analytical skills into increasingly complex conflicts
- ✓ Theorize possible and probable strategies where information is incomplete
- ✓ Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts

PREQUISITE:

Theory of Computation
Artificial Intelligence

MODULE I INTRODUCTION TO GAMING 7

History of Video games - Games and Society - Game Goals - Game Genres - Gaming Platforms - Time Intervals - Player Modes - Motivations -Rewards - Resolution.

MODULE II GAME DESIGN 7

Game Design - Game Writing - Narrative Theory - Story and Character Development - Game play - Creating the Game World - Level Design - Human-Computer Interface design.

MODULE III GAME PROGRAMMING :LANGUAGES AND ARCHITECTURE 8

Teams and Processes - C++ - Java - Scripting Languages - Game Programming Fundamentals - Game Architecture - Memory and I/O Systems-Debugging Games - Tools for Development and Testing.

MODULE IV GRAPHICS, ANIMATION, AI, NETWORK PROGRAMMING 8

Graphics - Character Animation - Artificial Intelligence: Agents, Architecture and techniques -Path finding - Collisions Detection and Resolution - Mathematical Concepts - Real-Time Game Physics - Networking and Multiplayer Games.

MODULE V AUDIO VISUAL DESIGN AND PRODUCTION 8

Visual Design - 3D Modeling - 3D Environments -2D Textures and Texture Mapping - Special Effects -Animation - Lighting - Cinematography- Audio Design and Production - Audio Programming.

MODULE VI GAME PRODUCTION AND BUSINESS OF GAMES 7

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

Total Hours: 45

TEXT BOOKS:

1. Jeannie Novak, "Game Development Essentials - An Introduction", 3rd Edition, Delmar Cengage Learning, 2011.
2. Steve Rabin, "Introduction to Game Development", 2nd Edition, Charles River Media, 2010.

REFERENCES:

1. Mat Buckland, "Programming Game AI by Example", 1st Edition, Wordware Publishing, Inc., 2005.
2. Tracy Fullerton, Morgan-Kaufmann, "Game Design Workshop: A Playcentric Approach to Creating Innovative Games", 2nd Edition, Elsevier Morgan Kaufmann, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Model competitive real world phenomena using concepts from game theory.
- Discuss the theory which underlies games.
- Possess a set of intermediate level game-theoretic skills which can be applied in real world contexts.
- Review and critically assess literature which deals with game theory and related materials.
- Elucidate the potential or proven relevance of game theory and its impact in many fields of human endeavour which involve conflict of interest between two or more participants.
- Communicate game-theoretic ideas and concepts to non-specialist audiences in a language which is accessible and comprehensible.

CSBX22	INTRODUCTION TO BIG DATA	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give the basic foundation for Big Data Analytics and introducing the various terms and terminologies
- To expose to emerging technologies including open source and cloud environment for Big Data
- To equip with the Big Data processing methodologies
- To provide the MapReduce fundamentals and its relationship to Big Data
- To drive the basics of analytics and its relationship to real time business scenarios
- To identify appropriate tools and technologies for real time applications

PREQUISITE:

DATABASE MANAGEMENT SYSTEM

MODULE I BIG DATA FUNDAMENTALS 6

Big Data and its Importance - Four V's of Big Data - Drivers for Big Data - Introduction to Big Data Analytics - Big Data Analytics applications.

MODULE II BIG DATA TECHNOLOGIES 8

Hadoop's Parallel World - Data Discovery - Open source technology for Big Data Analytics - Cloud and Big Data - Predictive Analytics - Crowd Sourcing Analytics - Inter- and Trans-Firewall Analytics.

MODULE III BIG DATA PROCESSING 7

Data Store Integration - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing- Subdividing Data.

MODULE IV MAPREDUCE FUNDAMENTALS 9

The Building Blocks of Hadoop MapReduce - Employing Hadoop MapReduce-Creating the components of Hadoop MapReduce jobs - Distributing data processing across server farms -Executing Hadoop MapReduce jobs - Monitoring the progress of job flows -

Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

MODULE V ADVANCED ANALYTICS 7

Real-Time Architecture - Orchestration and Synthesis Using Analytics Engines-Discovery using Data at Rest - Implementation of Big Data Analytics - Big Data Convergence - Analytics Business Maturity Model.

MODULE VI TOOLS AND TECHNIQUES 8

Fundamentals of Pig - Fundamentals of HBase - Fundamentals of Hive - Introduction to NoSQL - Introduction to Mahout.

REFERENCES:

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Wiley CIO Series, 2013.
2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
3. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'Reilly, 2012.
4. Kevin Roebuck, "Storing and managing Big Data - NoSql, Hadoop and more: High-Impact Strategies - What You Need to Know", Tebbo Publishers, 2011.
5. Bill Franks, "Taming The Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics",1st Edition, Wiley and SAS Business Series, 2012.

OUTCOMES:

Students who complete this course will be able to:

- State the basic concepts, terms and terminologies in Big Data
- Connect emerging technologies in Big Data eco-space
- Apply Big Data processing methodologies
- Deploy MapReduce framework for Big Data analytics
- Recognize real-time business analytics problem
- Choose appropriate tools and technologies for analytical scenarios.

CSBX23	XML AND WEB SERVICES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide the theory behind web services.
- To establish the role of XML in web services.
- To describe the web services.
- To examine the role of different technologies.

PREQUISITE:

· SERVICE ORIENTED ARCHITECTURE

MODULE I WEB SERVICES **6**

Introduction: Web services - SOAP WSDL UDDI-Importance of web services-The evolution of web applications Not just another distributed computing platform - Web services and enterprises.

MODULE II XML FUNDAMENTALS **9**

XML Fundamentals: The Lingua Franca of web services- XML Documents-XML namespaces Explicit and Default namespaces, Inheriting namespaces, And not inheriting namespaces, Attributes and namespaces -XML Schema XML schema and namespaces, A first schema, Implementing XML schema types, The any Element, Inheritance, Substitution groups, Global and local type declarations, Managing Schemas, Schemas and instance documents, XML schema best practices.

MODULE III OVERVIEW OF SOAP **7**

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

MODULE IV UDDI **8**

UDDI at a glance- The UDDI Business registry- UDDI under the covers - Accessing UDDI- How UDDI is playing out.

MODULE V CONVERSATIONS **9**

Conversations: Overview - Web Services - Web services Conversation Language - WSCL Interface components - The Bar scenario conversations - Relationship between WSCL and WSDL.

MODULE VI CURRENT STATE **6**

Current Issues: Semantic Web, Role of Meta Data in web content- Architecture of Semantic web- Content Management- Workflow-XLANG- BPEL4WS.

Total Hours: 45

TEXT BOOKS:

1. Glenn Hostetler, Sandor Hasznos and Christine Heron, Web Service and SOA Technologies, Practicing Safe Techs", 1st Edition, 2009.
2. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", 1st Edition, Pearson Education, 2004.

REFERENCES:

1. Frank. P. Coyle, "XML, Web Services And The Data Revolution", 1st Edition, Pearson Education, 2002.
2. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, "Developing Java Web Services", Wiley Publishing Inc., 2004.

OUTCOMES:

Students who complete this course will be able to:

- Implement the various forms of XML constructs.
- Describe the role of web services in different applications.
- Validate XML documents with the use of Document Type Definitions and schemas according to industry standards.

CSBX24 INFORMATION RETRIEVAL

L	T	P	C
3	0	0	3

OBJECTIVES:

- To describe the role of ontology as a representational and reasoning mechanism in information retrieval
- To provide students with an overview of the main principles and methods underlying the domain of Information Retrieval.
- To introduce the IR principles to locate relevant information on large collections of data
- To evaluate the performance of an information retrieval system.
- To acquire knowledge and experience of the XML programming language.
- To equip students with sound skills to solve computational search problems.

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PREQUISITE:

DATA MINING

MODULE I KNOWLEDGE REPRESENTATION 6

Knowledge representation - Basics of Propositional logic- Predicate logic-reasoning using First Order Logic-unification- Forward chaining-Backward chaining-Resolution.

MODULE II ONTOLOGY DEVELOPMENT 7

Description logic-taxonomies-Topic maps-Ontology-Definition-expressing ontology logically-ontology representations-XML-RDF-RDFS-OWL-OIL-Ontology development for specific domain.

MODULE III INFORMATION RETRIEVAL 7

Parallel and distributed IR- Multimedia IR- Data modeling-Query languages-Web Searching Basics-Characterizing the Web-Search Engines-Web crawling and indexes-link analysis.

MODULE IV INFORMATION RETRIEVAL MODELING 9

Information retrieval - Taxonomy-formal characterization-Classic information retrieval-Set theoretic model-Algebraic model-Probabilistic model-Structured text retrieval models-

Models for browsing-Retrieval performance evaluation-Keyword based querying-Pattern matching-Structural queries-Query operations.

MODULE V CLASSIFICATION **8**

Language models for information retrieval-Text classification, Naïve Bayes-Vector space classification.

MODULE VI CLUSTERING **8**

Support vector machines and machine learning on documents-Flat clustering-Hierarchical clustering-Case study on cluster analysis.

Total Hours: 45

REFERENCES:

1. Stuart Russell-Peter Norvig, "Artificial Intelligence - A Modern Approach", 3rd Edition, Pearson Education,2009.
2. Michael C.Daconta,leo J. Obart and Kevin J Smith, "Semantic Web - A Guide to the Future of XML,Web Services and Knowledge Management", Wiley Publishers ,2003.
3. Elain Rich, Kevin Knight, B. Nair "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2008.
4. Christopher D. Manning,Prabhakar Raghavan and Hinrich Schutze, "Introduction to Information Retrieval", Cambridge University press, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Apply the basic concepts and techniques of Information Retrieval in various related fields.
- Form the ontology for different domains and generate the equivalent representations.
- Use different information retrieval techniques in various application areas
- Implement retrieval systems for web search tasks.
- Develop skills in problem solving using systematic approaches.
- Analyze the limitations of different information retrieval techniques

SEMESTER (Elective)

CSBX25 NATURAL LANGUAGE PROCESSING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To demonstrate issues and challenges in natural language and the various modules of a typical natural language processing system.
- To expound on natural language parsing and semantics
- To illustrate how language is generated with applications specific focus
- To focus on tagging parts of speech
- Throw light on speech models
- Discuss the applications of NLP

PREQUISITE:

- THEORY OF COMPUTATION
- WEB MINING

MODULE I INTRODUCTION 6

Natural Language Processing – Classical approaches – Current trends – Application domains – Societal applications

MODULE II ANALYSIS 6

Text processing – Tokenization – Sentence segmentation – Morphology and Lexical analysis – Parsing – Constraint based parsing – Natural language semantics – Representation – Relational Issues – Case studies

MODULE III GENERATION 12

Generated text – Components of Generator – Problems in generation – Text planning – Linguistic component – Story generation

MODULE IV EMPRIRICAL APPROACHES 9

Corpus creation – Treebank Annotation - Parts of speech Tagging approaches

MODULE V SPEECH RECOGNITION 6

Architectural components – Applications – Speech recognition – Speech recognizers – Applications –Research directions

MODULE VI APPLICATIONS 6

Information retrieval – Indexing – IR models –NLP and IR models – Question Answering systems – Information extraction – Sentiment mining – Multi lingual approaches

L – 45; Total Hours : 45

TEXT BOOKS:

1. Alexander Clark, Chris Fox, Shalom Lappin, The Handbook of Computational Linguistics and Natural Language Processing, July 2010, Wiley-Blackwell
2. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", 2nd Edition,Kluwer academic Publishers, 2002.

REFERENCES:

1. Nitin Indurkhya and Fred J. Damerau, "Handbook of Natural Language Processing", 2nd Edition, Chapman & Hall/CRC Machine Learning & Pattern Recognition, 2010.
2. Tomek Strzalkowski, "Natural Language Information Retrieval ", Kluwer academic Publishers, 1999.
3. Christopher D.Manning and Hinrich Schutze, "Foundations of Statistical Natural Language Processing ", MIT Press, 1999.
4. Michael W. Berry, "Survey of Text Mining: Clustering, Classification and Retrieval", Springer Verlag, 2003.

OUTCOMES :

Students to complete this course will be able to

- Tokenize and segment natural language using semantic rules and represent them
- Describe the issues and challenges in generating content
- Tag parts of speech and show its application in multiple languages
- Explain how speech recognition works and throw light on the research issues in it
- Explain any two algorithms in current domains of NLP research
- Describe NLP’s importance to the society.

CSBX 26 **CLUSTERING TECHNIQUES**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To expound on the need for clustering
- To illustrate the current needs of clustering systems
- To illustrate the models used in clustering
- To focus on clustering algorithms in the current and emerging applications of computer science.
- Focus on clustering in different data types like multimedia
- Show how time series data must be handled for effective usage.

MODULE I INTRODUCTION TO CLUSTERING 7

Introduction –Need for clustering – Clustering Vs Pattern matching – Role of clustering in Data mining – Applications of clustering - Common Techniques Used in Cluster Analysis-Data Types in Cluster Analysis-Feature Selection for Clustering- Algorithms for Generic Data- Algorithms for Text Data- Algorithms for Streaming Data- Algorithms for Linked Data. Case studies .

MODULE II CLUSTERING 8

Probabilistic Models for Clustering- Mixture Models- EM Algorithm and Its Variations- Probabilistic Topic Models- Partitional Clustering Algorithms and Hierarchical Clustering Algorithms- Density-Based Clustering. Evaluation of Clustering - Case studies

MODULE III GRID-BASED CLUSTERING 8

Grid-Based Clustering- The Classical Algorithms- Adaptive Grid-Based Algorithms- Axis-Shifting Grid Based Algorithms-High Dimensional Algorithms- Spectral Clustering-Clustering High Dimensional Data. Case studies.

MODULE IV CLUSTERING ALGORITHMS 8

Stream Clustering Algorithms- Big Data Clustering- One-Pass Clustering Algorithms-Randomized Techniques for Clustering Algorithms- Parallel and Distributed Clustering Algorithms- Similarity Measures for Categorical Data- Descriptions of Algorithms. Case study

MODULE V **MULTIMEDIA DATA CLUSTERING** **7**

Document Clustering- Modelling a Document- General Purpose Document Clustering- Clustering Long Documents- Clustering Short Documents- Clustering Multimedia Data- Clustering with Image Data- Clustering with Video and Audio Data- Clustering with Multimodal Data Case study.

MODULE VI **APPLICATIONS** **7**

Evaluation methods for clustering - Time Series Data Clustering- Online Correlation Based Clustering - Similarity and Distance Measures- Shape Based – Time Series Clustering Techniques-Application-Case study.

L – 45; Total Hours : 45

TEXT BOOKS:

1. Charu C. Aggarwal, Chandan K. Reddy., Data clustering : algorithms and applications, CRC Press,2014.

REFERENCES:

1. Sugato Basu, Ian Davidson, Kiri L.Wagistaff, “Constrained Clustering: Advanced in Algorithm, Theory and Applications”, Chapman and Hall/CRC Press,2008.
2. Mark Nixon, Alberto S Aguado, “Feature Extraction and Image Processing”, 2nd Edition, Academic Press,2008.

OUTCOMES :

Students to complete this course will be able to

- Define clustering in the context of other similar sub-domains like pattern matching and classification
- Apply statistical and probabilistic methods for clustering data.
- Relate the clustering systems with data mining and show how its usage.
- List and explain the methods of clustering used in current and emerging fields of computer science.
- Work with audio, video and text data to derive outcomes that point to trends in the domain.
- Apply time series algorithms for clustering in the context of a real life problem.

CSBX27	KNOWLEDGE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To establish the role of logic in Knowledge Engineering.
- To illustrate the resolution and reasoning techniques for knowledge interference.
- To show how the classification and inheritance concepts is used in Knowledge Engineering.
- Acquire knowledge on logic and limitations of defaults in Knowledge Engineering.
- Explore the knowledge in fuzzy logic to represent the uncertainity.
- To trace how the reasoning takes place in Knowledge Engineering.

PREREQUISITE:

DATA MINING

MODULE I INTRODUCTION 8

Knowledge Representation and Reasoning - First order Logic - Syntax, Semantics Pragmatics - Expressing Knowledge - Levels of Representation - Knowledge Acquisition and Sharing - Sharing Ontologies-Language Ontologies -Language Patterns - Tools for Knowledge Acquisition.

MODULE II RESOLUTION AND REASONING 8

Proportional Case - Handling Variables and Qualifies - Dealing with Intractability-Reasoning with Horn Clauses - Procedural Control of Reasoning-Rules in Production-Description Logic - Issues in Engineering -Vivid Knowledge- Beyond Vivid.

MODULE III REPRESENTATION 7

Object Oriented Representations - Frame Formalism - Structured Descriptions - Meaning and Entailment - Taxonomies and Classification - Inheritance - Networks - Strategies for Defeasible Inheritance - Formal Account of Inheritance Networks.

MODULE IV DEFAULTS 5

Defaults - Introduction - Closed World Reasoning - Circumscription – Default Logic - Limitations of Logic.

MODULE V UNCERTAINTY AND EXPRESSIVENESS 8

Fuzzy Logic - Nonmontonic Logic - Theories and World - Semiotics -Auto epistemic Logic - Vagueness - Uncertainty and Degrees of Belief - Non-categorical Reasoning - Objective and Subjective Probability.

MODULE VI ACTIONS AND PLANNING 9

Explanation and Diagnosis - Purpose - Syntax, Semantics of Context - First Order Reasoning - Modal Reasoning in Context - Encapsulating Objects in Context - Agents - Actions - Situational Calculus - Frame Problem - Complex Actions - Planning - Strips - Planning as Reasoning - Hierarchical and Conditional Planning.

Total Hours: 45

REFERENCES:

1. Simon Kendal and Malcolm Creen, "An Introduction to Knowledge Engineering", Springer, 2007.
2. Ronald Brachman, Hector Levesque, "Knowledge Representation and Reasoning", The Morgan Kaufmann Series in Artificial Intelligence, 2004.
3. John F. Sowa, "Knowledge Representation: Logical, Philosophical, and computational Foundations", 1st Edition, Brooks/Cole Publishers, 2000.

OUTCOMES:

Students who complete this course will be able to:

- Identify the various techniques to convert knowledge into formal logic statements.
- Apply the resolution and reasoning techniques for knowledge interference.
- Demonstrate the strategies used to represent the Knowledge Engineering process.
- Trace the logic and limitations of defaults in Knowledge Engineering.
- List the limitations of formal logic and apply fuzzy logic to represent uncertainty.
- Describe techniques for planning and reasoning in Knowledge Engineering.

CSBX28	VISUALIZATION TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To describe the principles of visual thinking.
- To show how the 2D space is mapped.
- Design rules for links and cycles.
- Introduce the importance of predictive modeling.
- To showcase the applications of visualization.
- Create model using semi formal visual language.

PREQUISITE:
MULTIMEDIA AND GRAPHICS

MODULE I VISUAL THINKING 6

Visual thinking - Visual detail - Top down Vs bottom up process - Implications for design - Steps in visual thinking - Distributed cognition.

MODULE II REPRESENTING KNOWLEDGE 9

Language and representation of knowledge - Mental models and representations - Operations of representation and interpretation - Examples of graphic representations - Semantic trees - Concept maps - Semantic networks - ER diagrams - Algorithms - Flowcharts - Inference trees - Diagnosing and assessing knowledge - Structuring information transfer - Knowledge representation and learning.

MODULE III MODELING USING A SEMI FORMAL VISUAL LANGUAGE 9

Basis of the MOT (Modeling using Object types): Schema representation in MOT, Objectives of the representation, Construction Principles - Basic Knowledge Types and Relations - Syntax Rules of the MOT Language: The MOT meta-model, Rules regarding the origin and destination of links - Rules regarding cycles and multiplicity of links - Representing other types of models in MOT.

MODULE IV STRUCTURING 2D SPACE 6

Patterns - Pattern processing machinery - Binding process - Texture regions-Patterns channels and attention - Visual pattern queries - Pattern for design - Semantic pattern mappings.

MODULE V PREDICTIVE MODELING 9

Predictive modeling - Testing modeling accuracy - Models predictive accuracy: Scatter plots - ROC charts - Lift charts.

MODULE VI CASE STUDIES 6

Industry specific data mining - Data analysis case study - Credit scoring case study - Data mining non tabular data.

Total Hours: 45

REFERENCES:

1. Colin Ware," Visual Thinking for Design",1st Edition, Morgan Kaufmann, 2008.
2. Gilbert Paquette, "Visual Knowledge Modeling for Semantic Web Technologies: Models and Ontologies", IGI Global, 2010.
3. Glenn J Myatt, Wayne P. Johnson, "Making sense of Data - A Practical Guide to Data Visualization, Advanced Mining Methods and Applications", Wiley, 2009.
4. Tom Soukup and Ian Davidson, "Visual Data Mining: Techniques and Tools for Data Visualization and Mining", John Wiley & Sons, 2002.

OUTCOMES:

Students who complete this course will be able to:

- Relate visual thinking with visualization.
- Relate commonly used artifacts with visualization.
- Able to design effective data visualization for the given data.
- Visualize pattern matching process for a given scenario.
- Apply predictive modeling for the given data.
- Apply visualization to real-life situations.

CSBX29	DATA WAREHOUSING AND BUSINESS INTELLIGENCE	L T P C
		3 0 0 3

OBJECTIVES:

- To provide the students with a data based view of marketing decisions.
- To acquire the knowledge for basic business data processing.
- To differentiate relational database and data warehouse modeling concepts.
- To cover concepts and fundamentals of Data Mining for better marketing campaigns and customer management.
- Describe the typical data warehouse lifecycle.
- Relate current trends in data warehousing.

PREQUISITE:

DATA BASE MANAGEMENT SYSTEM

MODULE I DATA MINING 9

Data Mining: - Data Mining Functionalities - Data Preprocessing - Data Cleaning- Data Integration and Transformation - Data Reduction - Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules - Association Mining to Correlation Analysis - Constraint-Based Association Mining.

MODULE II BUSINESS INTELLIGENCE 8

Effective and timely decisions - Data, information and knowledge - Role of mathematical models - Business intelligence architectures: Cycle of a business intelligence analysis - Enabling factors in business intelligence projects - Development of a business intelligence system - Ethics and business intelligence

MODULE III DATA ANALYSIS 7

Business focussed data analysis - Top down logical data modelling - Bottom up source data analysis - Data cleansing - Deliverables of data analysis - Importance of data analysis.

MODULE IV KNOWLEDGE DELIVERY 9

The Business Intelligence User Types- Standard Reports-Interactive Analysis and Ad Hoc Querying- Parameterized Reports and Self-Service Reporting-dimensional analysis-Alerts/Notifications- Visualization: Charts- Graphs-Widgets-Scorecards and Dashboards-Geographic Visualization- Integrated Analytics- Considerations: Optimizing the Presentation for the Right Message.

MODULE V EFFICIENCY 6

Efficiency measures - The CCR model: Definition of target objectives - Peer groups - Identification of good operating practices: cross efficiency analysis - Virtual inputs and outputs - Other models.

MODULE VI FUTURE OF BUSINESS INTELLIGENCE 6

Future of business intelligence-Emerging Technologies, Predicting the Future, BI Search & Text Analytics-Advanced Visualization- Rich Report, Future beyond Technology.

Total Hours: 45

REFERENCES:

1. Larissa T. Moss, S. Atre,"Business Intelligence Roadmap: The Complete Project Lifecycle for Decision Support Applications", Addison Wesley Reprint, 2003.
2. Carlo Vercellis,"Business Intelligence: Data Mining and Optimization for Decision Making", 2nd Edition, Wiley Publications, 2011.
3. David Loshin,"Business Intelligence: The Savvy Manager's Guide", 2nd Edition, Morgan Kaufman, 2012.
4. Cindi Howson,"Successful Business Intelligence: Secrets to Making BI a Killer App", 1st Edition, McGraw-Hill Osborne Media, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Analyze the business problems .
- Model the relational database required for an enterprise data warehouse.
- Show how ERP business intelligence can be derived from data warehouses
- Applying Data mining techniques for business intelligence.
- Categorize the various tools and its application in mining data.
- Analyze data to generate information and knowledge that lead to informed decisions for businesses

CSBX30	WEB MINING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give the basic foundation for mining procedures and related techniques.
- To expose to various classification algorithms
- To cluster the data using unsupervised learning algorithms
- To demonstrate different crawling algorithms for web mining
- To generate wrapper rules for data integration on the Web
- To experiment with emerging trends in web mining

PREQUISITE:

DATA BASE MANAGEMENT SYSTEM

MODULE I MINING FOUNDATION 8

Basics of Mining - Data Mining Vs Web Mining - Concepts of Association Rules-Apriori Algorithms - Mining With Minimum Supports -Mining Class Association Rules - GSP - Prefix Span - Generating Rules from Sequential Patterns.

MODULE II SUPERVISED LEARNING 8

Supervised Learning :Concepts - Decision Tree Induction - Classifier Evaluation - Rule Induction - Rule Learning: Learn - One - Rule Function-Classification Using Class Association Rules - Classification using Normal Association Rules - Naïve Bayesian Classification - Support Vector Machines-K. Nearest Neighbor Learning.

MODULE III UN-SUPERVISED LEARNING 8

Unsupervised Learning: K-means Clustering - Representation of Clusters - Hierarchical Clustering - Distance functions - Cluster Evaluation.

MODULE IV WEB MINING AND CRAWLING 7

Basic Concepts - Information Retrieval Models - Evaluation measure - Link Analysis - HITS Algorithm - Community Discovery - Web Crawling: Crawler Algorithm - Community Discovery - Web Crawler Algorithm - Implementation Issues - Types of Crawlers.

MODULE V WRAPPER GENERATION AND INFORMATION INTEGRATION 7

Wrapper Induction - Extraction Rules - Examples - Instance - Based Wrapper Learning - Problems - String Matching and Tree Matching - Multiple Alignment - Extraction Based on Single List Page - Extraction Based on Multiple Pages- Information Integration:Matching Approaches - Domain and Instance - Level Matching - Combing Similarities - Issues in Matching - Integration of Web Query Interfaces .

MODULE VI EMERGING TRENDS IN WEB MINING 7

Opinion Mining :Sentiment Classification - Feature Based Opinion Mining and Summarization - Sentence and Relation Mining - Opinion Search - Opinion Spam Detection - Extracting and Analyzing Web Social Networks - Web Mining and recommendation Systems.

Total Hours: 45

TEXT BOOKS:

1. Bing Liu,"Web Data Mining", 1st Edition, Jones and Barlett Publishers, 2010.
2. Alex Berson,Stephen J.Smith,"Data Warehousing, Data Mining & DLAP", Tata Mc Graw Hill, 2004.

REFERENCES:

1. George Meghabghab, Abraham Kandel,"Search Engineers, Link Analysis and Use Web Behaviour : A Unifying Web Mining Approach", Springer, 2008.
2. Anthony Scime,"Web Mining: Application and Techniques", Idea Group Publishing, 2005.
3. Gordon S. Linoff, Michael J.A.Berry, "Mining the Web Transforming Customer Data into Customer Value", Wiley, 2002.

OUTCOMES: Students who complete this course will be able to:

- Distinguish the web mining process and apply rule based algorithms
- Analyze and apply suitable classification algorithms
- Choose appropriate clustering algorithms and implement them for the given real time scenario
- Examine the working of web mining crawlers and summarize their features
- Interpret the various wrapper rules and web query interfaces
- Summarize the recent web mining trends and recommend techniques to a given scenario.

CSBX31 CONTENT MANAGEMENT AND WEB PUBLISHING **L T P C**
3 0 0 3

OBJECTIVES:

- Depict the issues and challenges in the web publishing domain
- Illustrate the needs of web publishing domain
- Rationalize the need to manage content
- Showcase how web publishing can meet the needs of content management
- Recognize the components of content management and provide various solutions to manage content in web.
- Analyze the information models, content units and apply the content management plans and strategies to meet various application needs.

PREQUISITE:
WEB TECHNOLOGY.

MODULE I INTRODUCTION TO WEB PUBLSIHING **7**

Basics of Web Publishing - Introduction to HTML - Introduction to PHP - Adobe Acrobat and PDF - Preparing content and format - Configuring the Servers.

MODULE II WEB PUBLISIHING AND FILEMAKER **9**

Building a simple FileMaker file - Viewing FileMaker Data - Altering FileMaker Data - Working with portals - Working with images - FileMaker Layout - Performance Tuning - Security Concerns- Error Handling and Prevention - FileMaker PHP API.

MODULE III CONTENT MANAGEMENT BASICS **8**

Data, Information and Content - Content Format - Content Structure - Content Context - CMS overview - Collection System - Management System - Publishing System - Principles of CMS - Limits of CMS - Technology Aspects-Branches of CMS.

MODULE IV CONTENT MANAGEMENT SOLUTION **7**

Phased Solution Approach - Authoring and Acquiring content - Content Management repository - Assembling and Linking content - Content Delivery - Information Sources.

MODULE V INFORMATION MODELS, TYPES AND CONTENT UNITS 7

Three-Tier Structure information model - Static Information Models - Dynamic Information Models - Defining Component of the model - Building a Model - Developing information types - Developing Content Units.

MODULE VI CONTENT PLANS AND STRATEGIES 7

Content Plans for Static Web Sites -Content Plans for Dynamic Web Sites - Developing Single Source strategies - Plan and author for reuse - Staffing - Establish business case for CMS.

Total Hours: 45

TEXT BOOKS:

1. Bob Boiko, "Content Management Bible", 2nd Edition, Wiley, 2004.
2. Jonathan Stark ," Web Publishing with PHP and FileMaker 9", 1st Edition, Sams Publishing, 2007.
3. JoAnn T. Hackos, "Content Management for Dynamic Web Delivery", 1st Edition, Wiley, 2002.

REFERENCES:

1. Russell Nakano, "Web Content Management: A Collaborative Approach", Addison-Wesley Professional, 2002.
2. Todd Kitta, Brett Grego, Chris Caplinger, Russ Houberg, "SharePoint Server 2010 Enterprise Content Management", Wrox, 2011.
3. Gaurav Kathuria, "Web Content Management with Documentum: Setup, Design, Develop, and Deploy Documentum Applications", Packt Publishing, 2006.
4. Bruce Page, Diana Holm "Web Publishing with Adobe Acrobat and PDF", Wiley Publications, 1996.

OUTCOMES:

Students who complete this course will be able to:

- Explain the basics principles of web publishing and list the tools used in it with their application use cases
- Given a scenario in web publishing, select an appropriate tool and apply it for effective outcomes
- Describe the need for content management systems
- Design appropriate information models based on the web content.
- Analyze the properties of a content management system and trace its operation
- Develop a design plan for content management system with emphasis on all the aspects using staffing.

CSBX32 SOFTWARE REQUIREMENTS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the concepts and the role of requirements engineering in software engineering.
- To introduce the different requirements elicitation techniques
- To describe the processes of requirements elicitation and analysis techniques.
- To consider the rationale in defining requirements and preparing requirements analysis documents.
- To provide an insight in to the current techniques, notations, methods, processes and tools used in requirements engineering.
- To provide comprehensive knowledge about the different methods of cost estimation for a software project.

PREQUISITE:

SOFTWARE ENGINEERING

MODULE I INTRODUCTION **7**

The Essential Software requirement, Good practices for requirements engineering, Improving requirements processes,-Software requirements and risk management - Requirements elicitation- Requirements analysis documentation-Verifying requirements quality.

MODULE II ANALYSING THE PROBLEM **8**

The five steps in problem analysis- business modeling - Systems engineering of software intensive systems - Understanding user and stakeholders needs-Features of a product or system -Interviewing - Requirements workshops-Brain storming and Idea reduction-Storyboarding.

MODULEIII REQUIREMENTS MANAGEMENT PRINCIPLES AND PRACTICES 7

Requirements management Principles and practices- Requirements attributes-Change Management Process- Requirements Traceability Matrix- Links in requirements chain.

MODULEIV DEFINING AND REFINING REQUIREMENTS 8

Software Requirements Modeling Use Case Modeling- Analysis Models-Dataflow diagram- State transition diagram- Class diagrams- Object analysis-Problem Frames Software Estimation Components of Software Estimations-Estimation methods-Problems associated with estimation- Key project factors that influence estimation.

MODULE V SOFTWARE REQUIREMENTS ANALYSIS 7

Size Estimation Two views of sizing- Function Point Analysis- Mark II FPA-Full Function Points- LOC Estimation- Conversion between size measures-Effort, Schedule and Cost Estimation - Estimation Factors- Approaches to Effort and Schedule Estimation-COCOMO II- Putnam Estimation Model-Algorithmic models- Cost Estimation.

MODULE VI ANALYSIS TOOLS FOR REQUIREMENT MANAGEMENT 8

Tools for Requirements Management and Estimation Requirements Management Tools: Benefits of using requirements management tool-Commercial requirements management tool- Rational Requisite pro- Caliber RM- Implementing requirements management automation- Software Estimation Tools: Desirable features in software estimation tools- IFPUG-COCOMO II- SLIM (Software Life Cycle Management) Tools.

Total Hours: 45

TEXT BOOKS:

1. Stephen Withal, "Software Requirement Patterns", 3rd Edition, Microsoft Press, 2011.
2. Karl & Joy Beatty," Software Requirements", 3rd Edition, Microsoft Press, 2012.
3. Swapna Kishore & Rajesh Naik, "Software Requirements and Estimation", Tata McGrawHill, 2008.

REFERENCES:

1. Ian Sommerville and P Sawyer, "Requirements Engineering a Good Practice Guide", 1st Edition, Wiley India, 1997.
2. Leffingwell, D.Widrig, D,"Managing Software Requirements A Use Case Approach", 2nd Edition, Pearson Education,2000.

OUTCOMES:

Students who complete this course will be able to:

- Analyze the various requirements elicitation methods and select the appropriate one.
- Identify the requirements of a project and document requirements.
- Explore requirement analysis methods and traceability of requirements
- Demonstrate the notational paradigms that can be applied to requirements.
- Apply methods and tools for requirements management from the development of project
- Examine the different cost estimation techniques and analyze the estimation factors.

CSBX33 SOFTWARE TESTING TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the testers role in a Software Development Organization.
- To find defects created by the programmer while developing the software.
- To portray the recent trends in the field of Software testing.
- To explore the different levels and types of testing.
- To have a thorough overview about the test design strategy and review plans.
- To throw light on the importance of test automation.

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PREQUISITE:

OBJECT ORIENTED SOFTWARE ENGINEERING

MODULE I SOFTWARE TESTING - QUALITY STANDARDS 8

Software Processes and Methodologies - Quality Standards, Practices & Conventions - Improving Quality with Methodologies - Structured and Information Engineering - Measuring Customer Satisfaction- Software Quality Engineering-Defining Quality Requirements - Management Issues for Software Quality - Data Quality Control - Benchmarking and Certification - software testing - Overview of Testing Maturity Model (TMM) - TMM levels - The Tester's Role in a Software Development Organization. Origins of Defects - Defect Examples-Developer and Tester Support for Developing a Defect Repository.

MODULE II TEST CASE DESIGN 8

Test Case Design Strategies - Using Black Box Approach to Test Case Design-Random Testing - Requirements based testing - Boundary Value Analysis - Decision tables - Equivalence Class Partitioning - State-based testing - Cause-effect graphing -Error guessing - Compatibility testing - User documentation testing - Domain testing Using White Box Approach to Test design - Test Adequacy Criteria - Static testing vs. structural testing - code functional testing-Coverage and Control Flow Graphs - Covering Code Logic - Paths - Their Role in White-box Based Test Design - Code complexity testing - Evaluating Test Adequacy Criteria.

MODULE III LEVELS OF TESTING 7

The Need for Levels of Testing - Unit Test - Unit Test Planning -Designing the Unit Tests - The Test Harness - Running the Unit tests and Recording results-Integration tests - Designing Integration Tests - Integration Test Planning - Scenario testing -Defect bash elimination - System Testing - Acceptance testing-Performance testing - Regression Testing - Internationalization testing - Ad-hoc testing - Alpha , Beta Tests - testing OO systems - Usability and Accessibility - Testing - Configuration testing - Compatibility testing - Testing the documentation- Website testing.

MODULE IV TEST MANAGEMENT 7

Testing and Debugging Goals and Policies - Test Planning - Test Plan Components - Test Plan Attachments - Locating Test Items - Reporting Test Results - The role of three groups in Test Planning and Policy Development - Process and the Engineering Disciplines - Introducing the test specialist - Skills needed by a test specialist - Building a Testing Group.

MODULE V CONTROLLING AND MONITORING 7

Measurement and Milestones for Controlling and Monitoring - Status Meetings-Reports and Control Issues - Criteria for Test Completion - SCM - Types of reviews - Developing a review program - Components of Review Plans - Reporting review results.

MODULE VI TEST AUTOMATION 8

Software test automation - Skills needed for automation - Scope of automation-Design and architecture for automation - Requirements for a test tool - Challenges in automation - Test metrics and measurements - Project, progress and productivity metrics.

Total Hours: 45

TEXT BOOKS:

1. M G Limaye, "Software Testing - Principles, Techniques and Tools", Tata McGraw Hill, 2011.
2. Elfriede Dustin, "Effective Software Testing", Pearson Education, 2003.
3. Renu Rajani and Pradeep Oak, "Software Testing - Effective Methods, Tools and Techniques", Tata McGraw Hill, 2003.

REFERENCES:

1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
2. Stephen Kan, "Metrics and Models in Software Quality", 2nd Edition, Addison-Wesley, 2004.
3. Edward Kit, "Software Testing in the Real World - Improving the Process", Pearson Education, 1995.

OUTCOMES:

Students who complete this course will be able to:

- Apply the appropriate testing technique for the developed software.
- Develop various testing design strategies.
- Perform different types of testing given an application.
- List the type of defects in a software application.
- Utilize various software testing tools and automation techniques.
- Test software in a structured and organized way.

CSBX34	SOFTWARE AGENTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide an insight into the theoretical concepts of automated planning and reasoning techniques
- To expose the strengths and weaknesses of different automated planning and reasoning approaches for software agents
- To highlight concepts and techniques of the agent technology and its standards and to evaluate current software agent systems.
- To introduce the methodology and applications of software agents and multi agent systems.
- To emphasize on co-ordination among autonomous agents.
- To provide an insight into multiagent interactions and approaches to characterize them.

PREQUISITE:

OBJECT ORIENTED SOFTWARE ENGINEERING ARTIFICIAL INTELIGENCE

MODULE I INTRODUCTION 8

The Vision Thing- Some Views of the Field- Agents as a paradigm for software engineering Agents as a tool for understanding human societies- Research-Ethical-Professional and Legal Issues.

MODULE II MULTI AGENTS SYSTEM 7

Agent Negotiation - Intelligent Agents- Agents and Objects- Agents and Expert Systems-Agents as Intentional Systems- Abstract Architectures for Intelligent Agents- How to Tell an Agent What to Do.

MODULE III DEDUCTIVE REASONING AGENTS 7

Agents Framework - Agent Reasoning - Agents as Theorem Provers- Agent-oriented programming – Concurrent MetateM

MODULE IV PRACTICAL REASONING AGENTS 8

Practical Reasoning = Deliberation + Means-Ends Reasoning- Means-Ends Reasoning - Implementing a Practical Reasoning Agent- The Procedural Reasoning System- Agent communication languages.

MODULE V REACTIVE AND HYBRID AGENTS 7

Reactive Agents- The Subsumption Architecture- PENGI- Situated automata-The Agent Network Architecture- The Limitations of Reactive Agents- Hybrid Agents- Touring Machines- InteRRaP- 3T- Stanley.

MODULE VI MULTI- AGENT INTERACTIONS 8

Utilities and preferences-Multi-agent encounters- Dominant strategies and nash equilibria- Competitive and zero sum interactions-the prisoner's dilemma- Other symmetric 2*2 interactions- Dependence relations in multi-agent systems.

Total Hours: 45

TEXT BOOK:

1. Michael Wooldridge, "An Introduction to MultiAgent Systems", 2nd Edition, John Wiley & Sons, 2009.

REFERENCES:

1. Jeffrey M.Bradshaw,"Software Agents",MIT Press,2000.
2. Richard Murch, Tony Johnson, "Intelligent Software Agents", Prentice Hall, 2000.
3. Gerhard Weiss, "Multi Agent Systems- Modern Approach to Distributed Artificial Intelligence", MIT Press, 2000.

OUTCOMES:

Students who complete this course will be able to:

- Analyze agent behavior in variety of environments
- Apply agent modeling techniques to agent based systems.
- Appreciate the trade-offs inherent in the design of agent-based systems.
- Evaluate, design, and implement automated planning and reasoning techniques.
- Investigate strategies used in classic scenarios such as prisoner’s dilemma.
- Identify the reactive agents that cause vital changes in the process

CSBX35	USER INTERFACE DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To expose the relation between interaction design and users expectations.
- To employ a set of usability engineering methods to refine a designed user-interface.
- To highlight the user interfaces in terms of work context Values and attitudes.
- To address a user-interface using suitable evaluation methodology.
- To acquire the concepts of usability, design principles, guidelines, heuristics and other fundamentals of Human-Computer Interaction.
- To describe the nature of the design process and its relation to other phases of the software development process.

PREQUISITE:

OBJECT ORIENTED PROGRAMMING

MODULE I INTRODUCTION 7

The importance of the user interface design, importance of user interface, human computer interface-Characteristics of Graphical and web user interface, Graphical User interface, Web user interface, Principles of user interface design.

MODULE II KNOWING THE USER 7

The user interface design process -Know your user or client, important human characteristic in design, Human consideration in design -Understand the Business function, Human consideration in screen design, Technical consideration in interface design.

MODULE III SYSTEM MENUS AND NAVIGATION SCHEMES 8

Develop System Menus and Navigation menus-Select the proper kinds of windows-Select the proper device based controls.

8

MODULE IV CONTROLS AND WEB PAGES

Select the proper screen based controls-Text for web pages-Provide effective feedback and Guidance and Assistance.

MODULE V PROVIDE EFFECTIVE INTERNATIONALIZATION 8

Provide internationalization and Accessibility - Create meaningful graphics, icons and Images-Choose the proper colors.

MODULE VI TEST, TEST AND RETEST 7

Organize and layout Windows and Pages - Test, Test and Retest, The purpose and importance of usability testing, kinds of test -Analyze, Modify and Retest.

Total Hours: 45

TEXT BOOK:

1. Wilbert O.Galitz, "The essential guide to User Interface Design", 3rd Edition, Wiley Publishers, 2009.

REFERENCE:

1. Alan Cooper, "The Essential of User Interface Design", Wiley, Dream tech Ltd, Reprint, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Demonstrate knowledge about some interaction design patterns and their applicability
- Select and execute an appropriate interaction design pattern for a particular user interface situation.
- Use several of the important concepts for interface design (i.e. color and typography) in their designs.
- Analyze users' needs, usability goals and user experience goals of a small-to-medium-sized software application.
- Implement basic user interface prototypes based on the design process
- Develop and construct suitable user interface for a given scenario

CSBX36	PATTERN RECOGNIZATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- An introduction to fundamentals of Pattern recognition.
- The ability to choose an appropriate Pattern classification algorithm for a given pattern recognition problem .
- Attain necessary foundation for efficient implementation of classification and clustering algorithms
- Exposing the student to the theorem, classifiers used in Navie Bayesian.
- Explain the fundamental principles of Support vector machine.
- Be familiar with the different types and algorithm used for Clustering.

PREQUISITE:

DATABASE MANAGEMENT SYSTEM

MODULE I PATTERN RECOGNIZATION OVERVIEW 7

Pattern Recognization - Data Sets - Different Paradigms - Representation - Data Structures - Representation Of Clusters - Proximity Measures - Size Of Patterns -Feature Extraction - Feature Selection - Evaluation Of Clustering - Evaluation Of Classifiers.

MODULE II NEAREST NERIGHBOUR BASED CLASSIFIER 7

Nearest Neighbor Algorithm - Variants of NN Algorithm - Use of Algorithms - Data Reduction - Prototype Selection.

MODULE III BAYERS CLASSIFIER 8

Bayes Theorem - Minimum Error Rate Classifier - Estimation of Probabilities- Comparison With The NNC - Naïve Bayes Classifier - Bayesian Belief Network.

MODULE IV DECISION TREES 8

Introduction - Decision Trees For Pattern Reorganization - Construction of Decision Trees - Splitting At The Nodes - Overfitting And Pruning - Examples Of Decision Tree Induction.

MODULE V SUPPORT VECTOR MACHINES **8**

Introduction - Learning the Linear Discriminant Function - Neural Networks - SVM for Classification.

MODULE VI CLUSTERING **7**

Importance of Clustering - Hierarchical Algorithms - Partitional Clustering - Clustering Large Data Sets.

Total Hours: 45

TEXT BOOK:

1. M. Narasimha Murty, V. Susheela Devi, "Pattern Recognition: An Algorithmic Approach", Springer, 2011.

REFERENCE:

1. R.O.Duda, P.E.Hart & D.G Stork, "Pattern Classification", 2nd Edition, J.Wiley Inc, 2001.

OUTCOMES:

Students who complete this course will be able to:

- have good knowledge of the issues and challenges faced while doing the Pattern Reorganization.
- Introduce the nature and inherent difficulties of the pattern recognizing problem
- Comparatively analyze various pattern recognition algorithms.
- Select and Develop suitable classification process, features to solve given patter recognition problem.
- Summarize, analyze, and relate research in the pattern recognition area verbally and in writing
- Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

CSBX37 FOUNDATIONS ON SOFTWARE QUALITY ASSURANCE

	L	T	P	C
	3	0	0	3

OBJECTIVES:

- To review the possibilities for integrating blended learning best practices to support student success.
- To provide an overview of our methodology for the public interest, for those who exercise the profession as accountants or auditors and for others who have a general interest in quality assurance methodologyTo illustraste why quality is key in all of the testing stages in the Software Development Lifecycle
- Be able to select suitable testing types and techniques based on the project's focus and the desired outcome
- Identify, prioritise, plan, create and execute test cases in test management
- Effectively log and manage identified defects.
- Accurately measure and report the progress of testing.

PREQUISITE:

SOFTWARE ENGINEERING.

MODULE I INTRODUCTION 5

Concept of quality-Quality and uncertainty-Quality and manufacturing-Quality and services- Historical evolution of quality approaches.

MODULE II TOTAL QUALITY MANAGEMENT 8

Introduction - Measurements and controls in TQM - Approaches to TQM and quality improvement - Certification and ISO 9000/9004 - Examples and applications - Total Productive Maintenance (TPM) - Reengineering and TQM-Implementation.

MODULE III TOOLS AND MANAGEMENT OF QUALITY CONTROL 8

Introduction -The tools of TQM-A statistical refresher -The reliability function-Formulation of problems under uncertainty - Examples and applications - Decision rules - Bayes rule and Bayesian decision making.

MODULE IV INSPECTION AND ACCEPTANCE SAMPLING 8

Introduction -Acceptance sampling -Rectifying inspection -Variables sampling plans - Inspection in a continuous process -Economic inspection sampling.

MODULE V CONTROL CHARTS 8

Introduction -Process capability -Constructing control charts -Pre-control - Control charts and the ARL -CUSUM Charts-Interpreting charts -Economic control charts -The practice of control charts.

MODULE VI STRATEGIE ISSUES AND ECONOMIES OF QUALITY 8

Introduction -Strategic issues and quality management -Audits and problems-Contract and producer supplier relationships -Quality and contracts: In practice-Technology and strategic quality management -Information technology and quality.

Total Hours: 45

TEXT BOOKS:

1. Larry Webber, Michael Wallace, "Quality Control for Dummies",1st Edition, Wiley, 2012.
2. Murali Chemuturi, "Mastering Software Quality Assurance", J. Ross Publishing, 2010.

REFERENCES:

1. The Institute of Internal Auditors, "Quality Assessment Manual", 6th Edition, The IIA Research Foundation, 2009.
2. Linda Westfall, "The Certified Software Quality Engineer Handbook", Quality Press, Har/Cdr edition, 2009.

OUTCOMES:

Students who complete this course will be able to:

- Describe the concept of quality assurance and total quality management.
- Analyze the need for statistics in process control and product evaluation.
- Apply the knowledge of sampling on real time data.
- Evaluate alternative standards, models and techniques aimed at achieving quality assurance in a variety of software development environments,
- Propose and defend innovative solutions to software quality assurance and measurement problems in the context of various software development environments,
- Critically evaluate leading edge approaches in software development and attendant quality assurance methodologies, presenting the research using Harvard referencing.

CSBX38	SOFTWARE DEVELOPMENT METHODOLOGIES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To illustrate the various software process models and the importance of planning and scheduling.
- To incorporate the need for analyzing the requirement and learn different stages of analysis.
- To design the software and the user interface based on the analysis.
- To distinguish between different testing strategies and learn the importance of configuration management..
- To learn the importance of the role of testing in quality assurance.
- To illustrate the emerging trends and methodologies of software development

PREQUISITE:

SOFTWARE ENGINEERING

MODULE I PROCESS MODELS 7

A generic view of processes - Process maturity - Process models - Agile process - Extreme programming - Software cost estimation - Risk analysis - Software project planning & scheduling.

MODULE II REQUIREMENT ANALYSIS 7

System engineering hierarchy - Requirement engineering: Tasks, Initiating the process, eliciting requirements, Developing use cases - Negotiating requirements - Validating requirements - Building the analysis models: Concepts - Object Oriented Analysis - Scenario based modeling - Data & control flow oriented model - Class based model - Behavioral model.

MODULE III SOFTWARE DESIGN 8

Design concepts - Design models - Pattern based design - Architectural design-Component level design - Class based and conventional components design-Real-time system design - User interface: Analysis and design.

MODULE IV SOFTWARE TESTING 7

Software testing - Strategies - Issues - Test strategies for conventional and object oriented software - Validation and system testing - Testing tactics: White box testing, Basis path testing - Control structure testing - Black box testing - Object oriented testing - Testing GUI - Testing Client/Server -Documentation testing.

MODULE V SOFTWARE QUALITY ASSURANCE 8

Software quality concepts - Quality assurance - Software technical reviews - Formal approach to software quality assurance - Reliability - Quality standards-Software quality assurance plan - Software maintenance - Software configuration management - Reverse engineering and reengineering - CASE tools.

MODULE VI EMERGING STANDARDS, TRENDS AND METHODOLOGIES 8

Agile - Scrum - Web Based Software Development- Web Service Orientation-Mobile Application Development - Software Engineering Body of Knowledge (SWEBOK) - Project Management Body of Knowledge (PMBOK).

Total Hours: 45

TEXTBOOKS:

1. Roger Pressman, "Software Engineering: A Practitioner's Approach", 7th International Edition, McGraw-Hill, 2009.
2. Ian Sommerville , "Software Engineering", 9th Edition, Addison-Wesley, 2010.

REFERENCES:

1. Steve McConnell, "Code Complete: A Practical Handbook of Software Construction", 2nd Edition, Microsoft Press, 2004.
2. Jana Polgar, Greg Adamson, "New Generation of Portal Software and Engineering: Emerging Technologies ", IGI Global, 2011.
3. Bhuvan Unhelkar, "The Art of Agile Practice: A Composite Approach for Projects and Organizations", 1st Edition, Auerbach Publications, 2012.
4. Andrea De Lucia, Filomena Ferrucci, Genny Tortora, Maurizio Tucci , "Emerging Methods, Technologies and Process Management in Software Engineering", Wiley-IEEE Computer Society, 2008.

OUTCOMES:

Students who complete this course will be able to:

- Analyze a software system and elucidate the requirements.
- Design a software system and validate the requirements.
- Apply appropriate testing strategies on it.

- Develop real time systems with quality assurance checks.
- Deploy the software based on the techniques in software configuration management.
- Maintain the developed software based on the emerging trends.

CSBX39	COMPUTER GRAPHICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To use specific tools and software to produce a graphic product based on the principle of creative art.
- To create a graphic product based on the principle of creative art.
- To introduce the principles of animation and design animated contents.
- To adapt professional workflows into the design process of animation industry.
- To render any objects using shadowing effects.
- To create graphic material using tools and software in line with the industrial norm.

PREQUISITES:

BASIC KNOWLEDGE ON COMPUTER FUNDAMENTALS.

MODULE I 2D PRIMITIVES **8**

Output primitives - Line, Circle and Ellipse drawing algorithms - Attributes of output primitives - Two dimensional Geometric transformation - Two dimensional viewing -Line, Polygon, Curve and Text clipping algorithms.

MODULE II 3D CONCEPTS **8**

Parallel and Perspective projections - Three dimensional object representation-Polygons, Curved lines, Quadric Surfaces - Visualization of data sets - 3D transformations - Viewing -Visible surface identification.

MODULE III COLOR MODELS **6**

Color Models - RGB, YIQ, CMY, HSV - Animations - Conversation between HSV and RGB Models-HLS Color Model-Color Selection and Applications.

MODULE IV COMPUTER ANIMATION **7**

General Computer Animation, Raster, Key frame - Graphics programming using OPENGL - Basic graphics primitives - Drawing three dimensional objects- Drawing three dimensional scenes.

8

MODULE V RENDERING

Introduction to Shading models - Flat and Smooth shading - Adding texture to faces - Adding shadows of objects - Building a camera in a program - Creating shaded objects - Rendering texture - Drawing Shadows.

MODULE VI FRACTALS **8**

Fractals and Self similarity - Peano curves - Creating image by iterated functions- Mandelbrot sets - Julia Sets - Random Fractals - Overview of Ray Tracing - Intersecting rays with other primitives - Adding Surface texture - Reflections and Transparency - Boolean operations on Objects.

Total Hours: 45

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, "Computer Graphics with OPENGL - C Version", 4th Edition, Pearson Education, 2010.
2. F.S. Hill, "Computer Graphics using OPENGL", 3rd Edition, Pearson Education, 2009.

REFERENCE:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, "Computer Graphics- Principles and practice", 2nd Edition, Pearson Education, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Identify the performance characteristics of advanced computer graphics pipeline.
- Distinguish between generic computer architecture and support for high performance graphics.
- Apply animated contents in any Multimedia projects.
- Design Multimedia content for handheld devices.
- Use OpenGL or any other graphical tools to create and render any object
- Use surface and object modeling techniques to build 3D models

CSBX40 FOUNDATION OF PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the importance and key concepts of project management.
- To expose the process of planning and controlling the project.
- To introduce the concepts of portfolio project management.
- Method of planning and guiding a project from start to finish
- To introduce and effectively execute all project management processes
- To examine roles and environments and various techniques of planning, evaluation, and control.

PREQUISITE:
SOFTWARE ENGINEERING

MODULE I INTRODUCTION **7**

Project Management: The key to thrive in the Project Management World, Foundation Principles of Project Management, Knowing your key stack holders and winning their cooperation.

MODULE II DEFINING THE PROJECT **7**

Five key document to manage expectation and define success- Risk Management and work Breakdown Structure.

MODULE III THE PLANNING PROCESS **8**

Realistic scheduling- The art and science of accurate estimating- Balancing the trade off among cost, schedule and quality.

MODULE IV CONTROLLING THE PROJECT **9**

Building a high performance project team - Clear communication among project stake holders-Measuring Progress-Solving common project problems.

MODULE V ADVANCE PROJECT MANAGEMENT **7**

Enterprise Project Management- Requirement Engineering.

MODULE VI PROJECT PORTFOLIO MANAGEMENT 7

Project initiation, Information Technology project success factors- Align project resources with business strategy.

Total Hours: 45

TEXT BOOK:

1. Eric Verzuh," The Fast Forward MBA in Project Management", 4th Edition, John Wiley and Sons, 2012.

REFERENCES:

1. "A Guide to the Project Management Body Of Language PMBOK(R) Guide", Project Management Institute, 5th Edition, 2013.
2. Eric.S.Norman Shelly. A. Botherton,Robert.T.Fried ,"Work Breakdown Structures:The Foundation for Project Management Excellience ", John Wiley & Sons ,2008.

OUTCOMES:

Students who complete this course will be able to:

- Analyze the key concept of project management.
- Manage different projects in their workplace.
- Improve their personal job skill of becoming a valuable project manager in the years ahead.
- Define the terms *project* and *project management*.
- Explain the role of the project manager in initiating and completing a project.
- Explain knowledge areas including *project integration management, project* scope management, project time management, project cost management, project quality management
- Define the terms *project* and *project management*.
- Identify the project management process groups including *initiating, planning,* executing, monitoring and controlling, and closing.
- Explain the role of the project manager in initiating and completing a project.

CSBX41	SOFTWARE PROCESS MODEL	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To define and highlight importance of software engineering process models.
- To discuss about the various strengths and weaknesses involved in people ware activities in a software process models
- To extend software process definitions to address people-related considerations as the key practices in extreme programming.
- To organize the activities in an pattern towards effectiveness ,which helps improving the software process.
- To analyze the capabilities of various components involved in process and utilize them in building an effective model.
- To develop process based on the *System dynamics* modeling *method* that enables us to build formal computer *simulations* of complex systems

PREREQUISITE :

SOFTWARE ENGINEERING

MODULE I INTRODUCTION 6

Software processes-Software process models - Process activities -Coping with change- The rational unified process.

MODULE II SOFTWARE PROCESS AND PEOPLEWARE BASICS 7

Software process versus lifecycle - Software process research - Software process modeling - Peopleware - Human competencies - Modeling peopleware in the software process.

MODULE III SOFTWARE PROCESS MODELS 8

Descriptive criteria - Activity oriented models - People oriented models - Activity oriented models.

MODULE IV CAPABILITIES ORIENTED SOFTWARE PROCESS MODEL 8

Adding capabilities to the software process model - People dimension - Roles dimension - Product dimension - Capabilities based assignation method in action - Benefits of incorporating peoples capabilities into the software process.

MODULE V SOFTWARE PROCESS DYNAMICS AND 8

SIMULATION

Modeling, Simulation and improvement - Software process simulation with system dynamics - High level software project modeling with system dynamics.

MODULE VI SOFTWARE PROCESS MODELING 8

Socio-Technical interaction network in free/open source development process- Discovering, modeling and re-enacting open source software development processes - Case study.

Total Hours : 45

TEXT BOOKS:

1. Silvia T.Acuna, Natalia Juristo, Ana Maria Moreno, Alicia Mon, "Software Process Model Handbook for Incorporating People's Capabilities", Springer, 2005.
2. Maria I. Sanchez-segura (Editor) Silvia T. Acuna,"New Trends in Software Process Modeling", World Scientific Publishing, 2006.
3. Ian Sommerville,"Software Engineering", 9th Edition, Pearson, 2010.

REFERENCES:

1. Rizwan Qureshi,"Software Process Models: To Improve the Efficiency of Software Development",VDM Publishing, 2010.
2. Stefen Koch," Free/Open Source Software Development", IGI, 2005.

OUTCOMES:

Students who complete this course will be able to:

- Compare and contrast different software process models.
- Design software based on Component-based development (CBD), Agile and Extreme Programming (XP).
- Analyze the issues and problems of scaling agile development methods to the development of large software systems.
- To acquaint with the project management skills
- Implement CPM and PERT methods in effective project management by planning and scheduling based on costing.
- Master the notion of user-centric viewpoints in system design.
- Develop a model based considering various attributes involved and their impact of changes that affect the entire process.

CSBX42	SOFTWARE MAINTENANCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study in detail software maintenance and how it affects all levels of the software evolution process.
- To impart key issues involved in software maintenance and the best solutions to overcome.
- To provide knowledge on how the object-oriented software and client/server software, corporate education and training programs, creative cost controls, and others affect software maintenance.
- To interpret the importance of reusing and reversing impact the software model.
- To visualize the process of evaluating the quality of a product and enforcing adherence to software product standards and procedures.
- To analyze the product from the customer perspective and customize according to their requirements by reusing than redeveloping.

PREQUISITE:

SOFTWARE ENGINEERING

MODULE I THE CONTEXT OF MAINTENANCE 7

Introduction to Basic concepts- Maintenance framework -Fundamentals of software change- Limitations and Economic Implications to Software Change-Maintenance process.

MODULE II UNDERSTANDING OF MAINTENANCE 8

Program understanding-Reverse engineering-Reuse and reusability-Testing-Management and organizational issues.

MODULE III PROBLEM SOLVING AND QUALITY ASSURANCE 8

Problem Reporting - Problem Resolution- Fix Distribution-Other Forms of Maintenance-Metrics and Measurements - Software Quality Assurance Activities for Maintenance

MODULE IV KEEPING TRACK OF MAINTENANCE PROCESS 8

Configuration Management and Maintenance- Software Maintenance from the Customer's Perspective-Maintenance of Mission-Critical Systems.

MODULE V MAINTENANCE TEAMS 7

Global Maintenance Teams- Maintenance and Other Life Cycle Activities-Building and sustaining maintainability- Common Technical Problems.

MODULE VI LOOKING TO THE FUTURE 7

Software maintenance management- Education and training-impact of object oriented technology on software maintenance- Software maintenance resources- The future of software maintenance.

Total Hours: 45

TEXT BOOKS:

1. Penny Grubb, Armstrong A Takang, "Software Maintenance Concepts and Practice", 2nd Edition, World Scientific, 2003.
2. Gopalaswamy Ramesh," Software Maintenance", 1st Edition, Mc Graw Hill Education, 2005.

REFERENCES:

1. Alain April,Alain Abran, "Software Maintenance Management", Wiley Publications, 2008.
2. Thomas M.Pigoski," Practical Software Maintenance", Wiley Computer Publications, 2007.

OUTCOMES:

Students who complete this course will be able to:

- Identify the primary activities of software maintenance.
- Solve the problem involved in a process and ensure the software quality in maintenance.
- Summarize the end-user participation, product functionality, and utilization factors of various components that affect the software maintenance quality.
- State the effects of globalization on the various roles and organization structure and the issues that arise in the teams distributed geographically.
- Identify the mission critical systems built for specific verticals that usually find high priority in the subsequent release and version in a product.

- List out the various ways to measure the ease of the maintenance process, not only to reduce the cost of maintainability but to ascertain whether the maintenance of a specific software product is worthwhile or not.

CSBX43	SOFTWARE DESIGN PATTERNS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Trace the relationship between design patterns and object orientation principles
- Relate software engineering with software design patterns
- Illustrate the consequences of applying software design patterns to the overall software quality of a system.
- Be able to mix patterns with each other and describe the consequences of mixing patterns on the overall quality of a system.
- Position UML in software design patterns
- Trace the relationship between current and evolving methods of software engineering and design patterns.

PREQUISITE:

SOFTWARE ENGINEERING

MODULE I THE OBJECT ORIENTED PARADIGM, THE UML 8

Overview - Problem Of Requirements - Dealing With Changes - Dealing With Changing Requirements - The Object - Oriented Paradigm - Special Object Methods - The UML - Use of UML - The Class Diagrams - Interaction Diagrams.

MODULE II INTRODUCTION TO DESIGN PATTERNS 5

Overview - Moving From Architectural To Software Design Patterns – Why Study Design Patterns? - Advantages of Study Design Patterns

MODULE III THE FACADE PATTERN AND THE STRATEGY PATTERN 8

Introducing to the facade pattern - Learning the façade pattern - Relating the facade problem to the CAD / CAM problem - An Approach to Handling New Requirements - Case Study - International E-Commerce System - Handling New Requirements - The Strategy Pattern - Using the Strategy Pattern.

MODULE IV BRIDGE PATTERN AND ABSTRACT FACTORY PATTERN 9

Introducing the Bridge Pattern - Learning The Bridge Pattern - An Example - Deriving It - Abstract Factory Pattern - Introducing The Abstract Factory Pattern-Learning The Abstract Factory Pattern - An Example - Implementing It.

MODULE V THE PRINCIPLES AND STRATEGIES OF DESIGN PATTERN 7

The open-closed principle - The principle of designing from context - The principle of encapsulating variation - Abstract classes Vs Interfaces - The principle of healthy skepticism.

MODULE VI LESSONS FROM DESIGN PATTERNS: FACTORIES 8

Factories - The universal context revisited - Factories follow guidelines - Limiting the vectors of change - Different roles of factories - Design patterns reviewed-How design patterns encapsulate implementations - Commonality and variability analysis and design patterns - Decomposing a problem domain into responsibilities - Patterns and contextual design - Design patterns and agile coding practices.

Total Hours: 45

TEXT BOOK:

1. Allan Shalloway, James .R.Trott, "Design Patterns Explained: A New Perspective on Object Oriented Design", 2nd Edition, Pearson Education, 2008.

REFERENCES:

1. Joshua Kerievsky, "Refactoring to Patterns", 1st Edition, Addison Wesley Professional, 2004.
2. Erich Gamma, Richard Helm Ralph Johnson, "Design Patterns: Elements of Resusable Object Oriented Software", Addison-Wesley, 1995.

OUTCOMES:

Students who complete this course will be able to:

- Explain why design patterns must be studied
- Describe the purpose of design patterns and trace the linkage with object oriented framework
- Recognize common software design patterns and analyze when to apply them.
- Trace the tradeoffs to be made when implementing a design pattern.
- Explain how UML can be used to capture the patterns identified in a system
- Demonstrate the applicability of the design patterns with examples from real life

CSBX44 SOCIAL NETWORK ANALYSIS

	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

OBJECTIVES:

- To explain an overview of social networks and its importance.
- To discuss the social network concepts and various methods of analysis.
- To familiarize with the methodological issues connected with social network.
- To identify the pros and cons of different data mining techniques for modeling a given social phenomen.
- To Use mathematical techniques to model and analyze structural and dynamical properties of social networks.
- To expose and train on using various tools and techniques for analyzing and visualizing social media networks.

.

PREQUISITE

COMPUTER NETWORKS

MODULE I INTRODUCTION TO SOCIAL NETWORKS 8

Brief history of Social Network Analysis - Connected World - Networks: Actors, Relations and Attributes - Networks as Information Maps - Networks as Conduits- Leaders and Followers - Psychological foundations of social networks - Basic building Blocks.

MODULE II NETWORK CONCEPTS 8

Individual Members of the Network - Sociological Questions about Relationships-Whole Social Networks - Distributions - Multiplexity - Roles and Positions - Network Segmentation - Graph Theory - Notations for Social Network Data.

MODULE III SOCIAL NETWORK ANALYSIS 8

Points, Lines and Density - Centrality and Centralization - Components, Cores and Cliques - Positions, Roles and Clusters - Dimensions and Displays.

MODULE IV METHODOLOGIES 8

Graphs - Matrices - Relationship Measures - Centrality and Prestiges - Structural Equivalence - Visual Displays - Bookmodels - Network Position Measures - Affiliation networks - Lattices.

MODULE V ANALYSIS LEVELS **7**

Actor Level in Complete Networks - Actor Level in Ego Networks - Dyad Level-Triad Level - Subgroups Level - Network Levels - Positions and Roles Analysis.

MODULE VI TOOLS AND TECHNOLOGIES **6**

Twitter Analytics - Facebook Analytics - Google+ Analytics - Pajek - Network Visualization Tools.

Total Hours: 45

REFERENCES:

1. Charles Kadushin , "Understanding Social Networks: Theories, Concepts, and Findings", Oxford University Press, USA, 2011.
2. Christina Prell , "Social Network Analysis: History, Theory and Methodology", SAGE Publications Ltd, 2011.
3. David Knoke, Song Yang , "Social Network Analysis", 2nd Edition, SAGE Publications, 2007.
4. John P Scott, "Social Network Analysis: A Handbook", 2nd Edition, SAGE Publications Ltd, 2000.

OUTCOMES:

Students who complete this course will be able to:

- Describe the importance of social networks.
- Summarize the theories and concepts of social networks.
- Plan and execute network analytical computations.
- Compare and contrast of the methodologies supported for visualization and measures.
- Solve concrete managerial and consulting problems using social network Analysis.
- Analyze the social networks by applying various methods of analysis, tools and techniques.

CSBX46	NoSQL DATABASE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To have an exposure on distribution models and transaction management on NoSql.
- To learn various NoSQL databases and their features.
- To study concepts relating to storage architecture and databases.
- To expose transaction management and data integrity.
- To work on concepts interfacing with NoSql using the tools.
- To address the issues on databases and its performance tuning.

PREQUISITE:

DATA BASE MANAGEMENT SYSTEM

MODULE I INTRODUCTION TO NoSQL 7

Definition - Need for NoSQL - Emergence and History of NoSQL - Aggregates-Key/Value Stores - Document Databases - Column Family Stores - Graph Databases - Schemaless Databases - Distribution Models.

MODULE II MANAGING TRANSACTION AND DATA INTEGRITY 8

CRUD Operations - RDBMS and ACID - Distributed ACID Systems – Update Consistency - Read Consistency - Relaxing Consistency - CAP Theorem - Relaxing Durability- Quorums - Upholding CAP - Version Stamping.

MODULE III STORAGE ARCHITECTURE AND IMPLEMENTATION 8

Key/Values Stores: Features, Use Cases and Usage Recommendation - Document Databases: Features, Use Cases, Usage Recommendation - Column Family Stores: Features, Use Cases, Usage Recommendation - Graph Databases: Features, Use Cases, Usage Recommendation.

MODULE IV NoSQL DATABASES 8

MongoDB - Redis - CouchDB - HBase - Apace Cassandra - Riak - Neo4j - PostgreSQL.

MODULE V INTERFACING AND INTERACTING WITH NoSQL 8

Storing Data In and Accessing Data from MongoDB - Querying MongoDB - Storing Data In and Accessing Data from Redis - Querying Redis - Storing Data In and Accessing Data from HBase - Querying HBase - Storing Data In and Accessing Data from- Apache Cassandra - Querying Apache Cassandra-Language Bindings for NoSQL Stores.

MODULE VI ADVANCE TOPICS 6

Google App Engine Data Store - Amazon SimpleDB - MapReduce - Hive - Benchmarking and Performance Tuning.

Total Hours: 45

TEXT BOOKS:

1. Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", 1st Edition, Addison-Wesley Professional, 2012.
2. Shashank Tiwari, "Professional NoSQL", 1st Edition, Wrox, 2011.
3. Eric Redmond , Jim R. Wilson, "Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement", Pragmatic Bookshelf, 2012.

REFERENCES:

1. MC Brown,"Getting Started with CouchDB", O'Reilly Media, 2012.
2. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilly Media, 2010.
3. Kevin Roebuck, "Storing and Managing Big Data - NoSql, Hadoop and More: High-Impact Strategies - What You Need to Know", Tebbo, 2011.
4. Eelco Plugge, Tim Hawkins, Peter Membrey, "The Definitive Guide to MongoDB: The NoSQL Database for Cloud and Desktop Computing", Apress, 2010.

OUTCOMES:

Students who complete this course will be able to:

- Address the principles and techniques used under NoSQL.
- Compare the architectural methods and storage techniques used under NoSql.
- Attain knowledge on storage architectures and its implementation.
- Identify the issues related to transactions management
- Interface NoSQL with tools and retrieve data from NoSql databases.
- Handle the database tools like Mapreduce and Hive.

CSBX47 MULTICORE ARCHITECTURE L T PC

3 0 0 3

COURSE OBJECTIVE

- To introduce the fundamentals of parallel Programming.
- To introduce the importance of the underlying architecture.
- To explain the emerging transactional approach to concurrency.

PREQUISITE:

MICROPROCESSOR

COMPUTER ARCHITECTURE

MODULE I INTRODUCTION 9

Definitions – Technological Aspects - Design Principles of Connected Devices - Fundamentals of IPv6 – Addressing and Protocols relevant to IoT - Smart Cities and Environments – Smart Metering – Applications in Security – Healthcare – Retail – Industrial Control –Smart Farming and Agriculture.

MODULE II FOUNDATIONS OF SHARED MEMORY 9

Register construction – Atomic snapshots -– Power of Primitive Synchronization Operations – Universality of Concensus – Spin Lock and Contention.

MODULE III SYNCHRONIZATION 9

Monitors and Blocking Synchronization – Role of Locking – Concurrent Queues – ABA Problem – Concurrent Stacks and Elimination.

MODULE IV CONCURRENT DATA STRUCTURES 9

Counting, Sorting and distributed coordination – Concurrent hashing and Natural Parallelism – Multiprocessor Scheduling and Parallelism - Barriers – Transactional Memory.

MODULE V PARALLEL PROGRAM DEVELOPMENT 9

Two n-Body Solvers – Tree Search – Pthreads – OpenMP – MPI

TEXT BOOKS

1. Peter Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann,1st Edition, 2011.
2. Maurice Herlihy, Nir Shavit, The Art of Multiprocessor Programming, Morganaufmann, 1st Edition, 2012.

COURSE OUTCOMES:

Upon the completion of the course students will be able to

- Write effective multiprocessor programs.
- Apply barriers, all of which are useful for structure concurrent applications
- Demonstrate synchronization and parallelism.

CSBX48 VIRTUALIZATION TECHNIQUES

	L	T	P	C
	3	0	0	3

OBJECTIVES:

- To introduce the importance of virtualization in distributed computing.
- To learn the essentials need to build virtualization.
- To illustrate the taxonomy of virtualization.
- Identify security implications in virtualization
- To learn different type of virtualization.
- To comprehend the technical capabilities and business benefits of virtualization.

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PREQUISITES:

BASICS OF CLOUD COMPUTING.

MODULE I INTRODUCTION 7

Virtualization Defined - Need of Virtualization - Moore's Law - Move to Virtualization: Five Step Process - Discovery, Virtualization, Hardware Maximization, Architectures, Managing Virtualization - Virtualizing Servers - Virtualizing Desktops - Virtualizing Applications.

MODULE II VIRTUALIZATION INFRASTRUCTURE BUILDING 8

Comprehensive Analysis - Planning and Preparation - Preparing Network Layer- Preparing Storage- Prepare Host Servers - Testing Environment.

MODULE III SERVER VIRTUALIZATION AND VIRTUAL LOADS 8

Choosing Server Virtualization Technology - Technology and Scenarios - Server Virtualization Decision Process - Virtualization Service Offering Structure - Resource Allocation Rules - Provisioning New Virtual Machines - Physical to Virtual Conversions.

MODULE IV DESKTOP VIRTUALIZATION 8

Working with system stack - Desktop Management Issues - Available Products- Licensing - Potential scenarios and audiences - Centralized Desktop Virtualization Infrastructures.

MODULE V APPLICATION VIRTUALIZATION 7

Application Management Issues - Redesigning Application Management - Benefits of AppV - Compare Application Virtualization Products - Key points on AppV - Integrating Application, Profile and Desktop Virtualization.

MODULE VI VIRTUALIZATION SECURITY 7

Castle Defense System - Securing Resource Pools - Securing Virtual Service Offering - System Protection Strategies - Complete Recovery Strategies - Business Continuity Essentials - Business Continuity Strategies.

Total Hours: 45

TEXT BOOKS:

1. Nelson Ruest, Danielle Ruest, "Virtualization, A Beginner's Guide", McGraw-Hill Osborne Media, 2009.
2. Matthew Portnoy, "Virtualization Essentials", 1st Edition, Sybex Publishers, 2012.

REFERENCES:

1. Ivanka Menken, "Virtualization - The Complete Cornerstone Guide to Virtualization Best Practices", Emereo Pty Ltd, 2010.
2. Daniel Kusnetzky, "Virtualization: A Manager's Guide", O'Reilly Media, 2011.

OUTCOMES:

Students who complete this course will be able to:

- Explain virtualization and their role in elastic computing.
- Compare the strengths and limitations of virtualization.
- Analyze different types of virtualization with performance metrics.
- Describe the architecture and taxonomy of virtualization.
- Analyze the constraints and techniques in setting up virtualization through its enabling technologies.
- Design virtualization infrastructure solutions and recommendations based on the need.

ECB3101	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To study various Fourier transforms and their application in Digital Filter design.
- To study the design of FIR and IIR Digital filters.
- To expose the concept of quantization noise and its effects in multi-rate signal processing
- To study the architecture and features of various digital signal processors.

MODULE I DISCRETE FOURIER TRANSFORM 8

Introduction to Discrete Fourier Transform, Direct computation of DFT, Properties of DFT, Efficient computation of DFT- FFT algorithms - Radix-2FFT algorithms -Decimation in Time, Decimation in Frequency algorithms, Computing Inverse DFT.

MODULE II DESIGN AND IMPLEMENTATION OF IIR FILTERS 8

Design of Low Pass Butterworth filters, analog to analog transformation -Analog to digital transformation, Bilinear transformation - Prewarping, Impulse invariant transformation.

MODULE III DESIGN AND IMPLEMENTATION OF FIR FILTERS 8

Amplitude and phase responses of FIR filters - symmetric and anti-symmetric impulse response, group delay and phase delay, Frequency response of FIR filters, Linear phase filters - Windowing techniques for design of Linear phase FIR filters - Rectangular, Hamming, Hanning and Blackmann windows, Frequency sampling techniques.

MODULE IV FINITE WORD LENGTH EFFECTS 8

Representation of numbers, - Fixed point and binary floating point number representation - Comparison, errors due to truncation and rounding- off, Quantization noise - Derivation for quantization noise power at the input and output of a digital filter , Co-efficient quantization error -Product quantization error, Round-off effects in digital filters, Limit cycle oscillation - Over flow error-Signal scaling.

MODULE V MULTIRATE DIGITAL SIGNAL PROCESSING 8

Mathematical description of change of sampling rate - Interpolation and Decimation , Decimation by an integer factor, Interpolation by an integer factor, Sampling rate conversion by a rational factor, Time and frequency domain descriptions - Single, Multi stage, Polyphase structures - Quadrature Mirror Filter banks - Sub-band Coding, few applications using sub-band coding.

MODULE VI DIGITAL SIGNAL PROCESSORS 5

Introduction to DSP architecture - Harvard and Von Neumann architecture - Pipelining - Dedicated MAC unit - Advanced addressing modes, Architecture of TMS320C5X and C54X, Overview of instruction set of TMS320C5X and C54X.

Total Hours: 45

TEXT BOOKS:

1. John G Proakis, Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", 4th Edition, PHI, 2009.
2. B.Venkataramani & M. Bhaskar, "Digital Signal Processor Architecture, Programming and Application", TMH 2002.

REFERENCES:

1. Alan V Oppenheim, Ronald W Schafer, John R Back, "Discrete Time Signal Processing", 2nd Edition, PHI , 2000.
2. Avtar Singh, S.Srinivasan, "DSP Implementation using DSP microprocessor with Examples from TMS32C54XX", Thomson / Brooks cole Publishers, 2003.
3. Johny R.Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 2002.
4. S.K.Mitra, "Digital Signal Processing- A Computer based approach", Tata McGraw-Hill, 2006.

OUTCOMES:

On completion of this course the student will be familiar with the

- Digital signal processing methods.
- Designing & analyzing of digital filters.
- Architecture and features of DSP Processors.

CSBX49 VIDEO ANALYTICS L T P C

3 0 0 3

OBJECTIVES:

- Showcase how the need in multimedia has driven the innovation in video analytics
- Illustrate the basic processes involved from the acquisition to the analytics phases
- Expose how the modeling of the content is a key step in all the phases of video analytics
- Depict the relationship between components of the video affects the final output in analytics
- Model the relation between time and analytics
- Showcase the current research domains and applications in video analytics

PREREQUISITE

ALGORITHM ANALYSIS.

KNOWLEDGE IN MATHEMATICS

MODULE I INTRODUCTION 7

Introduction to video Analysis - Video Broadcasting- Video Archives- Security and Surveillance - Business and education - Bridging the Semantic Gap - Video Principles - MPEG Standards.

MODULE II DETECTING SHOT BOUNDARIES IN VIDEO 7

Shot-Boundary Detection- Feature Extraction - Modeling Prior Information - Modeling Discriminative Information - Bayesian Approach to Decision Module Design.

MODULE III SEMANTIC SEGMENTATION 8

Principle of Content Coherence - Video Parsing Based on the Content Coherence Principle - Content Similarity between Clips: Keyframe Comparisons, Video Mosaics, Accompanying text - Audio-Assisted Video Parsing: Sound classification, Analyzing dominant sound source.

MODULE IV INDEXING AND ABSTRACTION FOR RETRIEVAL 8

Video Indexing - Content Modeling - Multi-Segment Video Indexing - Video Content Representation for Browsing -Content Preview.

MODULE V AFFECTIVE VIDEO CONTENT ANALYSIS 8

Dimensional Approach- Affective Video Content Representation- Affective Video Content Modeling: Modeling Criteria - Feature Selection - Arousal Time Curve Approach- Valence Time Curve Approach - Applications.

MODULE VI CAMERA NETWORKS AND VIDEO ANALYSIS 7

Introduction to Camera Networks - Wide Area Tracking - Distributed Processing in Camera Networks - Object and Activity Recognition - Active Sensing.

Total Hours : 45

TEXTBOOKS:

1. Alan Hanjalic, "Content-Based Analysis of Digital Video", Springer, 2004.
2. Amit K. Roy-Chowdhury, Bi Song,"Camera Networks: The Acquisition and Analysis of Videos over Wide Areas", Morgan & Claypool Publishers , 2012.

REFERENCES:

1. Hubert Knoblauch, Hans-Georg Soeffner, Bernt Schnettler, Juergen Raab, "Video Analysis: Methodology and Methods", Peter Lang GmbH, 2009.
2. Michael S. Lew,"Principles of Visual Information Retrieval",Springer; 2001.
3. Alberto Amato, Vincenzo Di Lecce, Vincenzo Piuri, "Semantic Analysis and Understanding of Human Behavior in Video Streaming",Springer, 2013.

OUTCOMES:

Students who complete this course will be able to:

- List and explain the video analysis principles
- Trace the key transitions involved in the transformation from analysis to analytics in video domain
- Discuss how shot boundaries can be detected in videos
- Show the techniques of indexing and browsing in videos
- Review and discuss current approaches to high-level visual recognition
- Analyze the real time video by applying segmentation and classification techniques.
- Discuss the applications of video analytics in real life.

CSBX50 MULTIMEDIA AND ANIMATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the various components of Multimedia.
- To expose the principles of animation and design for developing multimedia applications.
- To adapt professional workflows into the design process of animation industry.
- To effectively create and develop animated content for multimedia projects.
- To develop multimedia content for Hand held devices.
- To develop interactive and animated multimedia content.

PREREQUISITE:

BASIC KNOWLEDGE ON GRAPHICS AND SOUND

MODULE I INTRODUCTION TO MULTIMEDIA **8**

Definitions - Usage -Delivery - Virtual Reality - Text -Fonts and Faces -Text in Multimedia - Hypermedia -Hypertext.

MODULE II IMAGE AND AUDIO FUNDAMENTALS **8**

Images - Bitmaps -Vector Drawings - 3D Drawing and Rendering - Color Fundamentals - Digital Audio - MIDI - Audio File Formats - Adding Sound to Multimedia.

MODULE III VIDEO BASICS FUNDAMENTALS **7**

Animation Principles - Techniques - File Formats - Analog Video -Digital Video- Codecs - Format Converters - Shooting and Editing Videos

MODULE IV MULTIMEDIA REQUIREMENTS **8**

Stages of Making Multimedia -Intangibles - Multimedia Hardware Requirements- Multimedia Software Requirements - Authoring Systems - Acquiring Content- Internet and Multimedia.

MODULE V MULTIMEDIA PROCESS 7

Multimedia Skills - Planning - Costing - Designing - Producing - Talent Acquisition - Delivery Mechanism - Designing for World Wide Web- Designing for Handheld Devices.

MODULE VI MULTIMEDIA TOOLS 7

Macromedia Flash Introduction -Understanding the Interface - Drawing and Color Tools - Animation Basics- Shape Tweening - Filters and Blends –Motion Tweening - Timeline Effects - Action Scripts- Working with Text, Images, Videos - Integration.

Total Hours: 45

TEXT BOOKS:

1. Tay Vaughan , "Multimedia:Making It Work,8th Edition", McGraw Hill, 2010.
2. James Gonzalez , "Macromedia Flash Professional 8 Hands-On Training", Peachpit Press , 2006.

OUTCOMES:

Students who complete this course will be able to:

- Identify the basic components, basic hardware and software requirements for multimedia development and playback.
- Apply animation principles in Multimedia application development.
- Identify and describe the function of the general skill sets in the multimedia industry.
- Apply animated contents in any Multimedia projects.
- Design Multimedia content for handheld devices.
- Design and create animation using computerized animation tools.

GENERAL ELECTIVES

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 - Micellar nanoparticles.

MODULE III PRODUCTION OF NANOPARTICLES 7

Sol-gel, hydrothermal, solvothermal, Plasma Arcing, Electro deposition, RF sputtering, Pulsed laser deposition, Chemical vapour, deposition.

MODULE IV CARBON BASED NANOMATERIALS 6

Carbon nanotubes: Single wall nanotubes (SWNT), Multiwall nanotubes (MWNT) - structures-carbon nanofibre, Fullerenes-Application of carbon nanotubes and Fullerenes.

MODULE V NANOPHOTONICS 7

Light and nanotechnology, Interaction of light and nanotechnology, Nanoholes and photons, nanoparticles and nanostructures; Nanostructured polymers, Photonic Crystals, Solar cells.

MODULE VI CHARACTERISATION TECHNIQUES 7

Basic principles of scanning Electron Microscopy (SEM), Atomic force microscopy (AFM), Scanning tunneling microscopy (STM), Scanning probe microscopy (SPM) and Transmission electron microscopy (TEM), Particle size analyzer, Luminescence techniques.

Total Hours: 45

TEXTBOOKS:

1. Hari Singh Nalwa, "Handbook of Nanostructured Materials and Nanotechnology", Academic Press, 2000.
2. Guozhong Cao, "Nanostructures and Nano materials-Synthesis, Properties and Applications", Imperial College Press (2011).
3. Zhong Lin Wang, "Handbook of Nanophase and Nanomaterials (Vol 1 and II)", Springer, 2002.
4. Mick Wilson, Kamali Kannangara, Geoff smith, "Nanotechnology: Basic Science and Emerging Technologies", Overseas press, 2005.

REFERENCES:

1. A. Nabok, "Organic and Inorganic Nanostructures", Artech House, 2005.
2. C.Dupas, P.Houdy, M.Lahmani, Nanoscience: "Nanotechnologies and Nanophysics", Springer-Verlag Berlin Heidelberg, 2007.
3. Mick Wilson, Kamali Kannangara, Michells Simmons and Burkhard Raguse, "Nano Technology – Basic Science and Emerging Technologies", 1st Edition, Overseas Press, New Delhi,2005.
4. M.S. Ramachandra Rao, Shubra SinghH, "Nanoscience and Nanotechnology: Fundamentals to Frontiers", Wiley, 2013.

OUTCOMES:

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

- Apply the knowledge of different types of nanomaterials for various engineering applications.
- Acquire the knowledge of various methods of production of nanomaterials.
- Familiarize with various characterization techniques.

GEBX03	CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To describe 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:

- Analyze the 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 EONOMIC SYSTEMS 8

Demographic dynamics of sustainability- Policies for socio economic development-Sustainable Development through trade- Economic growth-Action Plan for implementing sustainable development- Sustainable Energy and Agriculture.

MODULE III FRAME WORK FOR ACHIEVING SUSTAINBAILITY 7

Sustainability indicators- Hurdles to sustainability- Business and Industry – Science and Technology for Sustainable Development- Performance indicators of sustainability and assessment mechanism- Constraints and barriers of Sustainable Development.

MODULE IV GREEN BUILDINGS 8

Introduction to Green Building- Energy- Water- Materials and Resources - Sustainable Sites and Land Use - Indoor Environmental Quality- Life Cycle Assessment- Energy, water and materials efficiency.

MODULE V ENERGY CONSERVATION AND EFFICIENCY 7

Energy savings- Energy Audit- Requirements- Benefits of Energy conservation-Energy conservation measures for buildings- Energy wastage- impact to the environment.

MODULE VI GREEN BUILDINGS DESIGN

Elements of Green Buildings Design- Foundation, Electrical, Plumbing, flooring, Decking, roofing, insulation, wall coverings, windows, siding, doors and finishing, LEED certification for Green Buildings, Green Buildings for sustainability.

Total Hours: 45

TEXT BOOK:

1. Kirby, J., Okeefe, P., and Timber lake, “Sustainable Development”, Earthscan Publication, London, 1995.

REFERENCE:

1. Charles Kibert, J., “Sustainable Construction: Green Building Design and Delivery”, 2nd Edition, John Wiley and sons, 2007.

OUTCOMES:

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

- Explain the relationship between sustainability and emergence of green building practices.
- Address the economic, environmental, and social concerns.

GEBX05 KNOWLEDGE MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

The course

- Focuses on positioning knowledge as a valuable commodity, embedded in products and in the tacit knowledge of highly mobile individual employees.
- Presents KM as a deliberate and systematic approach to cultivating and sharing an organization's knowledge base.
- Brings out the paradigm in terms of information technology and intellectual capital.

MODULE I KNOWLEDGE MANAGEMENT 6

KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence – Experience – Common Sense – Cognition and KM – Types of Knowledge – History of Knowledge Management - From Physical assets to Knowledge Assets – Expert knowledge – Human Thinking and Learning.

MODULE II KNOWLEDGE MANAGEMENT SYSTEMS AND MODELS 9

Challenges in Building KM Systems – Conventional Vs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – KM cycle - Different variants of KM cycle - KM models - Implications and practical implementations.

MODULE III CAPTURING KNOWLEDGE AND SHARING 9

Tacit knowledge capture - Explicit knowledge codification - Knowledge taxonomies - Knowledge sharing - Communities - Obstacles to knowledge capture and sharing.

MODULE IV KNOWLEDGE MANAGEMENT TOOLS 9

KM System tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Knowledge capture and creation tools - Content creation tools - Data mining and knowledge discovery - Content management tools - Knowledge sharing and dissemination tools - Group ware and Collaboration tools - Intelligent filtering tools.

MODULE V KNOWLEDGE APPLICATION 6

KM at individual level - Knowledge workers - Task analysis and modeling - Knowledge application at group and organizational levels - Knowledge repositories - Knowledge reuse -Case study: e-learning.

MODULE VI VALUE OF KNOWLEDGE MANAGEMENT 6

KM return on investment and metrics - Benchmarking method - Balanced scorecard method - House of quality method - Results based assessment method - Measuring success - Future challenges for KM.

Total Hours:45

TEXT BOOKS:

1. Elias M. Awad, Hassan M. Ghaziri, "Knowledge Management", Prentice Hall, 2nd Edition, 2010.
2. Jay Liebowitz, "Handbooks on Knowledge Management", 2nd Edition, 2012.
3. Irma Becerra-Fernandez, Rajiv Sabherwal, "Knowledge Management: Systems and Processes", 2010.

OUTCOMES:

Students who complete this course will be able to

- Describe the fundamental concepts in the study of knowledge and its creation, acquisition, representation, dissemination, use and re-use, and management.
- Explains the core concepts, methods, techniques, and tools for computer support of knowledge management.
- Critically evaluate current trends in knowledge management and apply it for e-learning

GEBX06	APPROPRIATE TECHNOLOGY	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To impart students knowledge about the basics and applications of various appropriate technologies in the field of civil engineering.

MODULE I BASICS CONCEPTS 9

Back ground, Tools, Choices and Implications, Appropriate Technology Movement (an overview) - Basic design process, basic financial analysis-discounted cash flow, and energy fundamentals.

MODULE II APPROPRIATE TECHNOLOGY WITH REFERENCE TO BUILDING DESIGN 9

Appropriate Building Materials, Appropriate Energy Saving Techniques, Water Conservation (Indoor), Rain Water Harvesting.

MODULE III WATER, HEALTH AND SANITATION MANAGEMENT 9

Water Storage: Designing Dams and Pipelines, Appropriate Selection for Sanitation Technique, Sewerage, Communal Health and Waste Water Recycling.

MODULE IV WASTE MANAGEMENT 9

Types of Waste - Sources - Collections and On-Site Processing – Transferring Stations - Disposal Systems - Recycling.

MODULE V ENERGY EFFICIENT TECHNIQUES 9

Green building concepts-renewable energy sources- Solar – Steam and wind-Biofuels - Biogas – Electricity.

MODULE VI TECHNOLOGY POLICY 9

Government Policies- Energy Policy-Appropriate technology Development Centre-its function and responsibilities-Building policies-Case Studies.

Total Hours: 45

TEXT BOOKS:

1. Barrett Hazeltine and Christopher Bull, “Appropriate Technology: Tools Choices and Implications”, Academic Press, Orlando, USA, 1998.
2. Ken Darrow and Mike Saxenian, “Appropriate Technology Source Book : A Guide to Practical Books for Village and Small Community Technology”, Stanford, 1986.

REFERENCES:

1. Richard Heeks, “Technology and Developing Countries: Practical Applications Theoretical Issues”, 1995.
2. John Pickford, “The Worth of Water : Technical Briefs on Health, Water and Sanitation”, Intermediate Technology Publications, 1998.

OUTCOME:

- At the end of the course, the students will be able to use suitable technologies for various conditions for sustainable development.

GEBX07	SYSTEM ANALYSIS AND DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basic principles of systems engineering
- To expose the systems engineering methodology
- To provide a systems viewpoint

MODULE I INTERDICTION TO SYSTEMS ENGINEERING 8

Concept of Systems Engineering – Origin – Systems Approach – Advantages of systems approach – Examples. The building blocks of modern systems – Systems and environment – Interfaces – Complexity of Modern Systems.

MODULE II SYSTEM DEVELOPMENT PROCESS AND MANAGEMENT 8

System life cycle – the systems engineering method – Role of Testing – Management of system development – Risk Management – Organisation.

MODULE III CONCEPT DEVELOPMENT 8

Need Analysis – Concept Exploration – Performance requirement and validation - Concept selection and validation – systems architecture – Decision making.

MODULE IV ESTABLISHING ENGINEERING SYSTEMS 8

Risk Analysis – Risk Mitigation –System performance Analysis – Simulation Techniques in System Analysis – Validation Methods..

MODULE V DECISION SUPPORT TOOLS IN SYSTEMS ENGINEERING 7

Analytical decision support – Statistical influences on system design – System performance analysis – System Reliability, Availability and Maintainability (RAM) – Analysis of Alternatives.

MODULE VI CASE STUDIES **6**

Case studies in Software Systems Engineering – Systems for Product Design - Manufacturing Systems.

Total Hours: 45

REFERENCES:

1. Charles S. Wasson, "System Analysis, Design, and Development: Concepts, Principles, and Practices", Wiley Series in Systems Engineering and Management, 2006.
2. Kossiakoff Alexander and William N. Sweet A, "Systems Engineering: Principles And Practice", Wiley Student Edition, 2009.

OUTCOMES:

At the end of the course the student will have the

- Ability to have systems of view of problems and issues at hand.
- Ability to comprehend systems in their totality and specific.
- Ability to design, build and evaluate simple systems for industrial requirement.
- Ability to analyze systems and strengthen them for performance enhancement.

GEBX08 VALUE ANALYSIS AND ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To get acquainted with value analysis and engineering tool for productivity improvement.
- To understand and analyze the theory and methodology of Value Engineering.

MODULE I VALUE ENGINEERING BASICS 8

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Difference between Value analysis and Value Engineering, Types of Value, function - Basic and Secondary functions, concept of cost and worth, creativity In Value Engineering.

MODULE II VALUE ENGINEERING JOB PLAN AND PROCESS 6

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioural and organizational aspects of Value Engineering, Ten principles of Value analysis, Benefits of Value Engineering.

MODULE III ORIENTATION AND INFORMATION PHASES 8

Launching Value Engineering project work - Objectives and Targets - VE Project work: a time-bound programme - Projects and Teams - Time Schedule - Co-ordination - Consultant. Technical data - Marketing related information - Competition profile - Cost data - Materials Management related information - Quality related information - Manufacturing data.

MODULE IV FUNCTION ANALYSIS AND CREATIVE PHASES 9

Objectives - Function definition - Classification of functions - Higher level functions – Function – Cost – Function – Worth - Value Gap - Value index - How to carry out Function Analysis? – Fast Diagraming - Cost Modelling. Creativity - How to improve creativity of an individual? – How to promote creativity in the organisation? - Obstacles to

Creativity - Mental road blocks - Creativity killer phrases. Positive thinking - Ideas stimulators - Creativity techniques - Brainstorming.

MODULE V EVALUATION, INVESTIGATION AND RECOMMENDATION 6

Paired comparison and Evaluation Matrix techniques - Criteria for selection of VE solutions. Design – Materials – Quality – Marketing – Manufacturing - Preview session. The report - presentation.

MODULE VI IMPLEMENTATION PHASE AND CASE STUDIES 8

Design department - Materials department - Production Planning & Control - Quality Control – Manufacturing – Marketing - Need for co-ordinated teams - The Action Plan. Value Engineering case studies.

Total Hours: 45

TEXTBOOKS:

1. Mudge, Arthur E. "Value Engineering- A systematic approach", McGraw Hill, New York, 2000.
2. Kumar S, Singh R K and Jha J K (Ed), "Value Engineering", Narosa Publishing House, 2005.

REFERENCES:

1. Park RJ, "Value Engineering: A Plan for Invention", St.Lucie Press, New York, 1999.
2. Lawrence, D.M., "Techniques of Value Analysis and Engineering", McGraw Hill 1988.
3. George, E.D., "Engineering Design: a Material and Processing Approach", McGraw Hill, 1991.
4. Heller, D.E., "Value Management, Value Engineering and Cost Reduction", Addison Wesley, 1988.

OUTCOME:

- The student will be able to realize the value of products, processes and implement value analysis to achieve productivity improvement.

GEBX09	OPTIMIZATION TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Introduce methods of optimization to engineering students, including linear programming, network flow algorithms, integer programming, interior point methods, quadratic programming, nonlinear programming, and heuristic methods.
- The goal is to maintain a balance between theory, numerical computation, problem setup for solution by optimization techniques, and applications to engineering systems.

MODULE I INTRODUCTION 7

Overview of Optimization techniques for Civil Engineering Problems - Introduction to methods of optimization - Classification of Optimization problems - optimality and convexity - General optimization algorithm - necessary and sufficient conditions for optimality.

MODULE II LINEAR PROGRAMMING 8

Introduction to linear programming - a geometric perspective - Standard form in linear programming; basic solutions; fundamental theorem of linear programming - Simplex Algorithm for Solving Linear Programs - Duality; complementary slackness; economic interpretation of the dual;

MODULE III DYNAMIC PROGRAMMING 8

Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP.

MODULE IV APPLICATIONS 8

Regression modeling in engineering; industrial blending problems; dynamic optimal control of engineering systems; optimal estimation in environmental engineering - Water resources; production planning in industrial engineering; transportation problem - Heuristic optimization methods: genetic algorithms;

ecological engineering application; Minimum cost network flow algorithms; out-of-kilter method; primal-dual methods; Dynamic Programming Applications - Water allocation as a sequential process - Capacity expansion and Reservoir operation.

MODULE V INTEGER PROGRAMMING 8

Integer programming - applications in optimal irrigation scheduling in agricultural engineering - Interior point optimization methods - affine scaling method.

MODULE VI NON-LINEAR PROGRAMMING 6

Non-linear programming - Kuhn-Tucker conditions for constrained nonlinear programming problems; necessary and sufficient conditions; quadratic programming; applications.

Total Hours: 45

REFERENCES:

1. Taha, H.A., "Operations Research - An Introduction", 9th Edition, Pearson Prentice Hall, 2011.
2. Winston.W.L. "Operations Research", 4th Edition, Thomson – Brooks/Cole, 2003.
3. Kreyszig .E., "Advanced Engineering Mathematics",10th Edition, John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.

OUTCOMES:

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

- Basic theoretical principles in optimization.
- Formulation of optimization models.
- Solution methods in optimization.
- Methods of sensitivity analysis and post processing of results.
- Applications to a wide range of engineering problems.

GEBX10 ENGINEERING SYSTEM MODELLING AND SIMULATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the concepts, techniques, tools for modeling and simulation systems and environments through the use of computers.
- To study the various aspects of discrete dynamic, stochastic systems modeling and conducting experiments with those models on a computer.

MODULE I INTRODUCTION 6

Systems – Modelling – types – systems components – Steps in model building-Simulation Algorithms and Heuristics; Simulation Languages.

MODULE II RANDOM NUMBERS / VARIATES 7

Random numbers – methods of generation – random variates for standard distributions like uniform, exponential, Poisson, binomial, normal etc. – Testing of Random variates – Monte Carlo Simulation.

MODULE III MODELLING PROCESS 7

Primitive Models : Establishing relationships via physical laws; Establishing relationships via curve fitting; Parameters estimation problems; Elementary state transition models.

MODULE IV DESIGN OF SIMULATION EXPERIMENTS 9

Steps on Design of Simulation Experiments – Development of models using of Highlevel language for systems like Queuing, Inventory, Replacement, Production etc., – Model validation and verification, Output analysis.

MODULE V SIMULATION LANGUAGES 10

Need for simulation Languages – Comparisons & Selection of Languages – GPSSARENA- EXTEND – Study of any one of the languages.

Total Hours: 45

REFERENCES:

1. Law, A.M., & W.D. Kelton, “Simulation Modelling and Analysis”, McGraw Hill, Singapore, 2000.
2. Harrel, C.R., et. al., “System Improvement Using Simulation”, 3rd Edition, JMI Consulting Group and ProModel Corporation, 1995.
3. Harrel, C.R. & T. Kerim, “Simulation Made Easy, A Manager’s Guide”, IIE Press, 1995.
4. Geoffrey Gordon, “Systems Simulation”, Prentice Hall, 2002.
5. David Kelton, Rondall P Sadowski, David T Sturrock, “Simulation with Arena”, Mc Graw Hill, 2004.

OUTCOMES:

The student should be able to,

- Model and simulate systems and environments through the use of computers.
- Conduct experiments with discrete dynamic, stochastic system models on a computer.

GEBX11	SUPPLY CHAIN MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various decision phases in a supply chain
- To be aware of the Supply Chain and its drivers
- To design Supply Chain Network
- To build a aggregate plan in supply chain
- To understand Sourcing Decisions in Supply Chain
- To comprehend the influence of Information technology in Supply Chain

MODULE I INTRODUCTION TO SUPPLY CHAIN 9

Understanding Supply Chain - Decision phases - Supply chain performance - Competitive and supply chain strategies - Achieving strategic fit - Expanding strategic scope

MODULE II SUPPLY CHAIN DRIVERS AND DESIGN 9

Drivers of supply chain performance – Designing distribution network - Network Design in the Supply Chain - Network design in Uncertain Environment

MODULE III AGGREGATE PLANNING AND MANAGING SUPPLY, DEMAND AND INVENTORY 9

Aggregate Planning in a Supply chain: role - Managing Supply - Managing Demand in Supply Chain – Cycle and Safety inventory in supply chain – Level of product availability.

MODULE IV SOURCING AND TRANSPORTATION 9

Sourcing decision in supply chain - Third and Fourth – Party Logistics providers - Supplier scoring and assessment - Transportation in a Supply Chain – Risk and Trade-offs in transportation design.

MODULE V INFORMATION TECHNOLOGY IN A SUPPLY CHAIN 9

Information technology in a supply chain – CRM, ISCM, SRM in supply chain - Over view of recent trends in Supply Chain: e-SRM, e-LRM, e-SCM.

Total Hours: 45

REFERENCES:

1. Sunil Chopra and Peter Meindl, "Supply Chain Management-Strategy Planning and Operation", Pearson Education, 4th Indian Reprint, 2010.
2. Jananth Shah "Supply Chain Management – Text and Cases" Pearson Education, 2008.
3. Altekar Rahul V, "Supply Chain Management-Concept and Cases", Prentice Hall India, 2005.
4. Monczka et al., "Purchasing and Supply Chain Management", Thomson Learning, 2nd Edition, 2nd Reprint, 2002.

OUTCOMES:

- After taking up the course the student will be able to brighten his prospects of taking up a career on supply chain management.
- The student decision making capability specific to supply chain issues in an industry is improved.
- The student can plan a well defined execution of supply chain strategy in companies.
- The student will be able to design a optimal distribution network as per the demands of the industry.
- The student can also determine the most favorable transportation plan for a company.
- The student will also be able to bring in company from paper environment to paperless environment.

GEBX12	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To get acquainted with the various statistical tools and approaches for quality control and continuous improvement.
- To get aware of the importance of ISO and Quality Systems.

MODULE I INTRODUCTION 8

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

MODULE II TQM PRINCIPLES 7

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits.

MODULE III TQM IMPROVEMENT PROCESS 8

Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

MODULE IV STATISTICAL PROCESS CONTROL (SPC) 8

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

MODULE V TQM TOOLS 7

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

MODULE VI QUALITY SYSTEMS 7

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

Total Hours: 45

TEXT BOOK:

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education, Inc. 2003.

REFERENCES:

1. James R.Evans & William M.Lidsay, "The Management and Control of Quality", 5th Edition, South-Western (Thomson Learning), 2002.
2. Feigenbaum.A.V., "Total Quality Management", McGraw-Hill, 1991.
3. Oakland.J.S., "Total Quality Management", Butterworth Hcinemann Ltd., Oxford, 1989.
4. Narayana V. and Sreenivasan. N.S., "Quality Management – Concepts and Tasks", New Age International, 1996.
5. Zeiri, "Total Quality Management for Engineers", Wood Head Publishers, 1991.

OUTCOMES:

The student should be able to

- Apply the various statistical tools and approaches for Quality control.
- Achieve continuous process improvement through TQM.

GEBX13 **ENERGY STUDIES** **L T P C**
3 0 0 3

OBJECTIVES:

- To learn the growing demand, supply of energy on global and national levels and the need for renewable energy promotion.
- To understand the basic need for energy conservation and waste heat recovery.
- To learn the important aspects of energy audit and management.
- To get acquainted with the global environmental issues and carbon credits.

MODULE I GLOBAL AND NATIONAL ENERGY SCENARIO 7

Role of energy in economic development, various energy resources - overall energy demand and availability- Energy consumption in various sectors and its changing pattern - Exponential increase in energy consumption and projected future demands. Need for renewable energy.

MODULE II SOLAR ENERGY 8

Solar Radiation – Measurements of Solar Radiation - Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

MODULE III OTHER RENEWABLE ENERGY SOURCES 8

Power from wind – wind turbine working and types, solar thermal power plants – low medium and high power generation, power from wave , tidal, geothermal sources, OTEC system. MHD power plants – working, types, merits and demerits. Energy from biomass.

MODULE IV COGENERATION, WASTE HEAT RECOVERY AND COMBINED CYCLE PLANTS 8

Cogeneration principles- topping and bottoming cycles, role in process industries. Energy from wastes- waste heat recovery- heat recovery from industrial processes. Heat exchange systems – recuperative and regenerative heat exchangers – commercially available waste heat recovery devices. Combined cycle plants – concept, need and advantages, different combinations and practical scope.

MODULE V ENERGY CONSERVATION AND MANAGEMENT 7

Need for energy conservation – use of energy efficient equipments. Energy conservation opportunities - in educational institutions, residential, transport, municipal, industrial and commercial sectors – concept of green building. Energy audit in industries – need, principle and advantages. Case studies.

MODULE VI GLOBAL ENRGY ISSUES AND CARBON CREDITS 7

Energy crisis, fossil consumption and its impact on environmental climate change. Energy treaties – Montreal and Kyoto protocols - Transition from carbon rich and nuclear to carbon free technologies, carbon foot print – credits – clean development mechanism.

Total Hours: 45

TEXT BOOKS:

1. S.S. Rao and B.B. Parulekar, "Energy Technology", 3rd Edition, Khanna Publishers, New Delhi, 2011.
2. O. Callaghn. P.W., "Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981.

REFERENCES:

1. G.D. Rai, "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 2011.
2. Archie, W Culp. "Principles of Energy Conservation", McGraw Hill, 1991.
3. D Patrick and S W Fardo, "Energy Management and Conservation", PHI,1990.
4. P. O'Callaghan: "Energy Management", McGraw - Hill Book Company, 1993.
5. Kenney, W. F., "Energy Conservation in Process Industries", Academic Press, 1983.

OUTCOMES:

The student should be able to

- Realize the global and national energy status and need to switch over to renewable energy technology.
- Energy audit and suggest methodologies for energy savings.
- Utilize the available resources in an optimal way.
- Concern about the global environmental issues & promote carbon credits.

GEBX14	ROBOTICS	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To learn about the robots, various components, of Robots, programming and their applications.

MODULE I INTRODUCTION 8

Definition- Need - Application, Types of robots – Classifications – Configuration, work volume, control loops, controls and intelligence- basic parts - functions – specifications. of robot, degrees of freedoms, end effectors – types, selection

MODULE II ROBOT DRIVES AND CONTROL 8

Controlling the Robot motion – Position and velocity sensing devices – Design of drive systems – Hydraulic and Pneumatic drives – Linear and rotary actuators and control valves – Electro hydraulic servo valves, electric drives – Motors – Designing of end effectors – Vacuum, magnetic and air operated grippers.

MODULE III ROBOT SENSORS 8

Transducers and Sensors – Tactile sensor – Proximity and range sensors – Sensing joint forces – Robotic vision system – Image Representation - Image Grabbing –Image processing and analysis – Edge Enhancement – Contrast Stretching – Band Rationing - Image segmentation – Pattern recognition – Training of vision system.

MODULE IV ROBOT PROGRAMMING & AI TECHNIQUES 7

Types of Programming – Teach pendant programming – Basic concepts in AI techniques – Concept of knowledge representations – Expert system and its components.

MODULE V ROBOTIC WORK CELLS AND APPLICATIONS OF ROBOTS 7

Robotic cell layouts – Inter locks – Humanoid robots – Micro robots – Application of robots in surgery, Manufacturing industries, space and underwater.

MODULE VI ROBOT KINEMATICS AND DYNAMICS 7

Forward and inverse Kinematic equations, Denvit – Hartenbers representations Fundamental problems with D-H representation, differential motion and velocity of frames - Dynamic equations for sing, double and multiple DOF robots – static force analysis of robots.

Total Hours: 45

REFERENCES:

1. Yoram Koren," Robotics for Engineers", Mc Graw-Hill, 1987.
2. Kozyrey, Yu, "Industrial Robots", MIR Publishers Moscow, 1985.
3. Richard. D, Klafter, Thomas, A, Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Prentice-Hall of India Pvt. Ltd., 1984.
4. Deb, S.R. "Robotics Technology and Flexible Automation", Tata Mc Graw-Hill, 1994.
5. Mikell, P. Groover, Mitchell Weis, Roger, N. Nagel, Nicholas G. Odrey, "Industrial Robotics Technology, Programming and Applications", Mc Graw-Hill, Int. 1986.
6. Timothy Jordanides et al,"Expert Systems and Robotics", Springer –Verlag, New York, May 1991.

OUTCOMES:

Students would be able to

- Understand about the robots, its various components.
- Design Robots for industrial applications.
- Do programming for robots and apply them in real time applications.

GEBX15	CYBER SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of Cyber Security Standards and Laws.
- To know the legal, ethical and professional issues in Cyber security.
- To understand Cyber Frauds and Abuse and its Security Measures.
- To know the technological aspects of Cyber Security.

MODULE I FUNDAMENTALS OF CYBER SECURITY 8

Security problem in computing – Cryptography Basics – History of Encryption – Modern Methods – Legitimate versus Fraudulent Encryption methods – Encryption used in Internet.

MODULE II TYPES OF THREATS AND SECURITY MEASURES 8

Security Programs – Non-malicious program Errors – Virus and other Malicious Code – Targeted Malicious Code – Control against program threats – Web Attacks – DOS – Online Security Resources.

MODULE III APPLICATION SECURITY 8

Introduction to Databases - Database Security Requirements – Reliability & Integrity – Multilevel Databases - E-Mail and Internet Security – SQL Injection – Cross Site Scripting – Local File Inclusion – Intrusion Detection Software"s.

MODULE IV PHYSICAL SECURITY AND FORENSICS 7

Firewalls – Benefits and Limitations – Firewall Types - Components – Server Room Design and Temperature Maintenance – Cyber Terrorism and Military Operation Attacks-

Introduction to Forensics – Finding evidence on PC and Evidence on System Logs – Windows and Linux logs.

MODULE V CYBER STALKING & FRAUD 7

Introduction – Internet Frauds – Auction Frauds – Identity theft – Phishing – Pharming- Cyber Stalking – Laws about Internet Fraud – Protecting against Cyber Crime – Secure Browser settings – Industry Espionage.

MODULE VI CYBER SECURITY STANDARDS AND POLICIES 7

Introduction– ISO 27001– ISO 27002 - PCI DSS – Compliance - IT ACT – Copyright ACT, Patents. Definition of Policy – Types- User Policies-Administrative Policies – Access control – Developmental Policies.

Total Hours: 45

TEXT BOOK:

1. Chuck Easttom, “Computer Security Fundamentals”, 2nd Edition, Pearson Education, 2012.

REFERENCES:

1. Charles B. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, 3rd Edition, Pearson Education, 2003.
2. William Stallings, “Cryptography and Network Security – Principles and Practices”, 3rd Edition, Pearson Education, 2003.
3. Atul Kahate, “Cryptography and Network Security”, Tata McGraw Hill, 2000.

OUTCOMES:

Upon completion of this course, attendees should be able to satisfy the critical need for ensuring Cyber Security in Organizations.

- The students attending this course will be able to analyse the attacks and threats.
- They can also provide solutions with Intrusion Detection systems and Softwares.
- They will have knowledge about Cyber Frauds and Cyber Laws.

GEBX16	USABILITY ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

The objective of this course is

- To explore concept of usability engineering in the software development life cycle.
- To create good user interface in a program or a website.
- 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.