REGULATIONS AND COURSE DESCRIPTION

BACHELOR OF TECHNOLOGY

Information Technology

Effective from 2016-17

COLLEGE OF TECHNOLOGY AND ENGINEERING
Maharana Pratap University of Agriculture and Technology
Udaipur (Rajasthan) – 313 001

VISION OF INFORMATION TECHNOLOGY ENGINEERING DEPARTMENT

- To contribute to India and the World through excellence in the Domain of Information Technology education and research and to serve as a valuable resource for Information Technology based Industry and society at-large.

MISSION OF INFORMATION TECHNOLOGY ENGINEERING DEPARTMENT

- Committed to excellence, the department seeks to impart knowledge to develop latest technological skills with value based education among students to facilitate their development as successful and competent professionals for the nation.
- Promote excellence, foster high standards and orient the education towards future needs and opportunities through strong Academia, Industry and Stakeholder linkages.
- Strengthen the curricula as per the current needs of the industry and academia to promote research and development in frontier areas of Computer Science & Engineering.
- Provide opportunities for research, continuing education, faculty up-gradation and development of human resources in new and cutting edge technologies, especially through national and international collaboration.
- Strengthen non-formal training to promote innovation among students and equip them to be successful future entrepreneurs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I:

To provide the necessary background in the field of Information Technology to deal with Engineering problems, to pursue Graduation/Research program and to excel as IT engineering professionals in industries.

PEO II:

To develop ability among students towards innovation and entrepreneurship that caters to the need of Industry and society.

PEO III:

To develop an attitude to apply the technical knowledge acquired to solve real life problems and to develop the qualified workforce to carry out competent services in the domain industries.

PEO IV:

To develop the qualities like creativity, leadership, team work, skill, and professional ethics, thus contributing towards the growth and development of society.

PEO V:

To inculcate an attitude for life- long learning process through the use of information technology sources.

Program outcome: At the end of the program the student will be able to:

PO I:

Apply Engineering knowledge to solve problems in different areas of Information Technology.

PO II:

Identify, hypothesize and construct software Requirement Specification using various concepts and techniques in the field of IT.

PO III:

Design and develop solutions for complex systems to meet the needs of society and IT industry.

PO IV:

Conduct research in diversified field of the IT Domain.

PO V:

Develop programming skills to use sophisticated and advanced software tools of IT.

PO VI:

To develop ability among students towards innovation and entrepreneurship that caters to the need of Industry and society.

PO VII:

Learn and follow the ethical principles involved in IT research and industrial practices.

PO VIII:

Ability to work as an individual based on interest and also in multidisciplinary team of Information Technology.

PO IX:

Develop effective communication and technical writing in IT research and industrial practices.

PO X:

Engage in lifelong learning process by updating the knowledge of individual with the upcoming software tools and techniques.

ACADEMIC REGULATIONS
(UNDER-GRADUATE COURSES)

The students admitted in 2016-17 shall be governed by the relevant rules as indicated below:

1.0 DEFINITIONS

1.1 'Academic Year' or 'Academic Session' of the University shall ordinarily be between July to June and shall consist of two semesters.

1.2 'Semester' is an academic term of normally 18-20 weeks including examinations.

1.3 'Course' means a unit of instruction or a segment of a subject matter to be covered in a semester. Each course is assigned a specific number, title and credits.

1.4 'Credit Hour' also written as 'Credit' means the numerical weight allotted to the course, including its theory and practical parts. One credit will represent one hour of lecture and two to three hours of laboratory/field practical in each week.

1.5 'Grade point' is a numerical number which denotes students' performance in a course. It is obtained by dividing the percentage marks obtained by ten.

1.6 'Credit point' is the product of credit and grade point obtained by the student in a course.

1.7 'SGPA' (Semester Grade Point Average) is the average of the credit points of a semester.

1.8 'OGPA' is the overall cumulative grade point average obtained by the student in the courses taken in all the semesters completed by him/her.

1.9 'Year' means an academic session consisting of two semesters. Say, first year means the first academic session of the prescribed course of a degree programme. Similarly, second year, third year, and fourth year mean second, third and fourth academic sessions, respectively.

1.10 'Equivalent percentage' is the percentage obtained by multiplying grade point, SGPA, and OGPA respectively by ten.

2.0 THE PROGRAMME AND GRADUATION REQUIREMENTS

2.1 Minimum residential requirement and maximum period for all the programmes:

Minimum residential requirement	8 semesters
Maximum period for which a student can remain on the college roll	12 semesters

Note: In case a student does not complete his/her course work satisfactorily (5.0 OGPA out of 10) within the maximum prescribed period he/she shall no longer be a student of the university and the respective Dean of the college shall drop him from the college roll.

3.0 EXAMINATION

There shall be a main theory and/or practical examination conducted by the university at the end of each semester. The theory and practical examinations shall be of three hours duration except otherwise specified. Besides this, there will be a mid-term examination.

3.1 Mid-Term Examination:

A mid-term examination of 20 maximum marks shall be held after completion of about 50% syllabus in each course. The mid-term examination shall be of one hour duration.

"If a student misses the midterm examination due to any legitimate reason including deputation by the university, then he/she will be permitted to appear in a special midterm examination before the final examination". Only one special mid-term examination per course shall be conducted for all eligible students under this rule.

Students who are deputed by the university will have to submit the information in advance to the concerned department for awarding attendance.

3.2 The distribution of marks for the mid-term examination, final theory examination and practical examination shall be as follows:

Credit (Marks T/P)	Mid-Term Examination	Final (University) Examination		Total
		Theory	Practical	
1/2/3/4+1	20(T)	50	30	100
0+1/2/3/4	20(P)	-	80	100
1/2/3/4+0	20(T)	80	-	100
1+/2/3/4	20(P)	30	50	100

3.3 The distribution of marks for the final practical examination shall be as under

	Practical with Maximum Marks	30	50	80
(a)	Practical record and day-to-day assessment (Sessional work)	5	10	15
(b)	Practical exercises (may include any exercises as decided by the external examiner)	20	30	50
(c)	Viva-voce	5	10	15

3.4 Grading System

(i) A numerical grading system is followed for evaluation. Each course has a numerical weightage known as credit. The total marks obtained in each course (including its mid-term, theory and practical parts) are converted into percentage and divided by 10 to obtain the grade point for that course. The grade point when multiplied by the total course credit, gives credit points for the course.

(ii) Semester Grade Point Average (SGPA) is simply average of the credit points for a semester. The Overall Grade Point Average (OGPA) is the average for all courses upto the current semester.

If C_i and G_i are the credit and grade points for a course, then OGPA and SGPA are given by the following formulae:

$$\text{SGPA} = \frac{\sum C_i G_i}{\sum C_i}$$ where the summation is for all courses in the semester

$$\text{OGPA} = \frac{\sum C_i G_i}{\sum C_i}$$ where the summation is for all courses of preceding semester including the current one

(iii) The percentage equivalent of OGPA shall be determined by multiplying OGPA by ten.

(iv) The division of the under graduate student shall be determined by the OGPA at the end of successful completion of program as follows:

Division	OGPA
First	6.00 and above
Second	5.00 and above

3.5 Pass Requirements:

(i) Candidates are required to pass separately in final theory and/or practical examinations in each course

(ii) For a pass, a candidate is required to obtain at least 40% marks in each theory final examination as well as in each practical final examination and 4.00 grade point in the course.

(iii) The minimum OGPA required for degree is 5.00.

3.6 Promotion to Higher Classes:

(i) The promotion to next class shall be decided only at the end of an academic year.

(ii) A student will be promoted to higher class if he/she secures an OGPA as mentioned in the table below.

Year to which promotion is being Considered	Minimum OGPA required for Promotion
Second	4.00
Third	4.50
Fourth	4.75

(iv) A student who has been promoted to the first Semester of a class as a result of above rule, shall be automatically promoted to the second semester of that class regardless of the result of the year's first semester examination.

(v) If a student is not promoted to a higher class, he/shall become an ex-student of the failed class and has to clear the backlog and/ or improve his/her OGPA to be eligible for promotion.

(vi) Provisional Promotion :

(a) The Promotion will be provisional with the permission of Concerned Dean to higher class till the result of the previous semester is declared.

(b) Student has to register as per academic calendar, i e. Date of registration without late fee and date of registration with late fees would be applicable.

(c) Student has to give an undertaking that on declaration of result, if he/ she is not eligible, the registration would stand cancelled automatically.

(d) Student should have a minimum OGPA as per existing UG rules.

(e) Per-requisite courses, if any, have to be cleared prior to the regular courses.

3.7 Clearing of Backlogs and Repeating of Courses for Improvement of OGPA:

A. Clearing of Backlog:

(a) All the students with backlog (whether promoted or ex-students) shall have to appear in the examination of backlog courses in the main examination of the semester in which such courses are regularly offered. The student will be permitted to appear in backlog examination in failed part only whether it is theory or practical or both. He/she shall not be required to attend regular classes for such courses.

(b) Midterm marks obtained by a student will not be carried over for backlog examination and proportionate marks shall be awarded.

(c) The university shall conduct final examination as per current scheme of examinations. Students offered backlog courses would be required to appear in the equivalent course in the new programme. In case of variation in the course content, student has to do self preparation.

(d) If the backlog course is the result of being detained on account of shortage of attendance, the student has to appear in both theory and practical examinations by regularly offered courses or as a contact course, if time table adjustment is not possible

B. Improvement of OGPA:

(a) Student should apply to improve the OGPA within 11 days from the date of issue of mark sheet of last semester. They should surrender the original mark sheet issued to them and submit the same along with application form.

(b) A student would be given only one chance for improvement of OGPA.

(c) Student will be allowed to repeat two courses of his/her choice irrespective of grade obtained in the course (s) or semester, provided that the course is being offered as regular course in current semester.

(d) There will be a common examination for regular students and for those who have been offered courses for improvement.

(e) Students will not be issued PDC till the result of the courses offered for improvement is declared.

(f) The repeated course shall be marked as "Repeat" in the revised mark-sheet.

(g) In case PDC has been issued to the student he/she will not be eligible for improvement.

(h) The student would be required to pay regular semester fees if he/she wishes to attend the classes. Otherwise he/she shall be treated as Ex-student.

(i) The examination fee for courses offered for improvement will be Rs. 1000.00 (Rupees one thousand only) per paper irrespective whether it is a regular course or a special paper.

(j) The student has to submit an undertaking that the marks obtained in the examinations taken for improvement will replace the marks obtained in the original examination of the paper(s), if he/she gets more than previous result.

(k) In case a student fails in the improvement course, he/she will be awarded minimum pass marks in that paper.

(l) Midterm marks in improvement courses: In such cases, the student will be awarded proportionate marks based on marks obtained in final examination.

3.8 Special Backlog Examination:

A. In case student has completed 8th Semester and has backlog in only one course:

(i) Special examination will be conducted earliest possible after the declaration of semester result i.e. September/ October of 1st semester of the academic year for only that course.

(ii) Student will be charged fee as prescribed by the university, irrespective of whether it is a regular course or a special paper.

(iii) Student has to apply for special examination within 11 (eleven) days of declaration of result of 8th semester, failing which his/her application will not be considered.

(iv) If a student fails in a special paper examination, he/she would be allowed to reappear with regular examination of next semester only i.e. once in a semester.

B. In case a student has completed 8th semester and has got backlog of up to 6 courses irrespective of semester:

(i) Backlog examination will be conducted along with regular examination of the semester.

(ii) If regular examination is being conducted for a particular paper, he/she would have to pay normal fee for that paper and special fee of Rs. 1000/- per paper will be charged for the course which are not listed for conducting the examinations in that semester.

(iii) If a student does not clear one or more backlog course, he/she will have to appear as Ex-student along with regular examination in the next semester and fee will be charged at regular rate, if the courses are listed for conducting the examination in that semester, otherwise, special fee of Rs. 1000/- will be charged

C. Other rules like maximum number of semesters, minimum passing marks, etc will be applicable as per rules.

3.9 Re-evaluation for answer book:

(i) (a) Re-evaluation is permissible only in Theory paper of semester's final examination.

(b) Re-evaluation is not permissible in the Answer book of unfair means case (s)

(ii) The candidate may apply for re-evaluation within 11 days of the issue of the mark sheet on the prescribed form through Head of the institution depositing required fee and original mark-sheet. Incomplete and late submitted application shall not be considered.

(iii) The re-evaluation fee per paper shall be as prescribed and will not be refundable on any pretext.

(iv) Re-evaluation shall be done by an examiner of the subject to be appointed by the Vice Chancellor.

(v) If the marks obtained after re-evaluation increase / decrease within 20% of the maximum marks prescribed for the paper, the same will be taken as marks obtained after re-evolution. However, if the marks awarded by the re-evaluation increase /decrease by more than 20% of maximum marks prescribed for the paper then the answer book will be referred to the second re-evaluation and the average of two closest awarded marks (the middle award in case the three awards if uniformly spread) shall be taken as the marks obtained after re-evaluation and shall be awarded. However, a student who was declared Pass prior to re-evaluation and fails after re-evaluation, shall be awarded minimum pass marks.

(vi) Marks awarded after re-evaluation of the paper will be considered for award of merit.

(vii) (a) No one shall be admitted in the next higher class and considered for any beneficial claim only on account of submission of application of the re-evaluation of Answer Book(s) in the office.

(b) A student becoming eligible for admission on account of result of re-evaluation may be admitted in next higher class without late fee. He will be required to pay full fees for the year within 7 days of declaration of the result. Attendance in such case shall be counted from the date of admission.

3.10 Moderation of Results:

The result committee shall also act as Moderation Committee to review the results for the normal distribution of marks, the percentage of pass and failure. Any moderation suggested in a paper shall be uniformly applied to all the students registered in that paper, with the approval of the Vice Chancellor. Any moderation effected should not be more than 10 % of maximum marks in a paper. However, if after moderation or otherwise, if a student is failing only by one mark in a paper, Controller of Examinations may award one grace mark to pass the student in that paper.

4.0 GENERAL RULES PERTAINING TO EXAMINATIONS

4.1 A student who has been deputed by College/University authorities to represent at a national/international meet/ championship/tournament/extra curricular activities, does not appear in the final examination due to such participation, may be permitted to take missing paper(s) at next main examination, when such course(s) are regularly offered as a special case. He/she, however, will be required to seek prior permission from the Vice-Chancellor.

4.2 No special examination shall be held for students who miss the examination on account of police custody, court attendance or fail to attend for other reason, whatsoever.

4.3 Examinations will not be postponed due to failure of electricity.

4.4 The boycotted and walked out papers shall not be recounted. This authority rests only with the Chancellor of the university.

5.0 PRACTICAL WORK EXPERIENCE REQUIREMENTS

After successful completion of all the courses including practical trainings with minimum OGPA of 5.0, a student will become eligible for the degree.

Details of practical training (Training in factory, workshop, mine, engineering works/design, office etc.) which students are to undertake in different degree programmes are given below:

Branch of Engineering	Duration	Year
(a) Agriculture*	30 + 30 = 60 days	At the end of II & III year
(b) Mechanical	30 + 30 = 60 days	- do -
(c) Mining**	30 + 30 = 60 days	- do -
(d) Electrical	30 + 30 = 60 days	- do -
(e) Computer Science & Engg.	30 + 30 = 60 days	- do -
(f) Electronics & Communication	30 + 30 = 60 days	- do -
(g) Information Technology	30 + 30 = 60 days	- do-
(h) Civil Engineering	30 + 30 = 60 days	- do-

* *In addition to the above 2 months training programme, the agricultural engineering graduates have to undergo experiential learning or Hands-on training (4 month) in the second semester of final year BE.(Ag.).*

In order to take policy decision and to solve the operational and administrative bottleneck, if any, there shall be a college level committee consisting of the followings. The committee will guide in selection of cafeteria courses and experiential learning/project.

Senior most Head of the Department	-	*Convener*
Heads of concerned Department	-	*Member*
Training Officer	-	*Member*
Class Advisor of IV year	-	*Member*

Procedure for evaluating the students on all the above practical trainings will be followed as prescribed.

** *The Mining Engineering students shall have to undergo 12 days mining camp at the end of I semester of II year and 12 days survey camp at the end of I semester of III year, in addition to 60 days practical training.*

6.0 ATTENDANCE REQUIREMENTS

6.1 The student shall be permitted to appear in the university main examination only if a minimum attendance of 75% is maintained separately in theory and practical in each course from the date of registration in that course. However, in NCC/NSS/NSO the minimum attendance requirement would be 65%. In case of sickness or any other valid reasons, the vice-chancellor may condone the attendance to an extent of 10%.

6.2 A student who is short of attendance in one or more courses will be detained form appearing in the final semester examination of all such course(s) and will be awarded zero grade point. Such courses shall be denoted by letter "DE" in the mark sheet.

6.3 En-mass absence shall be treated as absent in the attendance record of the students and will be charged a fine of Rs. 2000/- on en-mass cutting of the classes for more than 3 days.

6.4 If a student absents continuously for 7 working days in a semester in any subject, his/her registration in the semester will be cancelled and parents informed accordingly. Such students will be provided an option for re-admission in the course/ programme within 7 days of the cancellation of their registration by paying a fee of Rs. 500/-.

6.5 If a student who has been admitted to the 1st semester of a programme and fails to attend the classes continuously for a period of 30 days without the permission of the Dean of the college, the name of such a student will be removed from the college roll. No petition is permitted in this case. He/she may have to seek re-admission as a fresh candidate.

6.6 If a regular student of the college in subsequent semester fails to register on schedule time or fails to attend the class after registration continuously for 30 days without the permission of the Dean of the college, the student will be removed from the college roll and parents informed accordingly. A student so removed may apply to the Dean within 15 days of his/her removal for reconsideration for re-registration in the next academic session, giving valid and strong reasons for failing to take permission. His removal may be revoked, provided that, his/her advisor is satisfied with the performance of the student and the same is approved by the Dean. The period of removal shall be counted towards the number of semester, though no grade/marks would be awarded for this semester.

7.0 ADVISORY SYSTEM

Student will be required to report to the respective class advisors for getting registration form and examination form for the purpose of registration. Class advisors will also be responsible for distribution of marks sheet obtained from the university.

8.0 SYMBOLS AND THEIR MEANING

Following symbols would be used to designate the status of the student:

Symbol	Significance
F	Fail
DE	Detained
UM	Unfairmeans
R	Repeat

Note - *All such courses which are cleared by repeating the same or repeated for improvement of OGPA to bring it to the minimum required level shall be marked by letter 'R' in the transcript.*

9.0 WITHDRAWAL FROM SEMESTER

(a) A student shall be permitted to withdraw from a semester only two times in the degree programme, on the grounds of ill-health and personal exigencies subject to the condition that the reasons for withdrawal are convincing. For this the student has to submit a written request at least one week prior to the commencement of the main examination of the semester from which the student wants to withdraw.

(b) A student who has withdrawn from a semester has to join the same semester during next year.

(c) The period lost due to withdrawal (one year for one withdrawal) shall not be counted towards maximum permissible period for which a student can remain on the college roll.

10.0 EXAMINATION OF PRACTICAL TRAINING, PROJECT AND SEMINAR

(a) For the examination of practical training (including industry visit, mining camp, survey camp, etc.) there will be an internal board appointed by the Dean. The board will comprise of concerned Head of the Department as chairman and one or two teachers of the concerned department(s) as members. The marks will be awarded on the basis of work report, practical record, quiz. viva-voce, etc. and added to the marks list in the Final year's examination.

(b) For project viva-voce examination there shall be a Board of examiners consisting of project committee and one/two external examiners. The concerned Head of the Department will be the Chairman of the committee. However, in Agriculture Engineering discipline, the Chairman will be the Project Chairman. The Chairman will then nominate two teachers as members. The Board may meet in one or two meetings according to the availability of external examiner(s). A candidate will be assessed for the work done during semester by the Project Advisor and the Project Committee.

As the project is assigned in the first semester of the final year and the student works on it during both the semesters the assessment of the project shall be done in both the semesters. The internal viva-voce of first semester and both the seminars shall be assessed by the Project Committee. However the marks shall be counted in the second semester only. The distribution of marks shall be as follows :

Particulars	I Semester	II Semester	Total
Day-to-day assessment by the major advisor	15	20	35
Seminar	10	15	25
Viva-voce	10 (Internal)	30 (External)	40
TOTAL	35	65	100

(c) For seminar, wherever prescribed as a course of study, there shall be a board of examiners consisting of the Head of the Department as chairman and two teachers of the department.

11.0 CHANGE OF BRANCH OF STUDY IN SECOND YEAR B.TECH.

The students, in the second year, can avail one opportunity to change their branch of study on merit basis in accordance with rules framed by the university from time to time.

12.0 ADMISSION OF DIPLOMA STUDENTS IN SECOND YEAR B.TECH.

The diploma holders from the Board of Technical Education, Rajasthan with 10+2 qualification can seek direct admission in second year B.Tech. The number of seats, admission procedure, educational and other requirement would be as specified by the Government and/or approved by the university from time to time.

13.0 GRADUATION REQUIREMENT AND AWARD OF DIVISION

(a) A student shall be awarded degree only if he has passed all the courses and completed other requirements prescribed for the programme and secured an OGPA of 5.00 or above.

(b) The division of the student shall be determined by the OGPA at the end of successful completion of the program as follows :

Division	OGPA
First	6.00 and above
Second	5.00 and above

SCHEME OF TEACHING AND EXAMINATION

(Information Technology Engineering)

First Year B.Tech. (Common for All Branches)

I-SEMESTER

Course No.	Title	Credit		Hours/Week			Marks		
		Th.	P	L	T	P	Th.	P	MT
BS 111	Mathematics - I	3	0	3	0	0	80	-	20
ME 113	Mechanical Engg.	3	0	3	0	0	80	-	20
ME 114	Workshop Practice	0	1	0	0	3	-	80	20
CE 115	Engineering Drawing	0	1	0	0	3	-	80	20
	NCC/NSS/NSO[1]	-	-	0	0	2	-	-	-
	GROUP I								
BS 100P	Engineering Physics	2	1	2	0	2	50	30	20
CE 100	Engineering Mechanics	2	1	2	0	2	50	30	20
EE 100	Electrical Engg. - I	3	1	3	0	2	50	30	20
ENVS 100	Environmental Studies	2	0	2	0	0	80	–	20
	Total	15	5	15	0	14	800		
Total Credits/Hours/Marks		**20**		**29**			**800**		
	GROUP II								
BS 100C	Engineering Chemistry	2	1	2	0	2	50	30	20
EC 100	Electronics and Instrumentation	3	1	3	0	2	50	30	20
CS 100	Introduction to Computer Programming and Data Structure	3	1	3	0	2	50	30	20
BS 100E	English and Communication Skill	2	1	2	0	2	50	30	20
	Total	16	6	16	0	16	800		
Total Credits/Hours/Marks		**22**		**32**			**800**		

[1] NCC/NSS/NSO is compulsory and the student will be assessed as satisfactory/ unsatisfactory at the end of IV semester.

[2] The examination (Theory and Lab) shall be conducted internally by the college.

Note: *The courses BS 100P, CE 100, EE 100, ENVS 100, BS100C, EC 100, CS 100 and BS 100E shall be offered in both the semesters. The students will be divided in two groups in I semester itself and shall remain in the same group in II semester as well. However, they have to offer all the eight courses in first year.*

II-SEMESTER

Course No.	Title	Credit		Hours/Week			Marks		
		Th.	P	L	T	P	Th.	P	MT
BS 121	Mathematics - II	3	0	3	0	0	80	-	20
CE 122	Civil Engineering	1	1	1	0	2	50	30	20
ME 123	Machine Drawing - I	0	1	0	0	3	0	80	20
ME 124	Workshop Technology	2	1	2	0	3	50	30	20
	NCC/NSS/NSO[1]	-	-	0	0	2	-	-	-
GROUP I									
BS 100C	Engineering Chemistry	2	1	2	0	2	50	30	20
EC 100	Electronics and Instrumentation	3	1	3	0	2	50	30	20
CS 100	Introduction to Computer Programming and Data Structure	3	1	3	0	2	50	30	20
BS 100E	English and Communication Skill	1	1	1	0	2	50	30	20
GROUP II									
BS100P	Engineering Physics	2	1	2	0	2	50	30	20
CE 100	Engineering Mechanics	2	1	2	0	2	50	30	20
EE 100	Electrical Engineering - I	3	1	3	0	2	50	30	20
ENVS 100	Environmental Studies	2	1	2	0	2	50	30	20
	Total	15	7	15	0	18	-	-	-
Total Credits/Hours/Marks		22		33			800		

[1] NCC/NSS/NSO is compulsory and the student will be assessed as satisfactory/ unsatisfactory at the end of IV semester.

SECOND YEAR B.Tech.

III SEMESTER

Course No.	Title	Credit		Hours per Week			Marks		
		Th	P	L	T	P	Th	P	MT
BS 211 (All Branches)	Mathematics III	3	0	3	0	0	80	0	20
IT 211	Digital Systems & Design	3	1	3	0	2	50	30	20
IT 212	Shell Programming Lab	0	2	0	1	4	0	80	20
IT 213	Information Technology Paradigms	3	0	3	0	0	80	0	20
IT 214	Algorithms & Data Structure	3	1	3	0	2	50	30	20
EE 212 (EE,CS,IT)	Electrical Measurement and Instruments	3	1	3	0	2	50	30	20
EC 219 (CS,IT)	Analog Electronics	2	1	2	0	2	50	30	20
	NCC/NSS/NSO[1]	-	-	0	0	2	-	-	-
	Total	17	6	17	1	14	360	200	140
Total Credits/ Hours/Marks		23		32			700		

T- Tutorials do not carry any credit.

IV SEMESTER

Course No.	Title	Credit		Hours per Week			Marks		
		Th	P	L	T	P	Th	P	MT
BS 221 (EC,EE, ME,MI,IT)	Mathematics IV	3	0	3	0	0	80	0	20
BS 222 (CS, IT)	Discrete Mathematical Structure	3	0	3	0	0	80	0	20
IT 221	Computer Organization & Architecture	3	0	3	1	0	80	0	20
IT 222	Microprocessors & Interfacing	3	1	3	0	2	50	30	20
IT 223	Object Oriented Programming	3	2	3	0	4	50	30	20
EC 228 (CS, IT)	Communication Systems	3	0	3	1	0	80	0	20
	NCC/NSS/NSO	-	-	0	0	2	-	-	-
	Total	18	3	18	2	8	420	60	120
Total Credits/ Hours/ Marks		**21**		**28**			**600**		

T- Tutorials do not carry any credit.

[1]The NCC/NSS/NSO is compulsory and the students will be assessed as satisfactory/unsatisfactory at the end of IV semester.

Note: Students have to undergo a practical training of 30 days at the end of IV semester for which assessment will be made at the beginning of the next semester.

THIRD YEAR B.Tech.

V SEMESTER

Course No.	Title	Credit Hours		Hours per Week			Marks		
		Th	P	L	T	P	Th	P	MT
IT 311	Application of Graph Theory	3	0	3	0	0	80	0	20
IT 312	Language Translator & Compiler	3	1	3	0	2	50	30	20
IT 313	Computer Network and Internet	3	1	3	0	2	50	30	20
IT 314	Management Information System	3	0	3	1	0	80	0	20
IT 315	Design & Principles of Operating System	3	1	3	0	2	50	30	20
EC 317(IT)	Information Theory & Coding	3	0	3	1	0	80	0	20
	Total	18	3	18	2	6	390	90	120
Total Credits/ Hours/ Marks		**21**		**26**			**600**		

T- Tutorials do not carry any credit.

VI SEMESTER

Course No.	Title	Credit Hours		Hours per Week			Marks		
		Th	P	L	T	P	Th	P	MT
IT 321	Data Modeling & Design	3	1	3	0	2	50	30	20
IT 322	Computer Algorithms	3	1	3	0	2	50	30	20
IT 323	Internet Programming in JAVA	3	2	3	0	4	50	30	20
IT 324	Computer Graphics	3	1	3	0	2	50	30	20
CS 326 (CS, IT)	Software Engineering	3	1	3	0	2	50	30	20
EC 328 (IT)	Wireless Communication	3	0	3	0	0	80	0	20
	Total	18	6	18	0	12	330	150	120
Total Credits/ Hours/ Marks		**24**		**30**			**600**		

T- Tutorials do not carry any credit.

Note: Students have to undergo a practical training of 30 days at the end of VI semester for which assessment will be made at the beginning of the next semester.

FOURTH YEAR B.Tech.

VII SEMESTER

Course No.	Title	Credit Hours		Hours per Week			Marks		
		Th	P	L	T	P	Th	P	MT
IT 411	Advance Data Structure	3	1	3	0	2	50	30	20
IT 412	Multimedia Technology & Application	3	1	3	0	2	50	30	20
IT 413	Information & Transaction Management	3	1	3	0	2	50	30	20
IT 414	Elective-I	3	1	3	0	2	50	30	20
IT 415	Elective-II	3	1	3	0	2	50	30	20
IT 425	Project[1]	0	-	0	0	4	0	-	-
	Total	15	5	15	0	14	250	150	100
Total Credits/ Hours/ Marks		**20**		**29**			**500**		

[1] The topic for the project (IT 425) will be allotted in the VII semester but assessed in both the semesters. The total credits will however be counted in the VIII semester.

ELECTIVE-I

IT 414 (a) Simulation & Modeling

IT 414 (b) Image processing & Pattern Recognization

IT 414 (c) Artificial Intelligence

IT414 (d) Data Mining

IT 414 (e) Storage and Information Management

ELECTIVE-II

IT 415 (a) Optimization Techniques

IT 415 (b) Information Security

IT 415 (c) Programming Principles

IT 415 (d) Embedded Real-Time Systems

IT 415 (e) Neural Computing

NOTE: The students have to take one elective each out of the lists (Electives I and II) given. However, the elective may not be offered if faculty expertise is not available or a minimum of 10 students do not opt for a particular elective.

VIII SEMESTER

Course No.	Title	Credit Hours		Hours per Week			Marks		
		Th	P	L	T	P	Th	P	MT
IT 421	Net Centric Computing	3	1	3	0	2	50	30	20
IT 422	e-Commerce	3	0	3	0	0	80	0	20
IT 423	Elective-III	3	1	3	0	2	50	30	20
IT 424	Elective-IV	3	0	3	0	0	80	0	20
IT 425	Project	0	8	0	0	12	0	100	-
IT 426	Practical Training & Industrial Visit	0	4	0	0	0	0	100	-
IT 427	Seminar	0	2	0	0	4	0	100	-
	Total	12	16	12	0	20	260	360	80
Total Credits/ Hours/ Marks		**28**		**32**			**700**		

ELECTIVE-III

IT 423 (a) High Speed Networks

IT 423 (b) Pervasive Computing

IT 423 (c) Operating System Design

IT 423 (d) Discrete-Time Signal Processing

IT 423 (e) Parallel & Distributed Database

ELECTIVE-IV

IT 424 (a) Integrated Circuit Design

IT 424 (b) Parallel Computer Architecture

IT 424 (c) Real Time Computing

IT 424 (d) Geographical Information System

IT 424 (e) Automata Theory

[2] The marks of the practical trainings conducted during summer breaks (at the end of IV and VI semester) will be considered in VIII semester out of 90 marks. The industrial visit will be assessed out of 10 marks. If the tour does not undergo, the trainings will be assessed out of 100 marks.

NOTE: The students have to take one elective each out of the lists (Electives III and IV) given. However, the elective may not be offered if faculty expertise is not available or a minimum of 10 students do not opt for a particular elective.

COURSE CONTENT

FIRST YEAR B.TECH. (I SEMESTER)

BS 111 MATHEMATICS – I

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 Expand function in Taylor's and Maclaurin's series

CO2 Trace the Cartesian and Polar curves

CO3 The student will be able to apply the partial differentiation to compute the minima and maxima of functions of two variables.

CO4 The student will be able compute areas and volumes by integration.

CO5 Solve linear differential equations of higher order and homogenous differential equations with constant coefficients.

Unit-I

Differential Calculus : Taylor's and Maclaurin's expansions. Asymptotes and Curvature (Cartesian Coordinates only). Curve tracing (Cartesian and standard Polar Curves-Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral).

Unit-II

Differential Calculus : Partial Differentiation, Euler's Theorem on Homogeneous Functions. Maxima & Minima of Two Independent Variables. Lagrange's Method of Multipliers. Jacobians.

Unit-III

Integral Calculus : Double Integral, Areas & Volumes by Double Integration. Change of Order of Integration. Triple integrals. Beta Function and Gamma Function (Simple Properties), Relation between Beta and Gamma functions.

Unit-IV

Differential Equations : Linear Differential Equations of Higher Order with constant coefficients. Homogeneous Linear Differential Equations with constant coefficient.

Text Books/References

1. Guar, Y.N. and Koul, C.I. (2013) Engineering Mathematics, Vols. I & II, Jaipur Publishing House, Jaipur.

2. Babu Ram (2011) Engineering Mathematics-I, Pearson Education, India.
3. B.V. Ramana (2012) Higher Engineering Mathematics, Tata McGraw Hill, India.
4. J.L. Bansal and H.S. Dhami (2012) Differential Equations, Vols. I & II, Jaipur Publishing House, Jaipur.
5. M.Ray and Chaturvedi: A Text Book of Differential Equations, Student Friend & Co. Publisher, Agra.
6. Rao V. Dukkipati (2012) Engineering Mathematics, New Age International (P) Ltd., New Delhi.

ME 113 MECHANICAL ENGINEERING

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 A fundamental understanding of the laws of thermodynamics and their application to a wide range of systems with work and heat interactions.

CO2 Concept of entropy and irreversibility of a process and application of thermodynamic relationships to solve practical problems.

CO3 Gas and vapour power cycles and the efficiencies.

CO4 Properties of steam and its application in power generation.

CO5 Construction and working of various boilers and IC engines.

Unit-I

Thermodynamics: Thermodynamic properties, closed and open systems, flow and non-flow processes, gas laws, laws of thermodynamics, internal energy. Application of First Law in heating and expansion of gases in non-flow processes only.

Second law of thermodynamics: Kelvin-Planck and Claussius statements. Reversible processes, Carnot cycle, Carnot theorem. Reverse Carnot cycle. Entropy, physical concept of entropy.

Unit-II

Properties of Steam: Difference between gas and vapour, change of phase during constant pressure process. Generation of Steam, triple point and critical point. Internal energy and entropy of steam. Use of steam tables and Mollier chart, heating and expansion of vapour in non-flow processes.

Unit-III

Vapour Power Cycles: Introduction to Carnot Cycle. Rankine cycle and modified Rankine cycle.

Steam Generators: Classification of steam boilers. Cochran, Lancashire, Locomotive and Babcock-Wilcox boilers. Boiler mountings and accessories.

Steam Engines: Introduction to simple and compound steam engines.

Unit-IV

Gas Power Cycles: Introduction. Air Standard efficiency, other engine efficiencies and terms. Otto, Diesel and Dual cycles. Calculation of efficiency, mean effective pressure and their comparison.

Internal Combustion Engines: Introduction, Classification, terminology and description of IC Engines. Four stroke and two stroke petrol, gas and diesel engines. Comparison of petrol and diesel engines. Simple carburettor.

Text Books/References

1. M.L. Mathur and F.S. Mehta. Thermal Engineering, (Vol. I, SI Edition), Jain Brothers, New Delhi.
2. R.K. Purohit : Foundation of Mechanical Engineering; Scientific Publishers (INDIA), Jodhpur.
3. P.K. Nag : Engineering Thermodynamics, TMH.

ME 114 WORKSHOP PRACTICE

Cr. Hrs. 1 (0 + 1)

	L	T	P
Credit	0	0	1
Hours	0	0	3

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

CO1 Practical performance in carpentry shop.

CO2 Smithy Shop, Simple exercises involving basic operations like bending, drawing, punching, shaping, upsetting, and riveting.

CO3 Fitting Shop, Simple exercises involving basic operations like sawing, chipping, filling, drilling, reaming, threading with taps and dies.

CO4 Sheet Metal and Plumbing Shop: Demonstration of basic tools, pipe fittings and operations.

Carpentry Shop: Acquaintance with types of wood, tools and their uses. Simple exercises involving basic operations like sawing, planning, chiselling, etc. Preparation of simple joints, cross half lap joint, dovetail joint, bridle joint, tennon and mortise joint.

Smithy Shop: Acquaintance with types of tools and their uses. Simple exercises involving basic operations like bending, drawing, punching, shaping, upsetting and riveting.

Fitting Shop: Acquaintance with tools, measuring and marking tools, precision measuring tools and their uses. Simple exercises involving basic operations like sawing, chipping, filling, drilling, reaming, threading with taps and dies.

Sheet Metal and Plumbing Shop: Demonstration of basic tools, pipe fittings and operations.

Texts/References

1. S. K. Hajra Choudhury and AK Hajra Choudhury. Elements of Workshop Technology (Vol. I), Media Promoters & Publishers Pvt. Ltd., Bombay.

CE 115 ENGINEERING DRAWING

Cr. Hrs. 1 (0 + 1)

	L	T	P
Credit	0	0	1
Hours	0	0	3

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

CO1 Select, Construct and Interpret appropriate drawing scale as per the situation.

CO2 Draw simple curves like ellipse, cycloid and spiral.

CO3 Draw Orthographic projections of points, lines and planes.

CO4 Draw orthographic projection of solids like cylinders, cones, prisms and pyramids including sections.

CO5 Layout development of solids for practical situations.

CO6 Draw isometric projections of simple objects.

Introduction and letter writing. Construction and use of plain, diagonal and vernier scale. Methods of drawing ellipse, parabola and hyperbola. Methods of drawing cycloids, spirals. Orthographic projection and projection of points.

Projection of lines, projection of planes, projection of solids. Introduction of prism, pyramid, cylinder and cone.

Section of solids, introduction of intersection of surfaces. Development of plane and curved surface. Isometric projection.

Text/Reference

1. N.D. Bhatt. Elementary Engg. Drawing, Rupalee publication, Anand.
2. Lakshmi Narayan and Vaishwanar. A Text Book of Practical Geometry, Jain Brother, New Delhi.
3. R.B. Gupta. A Text Book of Engineering Drawing, Satry Prakashan, New Delhi.
4. Fundamentals of Technical Drawing, Parkinson.

BS 100P ENGINEERING PHYSICS

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

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

CO1 Apply vector calculus approach to problems in electric field and magnetic field.

CO2 Apply laws of physics to simple LRC circuits.

CO3 Learn physics behind various types of lasers and their characteristics.

CO4 Understand the interference and diffraction from wave optics concepts and know its applications.

CO5 Understand polarization of light and its applications.

Unit-I

Electric Field: Line integral of electric field, Potential difference, Field as gradient of potential, Divergence of a vector function, Differential form of Gauss's law, Laplacian, Laplace equations, Curl of a vector function. Gauss's divergence theorem.

Magnetic Field: Curl and Divergence of a magnetic field, Magnetic scalar and vector potential.

Unit-II

Varying Field: Faraday's law-integral and differential form, Self and mutual inductance, Neumann's equation, Charge and discharge of a capacitor through register, Growth and decay of current in LR circuit, Energy stored in electric and magnetic field, Displacement current, Maxwell's equations.

Unit-III

Laser: Coherence, Einstein's coefficient, Spontaneous and stimulated emission, Population inversion, Laser gain (pumping), Spectral narrowing in laser, Coherence length, Ruby and He-Ne laser.

Interference: Division of amplitude, colour of thin films, Newton's ring, Febry-Perot interferometer-principle, operation, determination of wave length and difference in wave length.

Unit-IV

Diffraction: Double slit Fraunhofer diffraction pattern, Fraunhofer diffraction by a plane transmission grating, Formation of spectra.

Polarization: Analysis of linearly, circularly and elliptically polarized light (Half wave and quarter wave plates), Optical activity, specific rotations, Laurent's half shade and its use for determination of specific rotation of sugar solution.

Practicals

1. To find refractive index and dispersive power of material of prism by spectrometer.
2. To find wave length of light by Newton's ring.
3. To find wave length of light by diffraction grating.
4. To find specific rotation of sugar solution by polarimeter.
5. To find wave length of light by Fresnel Biprism.
6. To find frequency of A.C. mains.
7. To determine dielectric constant of liquid using series resonance method.
8. To study charge and discharge of condenser through a resistor (C.R. Circuit).
9. To study LCR resonant circuit, resonance, quality factor and sharpness in (i) series circuit (ii) parallel circuit.

Text Books/References

1. K.K. Tiwari. (1995). Electricity and Magnetism, S. Chand and Company, New Delhi.
2. N. Subrahmanyam and Brijlal. (1993). A Text Book of Optics, S. Chand and Company, New Delhi.
3. Ahmed and Lal. (1966). Electricity, Magnetism and Electronics, Unitech House, Lucknow.
4. D.S. Mathur. (1993). Mechanics, S. Chand and Company, New Delhi.
5. Gupta and Kumar. (1995). Practical Physics, Pragati Prakashan, Meerut.

CE 100 ENGINEERING MECHANICS

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

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

CO1 Draw free body diagrams and determine the resultant of forces and/or moments.

CO2 Determine the centroid and second moment of area of sections.

CO3 Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.

CO4 Analyse statically determinate planar frames.

CO5 Analyse the motion and calculate trajectory characteristics.

CO6 Apply Newton's laws and conservation laws to elastic collisions and motion of rigid bodies.

(A) STATICS

Unit-I

Introduction of condition of equilibrium: Force, system of force, coplanar forces.

Moment and couples: Moment and parallel forces, Couples, General conditions of equilibrium

Practical Applications: Levers, Cracked levers, Steel yards. Sagging chains and toggle joints.

Centre of Gravity: Centre of parallel forces, C.G. in some simple cases, C.G. of Solids.

Moment of Inertia: Moment of inertia, Radius of gyration and perpendicular axis. Determination of moment of inertia of simple sections. Mass of moment of inertia.

Unit-II

Friction: Introduction, Critical angle of friction, Friction on horizontal planes, Friction on inclined planes, Wedge and block, Screw jacks, Rolling friction.

Machines: Introduction, Effects of friction, Loss of work, Reversible and irreversible machine, Law of machine, Wheel and axle, Differential wheel and axle, Pulley block, Screw jack, Single and double purchase crab, Worm and Worm wheel, System of pulleys.

Frames: Statically determinate plane frames, Method of joints, Method of sections, Graphical method.

(B) DYNAMICS

Unit-III

Rectilinear Motion, Motion under gravity, Projectiles equation of the path, Maximum height attained, Time of flight, Horizontal range. Angle of projection, Projectile from a given height, Projectile on an inclined plane, Problems.

Work, Power and Energy: Work, Power, Work done by torque, Energy, Law of conservation.

Unit-IV

Centripetal and centrifugal forces, Laws of motion: Newton's Law of motion and their explanation, Collision of elastic bodies; Impulse and impulsive force, Principle of conservation of momentum, Loss of kinetic energy during impact.

Practicals

1. Verification of law of polygon of forces.
2. Verification of principle of moment in case of compound level.
3. Verification of principle of moment in case of bell crack level.
4. Determination of reaction in case simply supported beam with or without overhang.
5. To determine coefficient of friction between different surfaces on horizontal plane.
6. To determine coefficient of friction between different surfaces in inclined plane.
7. Study of different wheel and Axle.
8. Study of single purchase crab.
9. Study of worm and worm wheel.
10. Study of Weston's pulley block.
11. Determination of mechanical advantage, velocity ratio and efficiency of single purchase crab.
12. Determination of mechanical advantage, velocity ratio and efficiency of double purchase crab.
13. Determination of mechanical advantage, velocity ratio and efficiency of first system of pulley.
14. Determination of mechanical advantage, velocity ratio and efficiency of second system of pulleys.
15. Determination of mechanical advantage, velocity ratio and efficiency of third system of pulleys Flywheel.

Text Books/References

1. I.B. Prasad. Engineering Mechanics, Khanna Publisher, New Delhi.
2. R.S. Khurmi. Applied Mechanics, S. Chand & Company Ltd., New Delhi
3. S.B. Junnarkar. Applied Mechanics, Charotar Publishing House, New Delhi.
4. Saluja. Applied Mechanics, Satya Prakashan, New Delhi.

EE 100 ELECTRICAL ENGINEERING – I

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1	Proficiency in solving DC network.
CO2	Know-how of single phase AC circuits
CO3	Competency in solving three phase balanced AC circuits
CO4	Dexterity in using basic electrical instruments
CO5	Comprehension of transformer working principles.

Unit-I

D.C. Networks: Kirchoff's law, node voltage and mesh current methods, delta-star and star delta transformation, source conversion; solution of DC circuits by network theorems: Thevenin's, Norton's, superposition, Reciprocity and Maximum Power Transfer theorem.

Unit-II

Single Phase A.C.Ciruits: Single Phase EMF generation, average and effective values of sinusoidal and linear periodic wave forms, instantaneous and average power, power factor, reactive & apparent power, solution of R-L-C, series, parallel, series-parallel circuits, complex representation of impedances, phasor diagram, series and parallel resonance.

Unit-III

Three Phase A.C., Circuits: Three phase EMF generation, delta and star-connection, line and phase quantities, solution of the 3-phase balanced circuits, Phasor diagram, measurement of power in three phase balanced circuits.

Transformer: Faraday's laws of Electromagnetic induction, construction and principle operation of single phase transformer, EMF equation, voltage and current relationship and Phasor diagram for ideal transformer.

Unit-IV

Electrical Measuring Instruments: Introduction, type of measuring Instruments, Deflecting controlling & Damping Torque, D.C. PMMC instruments, shunts and multipliers, Moving iron ammeters and voltmeter, Dynamometers wattmeter, Induction type energy meter.

Practicals : Based on theory

Text Books/References

1. B.L. Therja. Electrical Technology, S. Chand
2. M.E. Van Valkenberg. Network analysis, PHI
3. Soni and Gupta. Introduction to Electrical Network Theory, Dhanpat Rai Publisher
4. R.A. Gupta and Nikhal Gupta. (2002). Fundamentals of electrical & Electronics Engineering, JPH, Ist Edition,
5. H.P. Tiwari. (2002). Electrical & Electronics Engineering, College Book Centre, Jaipur.
6. J.B. Gupta. (2002). Fundamentals of Electrical & Electronics. S.K. Kataria and Sons. Dehli.

ENVS 100 ENVIRONMENTAL STUDIES

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

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

CO1 Develop an understanding of different natural resources including renewable resources.

CO2 Realize the importance of ecosystem and biodiversity for maintaining ecological balance.

CO3 Develop an understanding of environmental pollutions and hazards due to engineering/technological activities and general measures to control them.

CO4 Demonstrate an appreciation for need for sustainable development and role of science.

CO5 Aware of important acts and laws in respect of environment.

Unit–I

The Multidisciplinary nature of environmental studies:

Definition, scope and need for public awareness. Environmental problems and their consequences

Natural Resources:

Renewable and non-renewable resources

Natural resources and associated problems

a) Forest resources: Use over-exploitation, deforestation, and case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams, benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land and a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources, Equitable use resources for sustainable lifestyles.

Unit-II

Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem.

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rovers, oceans, estuaries)

Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, Biogeographically classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical and aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-III

Environmental Pollution

Definition, Causes, effects and control measures of: -

Air pollution

Water pollution

Soil pollution

Marine pollution

Noise pollution

Thermal pollution

Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

Unit-IV

Social Issues and the Environment - From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

Human Population and the Environment

Population growth, variation among nations, Population explosion-Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Text Books/References

1. K. C. Agarwal. (2001). Environmental Biology, Nidi Publications, Bikaner.
2. B.L. Chaudhary and Jitendra Pandey. (2005). Environmental Studies, Apex Publishing House, Udaipur.
3. H. Jhadav & V.M. Bhosale. Environmental Protection & Laws, Himalaya Pub. House, Delhi
4. M. N. Rao and A. K. Datta. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd.

5. B. K. Sharma. Environmental Chemistry. Goel Publishing House, Meerut.
6. Pratap Singh, N.S. Rathore and A.N. Mathur. (2004). Environmental Studies, Himanshu Publications, Udaipur.
7. R. K. Trivedi and P. K. Goel. Introduction to Air Pollution, Techno Science Publications.

BS 100C ENGINEERING CHEMISTRY

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

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

CO1 Demonstrate knowledge of science behind common impurities in water and methods to treat them.

CO2 Knowledge of methods to determine the calorific value of fuels, perform flue gas analysis and combustion analysis.

CO3 Apply the science for understanding corrosion and its prevention.

CO4 Demonstrate a knowledge of superconducting and organic electronic materials.

CO5 Knowledge of Kinetics of Reactions

Unit-I

Sources of water, common impurities, requisites of drinking water in municipal water supply. Purification of water, sterilization, break point chlorination. Hardness, determination of hardness by Complexometric (EDTA) method, degree of hardness, Boiler troubles, carry over corrosion, Sludge and scale formation. Caustic embrittlement, cause of boiler troubles and their prevention.

Unit-II

Classification of fuels, solid fuels, Proximate and Ultimate analysis of coal, significance of constituents, theoretical method for calculation of Gross and net calorific values. Liquid fuels-Petroleum origin, Refining of Petroleum, knocking, octane number, anti knocking agents. Flue gas analysis by Orsat Apparatus, Calculations based on combustion.

Unit-III

Corrosion: Definition and its significance, Dry and Wet theories of corrosion, Cathodic & Anodic protection of corrosion, types of corrosion, factors affecting corrosion.

New Engineering Materials: Introduction, Properties and Applications of Super Condcutors, Organic electronic materials, Fullerenes.

Unit-IV

Chemical Kinetics: Order and Molecularity of reaction, first and second order reaction, Derivation of equations for first and second order reaction, determination of order of reaction, Energy of activation and Arrhenius equations, Numerical of first and second order reactions.

Engineering Chemistry Practical

1. Determination of viscosity of a liquid.
2. Estimation of free chlorine in a water sample.
3. Determination of temporary and permanent hardness by EDTA method.
4. Determination of Copper Sulphate iodometrically.
5. Estimation of Potassium dichromate iodometrically.
6. Determination of purity of Ferrous Ammonium Sulphate (Mohr's Salt) using Potassium Permanganate.
7. Estimation of available chlorine in Bleaching Powder sample.
8. Analysis of Brass.
9. Determination of Strength of Ferrous Ammonium Sulphate (FAS) using Potassium Ferricyanide as an external indicator.
10. Analysis of Common Salt.

Text Books/References

1. Jain and Jain. Engineering Chemistry, Dhanpat Rai Publishing Company(P) Ltd., New Delhi.
2. Jain and Gupta. A Text Book of Engineering Chemistry, Jaipur Publishing House, Jaipur.
3. B.K. Sharma. Engg. Chemistry (General), Krishna Prakashan Media (P) Ltd., Merrut.
4. S.S. Dara. A Text Book of Engineering Chemistry, S. Chand & Co., New Delhi.
5. M.M. Uppal. A Text Book of Engineering Chemistry, Khanna Publishers, New Delhi.
6. S.S. Dara. A Text Book on Experiments and Calculations in Engg. Chemistry. S. Chand & Co., New Delhi.
7. Ameta and Yasmin. Practical Engineering Chemistry, Himanshu Publications, New Delhi.

EC 100 ELECTRONICS AND INSTRUMENTATION

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 Characterize passive electronic components.

CO2 Characterize diodes and transistors.

CO3 Demonstrate knowledge of concept and working of amplifier and oscillators circuits.

CO4 Demonstrate understanding of characteristics of power supplies.

CO5 Identify and select appropriate type of transducer for measurement of different quantities.

Unit-I

Passive Components: Construction and characteristics of carbon composition, wire wound and film resistors. Potentiometer, color codes and rating of resistors. Characteristics and rating of capacitors for electronics circuits.

Semi conductor: Basic electrical characteristics of semi conductors. Theory of p-n junction. Characteristics and ratings of junction diodes. Basics of zener diode, photo diode and LED.

Unit-II

Bipolar Junction Transistor: npn and pnp transistors,, Various configurations (CB, CC, CE) of BJT. Transistor biasing (Fixed, self, potential dividers) Basic classification of amplifier (Voltage and power amplifier). Basic concept of Class A, B , AB and C amplifiers.

Unit-III

Generation of waveforms: Concept of positive and negative feedback. Introduction of oscillators like R-C , L-C and Crystal oscillators.

Power supply: Circuit configuration and analysis of Half wave, Full wave and Bridge rectifier. Basic concept of regulation, Zener diode voltage regulator, Transistor series regulator.

Unit-IV

Transducers: Definition, classification: Active and passive transducer, primary and secondary transducers, Analog and digital transducers. Measurement of displacement, temperature, velocity, force and pressure using potentiometer, resistance thermometer, thermocouples, bourden tube, LVDT, strain gauge and techogenerator.

Practicals : Based on theory.

Text Books/References

1. Millman and Halkias. Integrated elecronics: Mc Graw Hill.
2. W.D. Cooper. Electronics Instrumentation and Measurement : PHI.
3. M.L. Gupta. Electrical Engineering Materials.
4. Malvino. Principles of Electronics.
5. Jhon D. Ryder. Electronics Fundamentals.

CS 100 INTRODUCTION TO COMPUTER PROGRAMMING AND DATA STRUCTURE

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 Understand the basic building blocks of a computer.

CO2 Learn different systems and codes to represent numbers in computers and be able to convert the numbers from one system to another.

CO3 Learn the data types and syntax of C language.

CO4 Write, compile and execute programs in C language for solving engineering problems.

CO5 Demonstrate capability to choose appropriate type of data structures and perform operations on them.

Unit–I

Computer Fundamentals: History of Computers; Organization of Computers: input unit, output unit, Storage Unit, Arithmetic Logic Unit, Central Processing Unit; CPU Operation; Memory Subsystem: RAM, ROM, Cache Memory & memory Hierarchy; Instruction Format and Instruction Execution Cycle; Number System & Codes: Binary, Decimal, Octal & Hexadecimal Number System, Conversion from one number system to another, sign magnitude, 1's Complement & 2's Complement representation of numbers; Numerical & Character codes: BCD, Excess – 3, Gray, ASCII & EBCDIC Codes.

Unit-II

Basics of Programming in C: Constants, Variables and Data Types, Operators and Expressions, Input and Output operations, Decision making & Branching: if-else, switch statement; Decision making and looping; Arrays.

Unit-III

Character Arrays & strings, User defined function, Structures & Unions, Pointer Management, Dynamic Memory allocation & linked lists.

Unit–IV

Introduction to Data Structures: Introduction to Linear Arrays & Representation of Linear Array in Memory, Traversing, Insertion & Deletion in Linear arrays, Bubble Sort, Linear & Binary search; Introduction to linked list – Representation of linked list in memory, Traversing, Searching, Insertion & Deletion in a linked list.

Practical: Lab experiments based on theory.

Text Books/References

1. E. Balagurusamy. "Programming in ANSI C", Tata McGraw Hill.
2. Kernighan and Ritchie. "The C Programming language", Printice Hall
3. P.M. Jat. "Programming with C", Apex Publishing House, Jaipur.
4. Dharm Singh. "Fundamentals of Compute Organization", Paragon International Publishers, New Delhi.
5. P.K. Sinha & P. Sinha. "Computer Fundamentals", BPB Publication.
6. Seymour Lipschutz. "Data Structure", Schaum's outline series, McGraw Hill.

BS 100E ENGLISH AND COMMUNICATION SKILLS

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

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

CO1 Understand basic grammar principles and be able to synthesise and transform sentences.

CO2 Write CVs, letters for job application, complaints and emails.

CO3 Prepare technical reports and short essays.

CO4 Learn phonetic symbols and use correct sound, stress and intonation.

CO5 Learn basic do's and don'ts of an interview.

CO6 Show enhance communication ability in English.

Unit-I

Grammar and Usage: Tense, Concord, Preposition, Common Grammatical Errors, Phrasal Verbs, Idioms, Words often misused, Synthesis of sentences, Transformation of Sentences (Simple, Compound, Complex, Voice, Speech). Analysis of sentences.

Unit-II

Comprehension-Unseen passage.

Composition: Business Letters, E-mail, Memos, Circular, Notice, Curriculum Vitae and Covering Letter, Writing of Technical Report, Essay Writing.

Unit-III

Phonetic Symbols and Transcription, Word Stress. Meaning and Characteristics of Seminar, Conference, Symposium and Work-Shop. Interview – Meaning, Types, Do's and Don'ts of Interviews.

Unit-IV

Communication Skills: Meaning and Process of Communication, Basic Forms of Communication, Verbal and Non-Verbal Communication, Communication Barriers, Principles of Effective Communication.

Language Lab Practical

Globerana Software: Listening skills, Fundamental language skills, Communication skills, Vocabulary, Phonetics, Conversation.

Group discussion on current topics, Oral presentations, Writing skills, Exercises on pronunciation.

Practical: Lab experiments based on theory.

Text Books/References

1. Thomson and Martinet. (1997). A Practical English Grammar Exercise Book, Vol. I and II. O.U.P. Publication.
2. Michal Swan. (1995). Practical English Grammar, O.U.P. Publication.
3. David Green. (1990). Contemporary English Grammar Structure Composition, Macmillan Publication.
4. S. Allen. (1997). Living English Structure, Orient Longmans.
5. Daniel Jones. Drills and Tests in English Sound, ELBS.
6. Hornby, (1990). Advanced Learners Dictionary, O.U.P. Publication.
7. Krishan Mohan. Speaking English Effectively, Macmillan Publication.
8. Audio-Video Tapes prepared by the British Council, New Delhi and Central Institute of English and Foreign Language, Hyderabad to be used in a Language Laboratory.
9. A. Adivi Reddy. Extension Education, Sree Lakshmi Press, Bapatla (A.P.).
10. G.L. Ray. (2005). Extension Communication and Management, Kalyani Publishers.

FIRST YEAR B.TECH. (II SEMESTER)

BS 121 MATHEMATICS – II

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1	Show knowledge of vector calculus and its applications in engineering.
CO2	Solve second order differential equations for application in their field of engineering.
CO3	Solve partial differential equations of first order and higher orders (with constant coefficients).
CO4	Solve simultaneous equations by matrix methods.
CO5	Determine eigenvalues and eigenvectors.
CO6	Diagonalise a matrix and invert a matrix.

Unit-I

Vectors Calculus: Scalar and Vector field. Differentiation of vector functions, Gradient, Divergence, Curl and Differential Operator. Integration of vector functions, Line, Surface and volume Integrals. Green's Theorem in a Plane, Gauss's and Stoke's Theorem (without proof) and their Applications.

Unit-II

Differential Equations: Second Order Ordinary Differential Equations with Variables Coefficients. Exact Forms. Part of Complimentary Function is known. Change of Dependent Variable. Change of Independent Variable, Normal Forms. Method of Variation of Parameter.

Unit-III

Partial Differential Equations: Formation of partial differential equations. Partial Differential Equations of First Order, Lagrange's Form, Standard Forms Higher order linear partial differential equations with constant coefficients.

Unit-IV

Matrices: Rank of a matrix, Inverse of a matrix by elementary transformations. Consistency and Solution of simultaneous linear equations. Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof). Diagonalization of matrix.

Text Books/References

1. Guar, Y.N. and Koul, C.I. (2013) Engineering Mathematics, Vols. I & II, Jaipur Publishing House, Jaipur.
2. Babu Ram: Engineering Mathematics-I, Pearson Education, India (2011).
3. B.V. Ramana (2012) Higher Engineering Mathematics, Tata McGraw Hill, India.
4. J.L. Bansal and H.S. Dhami (2012) Differential Equations, Vols. I & II, Jaipur Publishing House, Jaipur.
5. M. Ray and Chaturvedi: A Text Book of Differential Equations, Student Friend & Co. Publisher, Agra.
6. Rao V. Dukkipati (2012) Engineering Mathematics, New Age International (P) Ltd., New Delhi.

CE 122 CIVIL ENGINEERING

Cr. Hrs. 2 (1 + 1)

	L	T	P
Credit	1	0	1
Hours	1	0	2

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

CO1 Demonstrate knowledge of various surveying methods.

CO2 Conduct a chain survey.

CO3 Conduct a compass survey.

CO4 Conduct levelling survey and be able to do RL calculations.

CO5 Demonstrate knowledge of properties of various building materials.

(A) SURVEYING AND LEVELING

Unit-I

Principle and purpose of plane surveying.

Chain Surveying: Instrument for chaining, Direct & indirect ranging. Methods of chain along plane & sloping ground, Base line, check line, Tie line, Offset, Chain angle & recording in field book.

Compass Surveying : True & Magnetic meridian, whole circle bearing & quadrantal bearing system, construction & use of Prismatic & Surveyor Compass, Local attraction.

Unit-II

Level and leveling : Definition of various terms used in leveling. Types of Bench mark and their uses. Construction and use of Dumpy and Tilting levels, Leveling staves. Temporary adjustment of Dumpy level. Simple, differential leveling, fly leveling, longitudinal and cross sectioning, plotting of profile leveling. Determination of level by line of collimation and rise and fall method, Arithmetical checks. Level book and record keeping, leveling difficulties and errors in leveling.

(B) BUILDING MATERIAL

Unit-III

Stones: Different types, properties of good building stones, common testing of stones, Dressing of stones and use of stones in construction.

Bricks: Types, raw materials, identification, composition. Properties and uses of ordinary bricks, fire resistant and chemical resistant bricks.

Limes: Definition, sources of lime, slaking of lime, ISI classification of lime.

Unit-IV

Cement: Chemical composition, types of cement, properties, uses and tests on cement.

Mortars: Proportioning, properties of ingredients and use of lime, cement and gauge mortars.

Cement Concrete: Ingredients, common proportions, properties of fresh hardened concrete, Water cement ratio, curing and consolidation of concrete.

Practicals

1. Study of accessories used in measurement of distances.
2. Ranging Direct and indirect and use of chain and tape.
3. Chining along sloping ground.
4. Chain surveying, field book recording and taking offsets for location details.
5. Study of prismatic and surveying compass and taking bearings.
6. Study of Dumpy level, temporary adjustment and R.L. calculations.
7. Study of Tilting level, temporary adjustment and R.L. calculations.

8. Simply and differential leveling operation, record in level book, practice for staff reading line of collimation and Rise and fall method calculations.

9. L-section and cross sectioning, fly leveling operation.

10. Plotting of working profile.

Practical: Lab experiments based on theory.

Text Books/References

1. S.C. Rangwala. Engineering Materials, Charotar Book Stall, Anand.
2. B.C. Punmia. Surveying & Field Work (Vol. I), Laxmi publications, New Delhi.

ME 123 MACHINE DRAWING – I

Cr. Hrs. 1 (0 + 1)

	L	T	P
Credit	0	0	1
Hours	0	0	3

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

CO1 Introduction to BIS codes.

CO2 Introduction to Orthographic Projection.

CO3 How to draw the missing views and Sectional Views.

CO4 Knowledge about Riveted and Welded Joints, Screw Fastenings.

CO5 Knowledge of Conventional representation of threads, Different types of lock nuts, studs, machine screws, cap screws and wood screws.

Introduction, conventional representation of different materials used in machine drawing, Introduction to BIS codes.

Orthographic Projection: First and third angle methods of projection. Preparation of working drawing from models and isometric views. Drawing of missing views.

Dimensioning: Different methods of dimensioning.

Sectional Views: Concept of sectioning. Revolved and oblique section. Sectional drawing of simple machine parts

Riveted and Welded Joints: Types of rivet heads and riveted joints. Processes for producing leak proof joints. Symbols for different types of welded joints.

Screw Fastenings: Nomenclature, thread profiles, multistart threads, left and right hand threads. Square headed and hexagonal nuts and bolts. Conventional representation of threads. Different types of lock nuts, studs, machine screws, cap screws and wood screws. Foundation bolts.

Different types of joints: Knuckle joint, cotter joint and universal joint.

Text Books/References

1. N.D. Bhatt. Machine Drawing, Charotar Book Stall, Anand.
2. V. Laxminarayan and M.L. Mathur. A Text Book of Machine Drawing, Jain Brothers, New Delhi.
3. P.S. Gill. Machine Drawing: S.K. Kataria & Sons, New Delhi.

ME 124 WORKSHOP TECHNOLOGY

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	3

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

CO1: Understand welding principles, equipment and tools of arc-gas and resistance welding, brazing and soldering.

CO2: Describe construction, operations and tools of lathe, shaper and drilling machines.

CO3: Understand basic hot and cold forming operations.

CO4: Demonstrate knowledge of types of patterns, cores, moulding sands and tools.

CO5: Understand sand, permanent mould and investments castings and casting defects.

Unit-I

Welding: Introduction to types of welding; Principle of Electric arc welding, welding tools and safety devices, welding positions, welding joints, types of welds, Resistance welding, Oxyacetylene gas welding, types of flames, Soldering and Brazing.

Unit-II

Lathes: Constructional details of centre lathe. Main operations and tools used on centre lathes.

Shaper: Types of shapers. Constructional details of standard shaper, shaper tools and main operations.

Unit-III

Drilling Machines: Types of drilling machines. Constructional details of pillar type and radial drilling machines. Main operations. Twist drills, drill angles and sizes.

Forming : Basic descriptions and applications of hot and cold working processes, forging, bending, shearing, drawing and forming operations.

Unit-IV

Foundry & Casting Practice : Introduction, types of pattterns, mouldings, moulding Materials, cores, moulding tools and equipments. Moulding sands, properties of moulding sands. Casting defects.

Casting methods : Permanent mould casting, investment casting.

Practicals

Practical exercises on welding, pattern making, foundry and machining operations.

Text Books/References

1. Mathur, Mehta and Tiwari : Elements of Mechanical Engineering, Jain Brothers, New Delhi.
2. S.K. Hajra Choudhury and A.K. Hajra Choudhury. Elements of Workshop Technology (Vol. I and II), Media promoters & Publishers Pvt. Ltd., Bombay.

SECOND YEAR B.TECH. (III SEMESTER)

BS 211 (All Branches) MATHEMATICS-III

Cr. Hrs.	3 (3 + 0)		
	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand Finite differences, various difference operators and their relationships, factorial notation

CO2 : Use of numerical methods in modern scientific computing

CO3 : Find the Inverse Laplace Transform By Partial Fractions

CO4 : Use the Laplace Transform to solve differential equation with constant coefficients

CO5 : Numerically integrate any function by Trapezoidal and Simpson's rule

Unit-I

Interpolation: Finite differences, various difference operators and their relationships, factorial notation. Interpolation with equal intervals; Newton's forward and backward interpolation formulae, Lagrange's interpolation formula for unequal intervals.

Unit-II

Gauss forward and backward interpolation formulae, Stirling's and Bessel's central difference interpolation formulae.

Numerical Differentiation: Numerical differentiation based on Newton's forward and backward, Gauss forward and backward interpolation formulae.

Unit-III

Numerical Integration: Numerical integration by Trapezoidal, Simpson's rule.

Numerical Solutions of Ordinary Differential Equations: Picard's method, Taylor's series method, Euler's method, modified Euler's method, Runge-Kutta methods.

Unit-IV

Laplace Transform: Laplace transforms of elementary functions; Basic properties of Laplace transform; Initial value theorem, final value theorem and convolution property of Laplace transform; Inverse Laplace transforms. Applications of Laplace transform to solve ordinary differential equations

Texts Books /References

1. H.C. Saxena: Text Book of Finite Differences and Numerical Analysis, S. Chand and Co.

2. M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical Methods for Scientific and Engineering computation, New Age International (P) Ltd.

3. N.P. Bali and Manish Goyal: A Text book of Engineering Mathematics, Laxmi Publication Pvt. Ltd., New Delhi (VII Edition).

4. S.P. Goyal and A.K. Goyal: Integral Transforms, Jaipur Publishing House, Jaipur.

IT 211 DIGITAL SYSTEMS AND DESIGN

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Evaluate and simplify logical functions using Boolean algebra.

CO2 : Analyze and design modular combinational logic circuits using decoders, multiplexer, decoders and adders.

CO3 : Design k-maps to optimize logic functions for few variables..

CO4 : Analyze and design sequential systems using standard sequential modules, such as counter and registers.

CO5 : Demonstrate and compare various logic families, semiconductor memories, shift registers and analog to digital and digital to analog conversion circuits

Unit – I

Boolean Algebra and Digital, Logic Gates: Features of logic algebra, postulates and theorems of Boolean algebra. Boolean functions drive logic gates: NAND Gate, NOR Gate, Exclusive-OR, and Exclusive-NOR gates. Logical Operations and logic gates, logic circuits, realizing circuits from Boolean expressions, Boolean Algebra Theorems, De Morgan's Theorems, Duality Theorem, Reducing Boolean Expressions by Algebraic reduction, logic gate conversion, universal gates. *Essentials of Minimization Techniques:* Minterm and Maxterm, Canonical Forms, *Karnaugh Map*: Karnaugh Map upto six variables. Prime implicant (PI), Essential Prime implicant (EPI).

Unit – II

Minimization Techniques: Simplification of logic function using K-map. in POS and SOP form, Incompletely Specified Functions, Mixed (Buble) logic Combinational Circuits, Quine-McCluskey Minimization technique.

Combinational Systems: Combinational circuit Design, *Arithmetic Circuits*: Adders, Subtractor, 2-bit Full-Adder/Subtractor, Binary Parallel Adder, BCD Adder, Multiplier, Digital comparator, Decoders, Encoders, Priority Encoder, Multiplexers, Implementation of Boalean Function with Multiplxer, Demultiplexer.

Unit - III

Sequential Systems: Latches, Flip-flops: SR(Set-Reset) Flip-Flop, Edge-Detector Circuits, Master-Slave S-R Flip-Flop, J-K flip-flop, Master-Slave J-K Flip-flop, D Flip-Flop, T Flip-flop, Conversions of flip-flops. *Counters*: Asynchronous (Ripple) Counters, Propagation Delay in Ripple Counter, Asynchronous Counters with Mod Numbers, Synchronous (Parallel) Counters, Design of Synchronous Counter. *Registers*: Serial- in/serial-out, Serial- in/parallel- out, Parallel- in/serial- out, Parallel- in/parallel- out, Bi-directional shift register, Ring Counter, Johnson Counter.

Unit - IV

Semiconductor Memories: Logic Families: Transistor- Transistor Logic (TTL), Metal-oxide semiconductor (MOS) logic, Characteristics of digital ICs. Categories of memory, Types and architectures, random access memory (RAM) cells, dynamic memory cell, address decoders, column-address decoder, read only memory (ROM), mask-programmable ROMs, programmable ROMs. SRAM: operation, characteristics, understanding the SRAM timing diagram, DRAM: operation, architecture, refreshing.

Practicals: Lab experiments based on theory

Text Books/References

1. Dharm Singh, Fundamental of Computer Organization, Paragoan International Publishers, New Delhi.

2. Mano Morris M., Digital Logic and Computer Design, Prentice-Hall of India Pvt. Ltd, New Delhi.

IT 212 SHELL PROGRAMMING LAB

Cr. Hrs. 2 (0 + 2)

	L	T	P
Credit	0	0	2
Hours	0	1	4

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

CO1 : Understand and apply various Unix commands.

CO2 : Understand the various features of popular editors of Unix such as vi and gedit.

CO3 : Understand and apply shell programming to develop shell scripts

CO4 : Evaluate pattern matching in shell, shell variables and BASH shell environment variables.

Basic unix commands: who, date, passwd, echo, cat, cp, rm, mv, more, ls, cd, pwd, mkdir, rmdir, sh, ps. kill, corn, chmod, chown, chgrp, ln, write, mail, finger, pine; simple editors : vi, gedit; Shell programming : designing shell scripts using if, case, expr, sleep, while, until, for, redirection, pipe & set constructs, pattern matching in shell, shell variables, BASH shell environment variables, .profile & BASH & system startup scripts.

Text Books/References

1. Sobell G. Mark, Practical Guide to Solaris, Pearson Education Asia.
2. Richard Peterson, Linux Complete Reference, TMH, New Delhi.
3. Das Sumitabha, Unix Concepts and Applications, TMH, New Delhi.

IT 213 INFORMATION TECHNOLOGY PARADIGMS

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand features of various applications of a software and their configurations.

CO2 : Understand and compare different storage devices and their compression and decompression standards.

CO3 : Understand various popular information and communication technology devices and applications such as telecommuting, virtual and mobile workspace and associated network devices.

CO4 : Understand and analyze various techniques used in Telecommunication.

CO5 : Understand and analyze various software development issues such as design, coding, testing, security, documentation and maintainance.

Unit - I

Computers & Communication: The digital age, overview of development in computer technology, communication technology, connectivity & interactivity, information Technology ethics.

Applications Software: Software, common features of software, examples and features of word processing, spreadsheets, database, financial software for Cyberspace, Communication, E-mail, Web browsers, desktop publishing, presentation graphics, project management, computer-aided design, drawing and painting, groupware, multimedia authoring software, Software Ethics & intellectual property rights. *processors:* Microchips, miniaturization & mobility. CPU, main memory, Binary system, parity bit, machine language, microcomputer components. Computers future trends. energy consumption and "Green PCs".

Unit - II

Storage devices: Storage fundamentals, secondary storage device rating. Diskettes, hard-disks, optical disks, Flash-memory cards. Magnetic tape. Online secondary storage devices, Compression & decompression standards, Secondary storage future.

Telecommunication: Practical uses of communications & connectivity. Telephone related communications services: Fax & voice mail, Video/Voice communications Video conferencing & picture phones. On-line information services, internets & world-wide-web. Shared resources: Workgroup computing, EDI, Internet, new Internet Technologies: Phone, Radio, TV & 3-D. Cyber ethics: Netiquette, controversial material & censorship, privacy issues.

Unit - III

Communication technology: Telecommuting, virtual offices & mobile workspace. Analog & digital signals, modems. communication channels, communication Networks, Local Networks, Factor affecting communication among devices, future of communication. *Information systems:* Trends forcing change in the workplace. organizations, department, tasks, management level & types of information, systems analysis & design.

Unit - IV

Software development: Programming concepts, design of program. Coding & Testing, Documentation & maintenance of program. Generations of programming languages. Examples & features of some programming languages used today. *Society & the digital age:* Information superhighway, Security issues, safeguarding computers & communications Quality-of-line & economic issues, benefits of information revolution.

Text Books/References

1. Williams. Sawyer & Huthcinson. Using Information Technology- Tata Mc-Graw Hill.
2. Curtin, Forley, Sen & Morin, Information Technology- Tata McGraw Hill.

IT 214 ALGORITHMS & DATA STRUCTURE

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Evaluate the significance of data structure in different applications through different programming language constructs.

CO2 : Implement and analyze ADT such as arrays, records, linked structures, stacks, queues, trees and graphs with different operational algorithms.

CO3 : To implement, analyze and compare different standard searching and sorting algorithms based on complexities.

CO4 : Analyze and understand recursive functions and its applicability in implementation of different data structures.

CO5 : Compare and choose among different implementations of data structures and their algorithms in order to efficiently model the information given in a computational problem.

Unit- I

String Processing: storing strings, character data type, string processing, word processing, pattern matching; *Array, Records & Pointers*: memory representation, traversing, insertion & deletion in linear arrays, linear search, bubble sort, binary search, multidimensional arrays, pointer arrays, Record structures & representation, Matrices & Sparse Matrices.

Unit -II

Linked Lists: memory representation, traversing, searching, insertion & deletion in linked lists, Garbage Collection, header, circular and Two-Way linked lists; *Stacks*: Array & linked list representation of stacks, arithmetic expression, polish notation, Quicksort, application of stack in implementing recursion, Tower of Hanoi.

Unit- III

Queues: memory representation & algorithms for queues, circular queues, Deques & priority queues; *Trees* : general tree, binary tree traversals & memory representation, binary search tree representation, traversal, insertion, deletion & searching, heap, heapsort, *AVL trees, B-Trees*: representation , operations & application of AVL trees & B-Trees.

Unit -IV

Graph and their application : Graph theory terminology, graph representation, Adjacency Matrix, path matrix and linked representation of graphs, shortest path algorithm, operation on graphs, graph traversals, spanning tree; *Sorting & Searching* : Insertion sort, selection sort, merging, merge-sort, linear & binary search *Hashing*: hash functions, collision resolution, linear probing & chaining.

Practicals: Lab experiments based on theory

Text /References

1. Seymour Lipschutz, Theory and problems of Data Structure, McGraw-Hill
2. Sartaj Sahni, Data Structure, Algorithms and Applications in C++, WCB McGraw-Hill.

EE 212 (EE, CS, IT) ELECTRICAL MEASUREMENT AND INSTRUMENTS

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Ability to comprehend for the measurement of circuit quantities.

CO2 : Capacity to deal with minimization of errors in measurement.

CO3 : Capacity for understanding of most useful techniques in a particular case of measurement.

CO4 : Ability to understand electronic instruments and related losses.

Unit-I

Measuring Instruments: Principal of operation, construction detail, torque equation, scale shape, uses and error in Moving iron, Electrodynamics and in duction instruments for the measurement of voltage, current, power and energy.

Galvanometers: D'Arsonval, Vibration and Ballistic galvanometers, Dynamic equation of motion and its solution for various conditions, Relative damping, logarithmic decrement and galvanometer sensitivities.

Unit-II

Potentiometers: Theory of operation and construction of D.C. and A.C. potentiometers (polar and coordinate type), Their standardization and applications.

Measurement of Resistance: Methods of measurement of medium, low and high resistances, three and four terminal type resistance, Kelvin's double bridge, Price's guard wire and Loss of charge method.

Unit-III

A.C. Bridge: Four arm A.C. bridge for the measurement of inductance, capacitance, quality and dissipation factor. Screening, Wagner earthing.

Instrument Transformers: Theory and construction of current and potential transformers, Ratio and phase angle errors and their minimization, effects of variation of power factor, secondary burden and frequency on errors, Testing of CTs and PTs.

Unit-IV

Magnetic Measurement: Determination of B-H curve and hysteresis loop of ring and bar specimens, Measurement and separation of iron losses.

Electronic Instruments: Transistor voltmeter, TVM using FET in input stage, Digital voltmeter: Ramp type, integrated type, Measurement of time, phase and frequency using digital counters, Principal and working of cathode ray oscilloscope.

Wave analyzers: Frequency selective and heterodyne wave analyzers and its applications.

Practicals: Lab experiments based on theory.

Text Books/ References

1. A.K. Sawhney, Electrical & Electronic Measurement & Instrumentation, Dhanpat Rai & Co.
2. H.S. Kalsi, Electronic Instrumentation.
3. E.W. GoldinG, Electrical Measurements.

EC 219 (CS, IT) ANALOG ELECTRONICS

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

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

CO1 : To develop fundamental concepts of analog electronics.

CO2 : To enhance the knowledge of feedback concepts and their effects on amplifier performance.

CO3 : To master the basic ideas of power amplifiers and tuned amplifiers.

CO4 : To understand the concept of oscillator using positive feedback systems.

CO5 : To develop an knowledge of operational amplifier and various analog computation using operational amplifiers.

Unit – I

Response of Transistor Amplifier: Review of biasing, classification of amplifiers, distortion in amplifiers, frequency & phase response of an amplifier, cascaded amplifiers responses, transistors model at high frequencies for CE and Emitter follower configuration, high frequency response of two cascaded CE transistor stages.

Unit – II

Feedback Amplifier: Classification of amplifier, feedback concept, general characteristics of negative feedback amplifiers, analysis of a feedback amplifier, various types of feedback and their effects on amplifier performance.

Unit – III

Power Amplifiers: Class A large signal amplifier, second and higher harmonic distortion, transformer coupled amplifiers Efficiency of amplifiers, Push-pull amplifiers (Class A & Class B). *Tuned Amplifiers:* Single tuned

capacitively coupled amplifier & its steady state response determination of Gain, Band width product. Tapped tuned, inductivity coupled single tuned.

Unit – IV

Oscillator: Criteria of oscillations, sinusoidal oscillators, Hartley, Colpits, Wains bridge, Phase shift. General form of oscillators, crystal oscillator, frequency stability. *Operational Amplifiers*: Basic op-amp, differential amplifier, IC Op-amp & its characteristics, Linear applications of IC Op-amp, Inventor, Adder, Intergrator, Differentiator, Analog computation.

Practicals: Lab experiments based on theory.

Text Books/References

1. Millman & Halkias, Integrated Electronics, McGraw Hill publication.
2. Alley & Ahwood, Engineering Electronics, John Wiley & Sons Inc, Newyork London.

SECOND B.TECH. (IV SEMESTER)

BS 221 (EC, EE, ME, MI, IT) MATHEMATICS IV

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Solve Algebraic, Transcendental, And Differential Equations, and To Calculate Derivatives And Integrals.

CO2 : Expand any periodic function by Fourier series, in both exponential and sine- cosine forms.

CO3 : Solve Laplace, Wave and Heat conduction partial differential equations and apply them to their field.

CO4 : Distinguish Binomial, Poisson and Normal Distribution

CO5 : Correlate the given data and will be able to fit the curves using least square method

Unit-I

Fourier Series: Fourier series, even and odd functions; Half range series; Change of interval; Exponential form of Fourier series; Harmonic analysis.

Unit-II

Roots of Nonlinear (Algebraic and Transcendental) Equations: Bisection method, False position method, Newton Raphson method; Convergence of False position and Newton Raphson method. Complex roots of polynomials by Bairstow's method.

Unit-III

Partial Differential Equations: Classifications of partial differential equations; Method of separation of variables to solve Heat equation, Wave equation and Laplace's equations.

Unit-IV

Statistics: Correlation and regression; Principle of least square method and curve fitting.

Probability Distribution Functions: Random variable; Mathematical expectations; Moment generating functions; Discrete and continuous distribution functions; Binomial, Poisson and Normal distributions.

Text Books/References

1. J.L. Bansal and H.S. Dhami: Differential Equations (Vols.-II), Jaipur Publishing House, Jaipur (2005).
2. N.P. Bali and Manish Goyal: A Text book of Engineering Mathematics (VII Edition), Laxmi Publication Pvt. Ltd., New Delhi.
3. S.C. Gupta and V.K. Kapoor: Mathematical Statistics, Sultan Chand & Sons, New Delhi.

BS 222 (CS, IT) DISCRETE MATHEMATICAL STRUCTURE

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Know Permutation, Combinations & logical operations.

CO2 : Understand properties of relations & digraphs.

CO3 : Manipulate, represent the relation & digraphs on computer.

CO4 : Distinguish paths and circuits and about Boolean Alzebra.

CO5 : Know about group, semi groups, products and quotients of group.

Unit - I

Fundamentals: Sets & Subsets, operation on sets, sequence, division in the integers, Matrices, mathematical structures, Logic: proposition & logical operations, conditional statements, method of proof, mathematical induction, Counting: Permutation, Combinations, pigeonhole principle, elements of probability, recurrence relations.

Unit - II

Relations & Digraphs: Product sets and partitions, relation & digraphs, paths in relation & digraphs, properties of relations, equivalence relations, computer representation of relation & digraphs, manipulation of relations, transitive closure and Warshall's algorithm, *Functions*: Functions for computer science, permutation of functions, growth of functions.

Unit - III

Graphs, Eular paths & Circuits : Hamiltonian paths and circuits, coloring graphs, Relations & Structures: Partially ordered sets, extremal elements of partially ordered sets, lattices, finite Boolean algebras, Boolean functions as Boolean polynomials.

Unit - IV

Semigroups & groups: Binary operation, semigroups, products & quotients of semigroups, groups, products and quotients of group.

Texts Books/References

1. Koloman and Busby : Discrete Mathematical Structures, P.H.I, New Delhi.
2. Trembley Manohar : Discrete Mathematical Structure With Application to Computer Science, Tata McGraw Hill.
3. S. Lipschutz and N.L. Lipson: Discrete Mathematics, 2nd Edition, Tata Mc-Graw Hill Publication Co. Ltd.

IT 221 COMPUTER ORGANIZATION & ARCHITECTURE

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	1	0

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

CO1 : Understand and analyze registers and register transfers language and describe various arithmetic micro-operations.

CO2 : Understand and analyze CPU organization, instruction formats and different addressing modes.

CO3 : Demonstrate and analyze the applicability of Arithmetic and logic Algorithms for signed-unsigned numbers in addition to basic organization of Micro-Programmed Controller.

CO4 : Understand & analyze memory organization, different types of auxiliary memories, cache memory and Associative Memory usage and design.

CO5 : Understand the I/O organization and their interfacing with the processor.

CO6 : Understand the basic concept of SIMD, MIMD, array & pipelined architecture of processor design.

Unit- I

*Register Transfer Language:*Data Movement around registers, Data movement from/to memory arithmetic and logic micro operations. Concept of bus and timings in register transfer. *CPU Organisation:* Addressing Modes, Instruction Format, CPU organisation with large registers, stacks and handling of interuppts & subroutines Instruction pipelining.

Unit -II

Arithmetic Algorithm:Array multiplier Both's algorithm, Addition/subtraction for signed/unsigned number and 2's complement number. *Microprogrammed Control Unit:*Basic organization of micro programmed controller, Horizontal & Vertical formats, Address sequencer.

Unit -III

Memory Organization: Memory Technology: Types, performance, access modes. Random Access Memories: RAM Organization and Design. Auxiliary Memories: Access methods and Organization, Magnetic disk, tapes and Optical memories. Memories hierarchies. Associative Memory.

Unit -IV

Cache Memories: Organization and mapping. Principles of Virtual Memory, Segmentation and Paging. *I/O Organisation*:Introduction to Peripherals & theri interfacing. Strobe based and handshake based communication, DMA based transfer, I/O Processor. Introduction to SIMD, MIMD, Array processor and pipelined architecture.

Text Books/References

1. J.P. Hayer-Computer Architecture & Organization, Mc-Graw Hill.
2. Heuring-Computer System Design and Architecture, Pearson Education.
3. M.Morrismanno-Computer System Architecture Prentice Hall of India.
4. Bartee-Computer Architecture, Tata Mc-Graw Hill.
5. Stallings-Computer Organization and Architecture Pearson Education.

IT 222 MICROPROCESSORS & INTERFACING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Demonstrate the architecture and instruction sets of 8085, 8086 microprocessor and 8051 microcontroller.

CO2 : Understand the i/o organization and their interfacing with the processor.

CO3 : Understand and analyze addressing modes, instruction set and timing diagram of different processor.

CO4 : Demonstrate the architecture and functioning of various peripheral devices and communication buses

CO5 : Demonstrate and compare the architecture and organization of various semiconductor memories such as SRAM, DRAM, and EPROM etc. with their operation.

CO6 : Analyze a given arithmetic and logic problem and design its corresponding assembly language solution.

Unit- I

Introduction of microprocessors: 8085 microprocessor: Block diagram, pins and their function, demultiplexing of bushes, control signals and flags. Introduction to 8085 based microcomputer system. Instructions and Timings: Instruction format, Instruction classification, addressing modes, Instruction set, and timing diagram. 8086 and 8088: Pin diagram and internal architecture.

Unit -II

Assembly Language and Programming in 8085: Instruction set, Program structures (sequential, conditional, iterative), Macros and subroutines, Stack, Counter and timing delay, interrupt structure and its programming.

Unit -III

Devices and Interfacing: Interfacing of Memory and I/O Devices, Architecture characteristics and interfacing to 8085: DMA controller 8257, interrupt Controller 8259A, USART 8251, PPI 8255, timer 8254 (8253) and keyboard display controller 8279.

Unit -IV

Programming and operation of 8254 (8253) and PPI 8255, ADC and DAC interfacing with 8085 miroprocessor, Level Converters MC 1488 and MC 1489. Communication buses : Centronics. IEEE 488, Current loop, RS 232 C, RS 422 A & RS 423 A. *Introduction to 8051 Microcontroller*: Architecture and Programming Model, Interrupt System and Instruction set.

Practicals: Lab experiments based on theory

Text Books/References

1. M.K. Gupta "Microprocessor Microcomputer, Microcontroller and Interfacing" Paragoan International Publishers, New Delhi.
2. R. Gaonkar "Microprocessor architecture, Programming and Applications, Wiely Eastern Ltd.
3. B. Ram - Fundamentals of Microprocessors & Micro Computers, Dhanpat Rai Pub.

IT 223 OBJECT ORIENTED PROGRAMMING

Cr. Hrs. 5 (3 + 2)

	L	T	P
Credit	3	0	2
Hours	3	0	4

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

CO1 : Decompose computing problems into classes, objects and functions for implementing OOPs concepts.

CO2 : Design, develop and analyze C++ programs with various concepts and constructs of OOP such as constructors, destructors, polymorphism, inheritance etc.

CO3 : Apply various advance features of C++ such as exception handling, templates, I/O streams etc. for making the program more organized, reusable and user-friendly.

CO4 : Analyze a given programming problem and design its corresponding object-oriented programming solutions.

Unit -I

Object-oriented programming: encapsulation, polymorphism, inheritance, namespaces, header files; *class & objects* : structures, classes, unions, anonymous unions, friend function, inline function, parameterized constructors, static data members and static member functions, scope resolution operator, passing objects to functions, returning objects, object assignment.

Unit - II

Arrays, pointer, references & dynamic allocation in C++ : array of objects, pointer to objects, this pointer, reference parameters, passing references to objects, returning references, independent references, C++ dynamic allocation operators; *Function overloading*: overloading function, overloading constructor functions, copy constructors, default arguments, function overloading & ambiguity; *operator overloading*: member operator functions, operator overloading using a friend function, overloading new & delete.

Unit -III

Inheritance: Base-Class access control, inheritance and protected members, inheriting from multiple base classes, execution of constructors & destructors in inheritance, passing parameters to Base-

Class Constructors, virtual Base classes; *Virtual functions & polymorphism*: calling a virtual function through a Base Class, hierarchical virtual functions, pure virtual functions & Abstract classes; *C++ I/O*: C++ streams, formatted I/O, formatting I/O using manipulators, overloading << & >>.

Unit -IV

Templates: generic functions, overloading function template, template classes, using default arguments with template classes, explicit class specializations; *Exception Handling*: catching class types, using multiple catch statements, handling derived class exceptions, restricting exceptions, rethrowing an exception; *C++ File I/O* : fstream & file classes, opening, closing, reading & writing text files, unformatted and Binary I/O, detecting EOF, random access of file; *Introduction to java*: advantages of java, java virtual machine, java byte code, importance of java in internet.

Practicals: Lab experiments based on theory

Text Books/References

1. Herbert Schildt, The Complete Reference C++, Tata McGraw-Hill.
2. Robert Lafore, Object Oriented Programming with C++, Techmedia Publications
3. Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley, Third Edition.

EC 228 (CS, IT) COMMUNICATION SYSTEMS

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	1	0

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

CO1 : Understand the fundamental concepts of communication systems.

CO2 : Understand and compare different analog modulation schemes.

CO3 : Understand and compare different digital modulation schemes.

CO4 : Understand the design tradeoffs and performance of communications systems.

CO5 : Learn about practical communication systems

Unit - I

Modulation of Signals: Principles of Analog modulation techniques like FM, PM, SSB, Generation and Detection) Block schematics only). Frequency Division Multiplexing and Time Division Multiplexing. *Pulse Modulation:* Pulse transmission over Band limited signals, sampling theory, PAM, DYE diagram.

Unit - II

Digital Communication: PCM, DPCM, DM ADM, comparison of the above on the basis of criteria such as bit transmission, signaling rate, error probability, S/N ration, bandwidth requirement. *Digital Modulation Techniques:* Data transmission such as PSK, FSK, QPSK (QAM) MSK, Inter system comparison.

Unit - III

Coding for communications: Information theory, Capacity, Shannon's theorem, Source coding error control coding Error detection and correction, Block codes, Cyclic coder, Line code, Channel throughput and efficiency.

Modem: Principles of modems, function operation. Short and long modems Digital modems, multiplexers, and concentrators.

Unit - IV

Broad View of Communication Channel: Transmission Line, Primary and secondary line constant, telephone line and cables, Public switch telephone network (Electronics). *Fiber Optic Communication*: Principles of light communication in fiber, losses in fiber, dispersion, light sores and detectors. Satellite Communications Orbits, satellite altitude, multiple access method.

Text Books/References

1. Lathi B.P., Modern Digital Communication, Oxford.
2. Tube and Schilling, Introduction to Communication system, McGraw Hill.
3. Coolen R, Electronic Communication, PHI.

THIRD YEAR B. TECH. (V SEMESTER)

IT 311 APPLICATION OF GRAPH THEORY

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Analyze and understand the fundamental concepts of Graph Theory, Eularian and Hamiltonian graphs.

CO2 : Apply and analyze the use of various trees, data structures along with its challenges, issues and applicability.

CO3 : Understand and analyze the applicability of various planar graphs, directed graphs and weighted graphs along with their properties and representations.

CO4 : Understand and analyze various coloring, covering and partitioning problems along with their applicability and representation.

Unit - I

Graph: Application of Graph, Finite and Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex and Null Graph; Paths and Circuits: Isomorphism, Subgraphs, Walks, Paths and Circuits, Connected Graphs, Disconnected Graphs and Components, Eular Graphs, Operations on Graphs, Hamiltonian Paths and Circuits, Traveling Salesman Problem.

Unit - II

Trees and Fundamentals Circuits: Properties of Trees, Pendent Vertices in a Tree, Distance and Centers in a Tree, Rooted and Binary Trees, On Counting Trees, Spanning Trees, Fundamentals Circuits, Finding All Spanning Trees of a Graph, Spanning Trees in a Weighted Graph; Cut – Sets and Cut – Vertices: Cut – Sets, Properties of Cut – Sets, Cut – Sets in a Graph, Fundamental Circuits and Cut – Sets, Connectivity and Separability, Network Flows, 1- Isomorphism, 2-Isomorphism.

Unit -III

Planer and Dual Graphs: Planer Graphs, Kuratowski's Two Graphs, Different representation of a Planner Graph, Detection of Planarity, Geometric Dual, Combinatorial Dual; Matrix Representation of Graphs: Incidence Matrix, Circuit Matrix, Cut–Set Matrix, Path Matrix, Adjacency Matrix.

Unit - IV

Coloring, Covering and Partitioning: Chromatic Number, Chromatic Partitioning, Chromatic Polynomial, Matching, Covering, The Four Color Problem; Directed Graph: Types of Digraphs, Binary Relation, Eular

Digraphs, Trees with Directed Edges, Fundamental Circuits in Digraphs, Adjency Matrix of a Digraph, Acyclic Digraph and Decyclization

Texts Books/References

1. Narsingh Deo : Graph Theory, Prentice- hall of India Pvt. Ltd.
2. Rogers : Procedural Elements of Computer Graphics, McGraw Hill
3. Asthana, Sinha : Computer Graphics, Addison Wesley

IT 312 LANGUAGE TRANSLATOR & COMPILER

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze different translators like compiler, interpreter, assembler and structure of compiler consisting various phases.

CO2 : Understand and apply the knowledge of patterns, tokens, lexemes and regular expressions to design lexical analyzer.

CO3 : Understand context free grammar, apply the top-down and bottom-up approaches to design various types of parsing like operator precedence, LR parsers.

CO4 : Analyze the translations on syntax directed definitions and evaluate the S-attributed, L-attributed definitions and inherited attributes.

CO5 : Understand various intermediate languages and implement intermediate code generator.

CO6 : Understand the use of symbol table and various code optimization techniques to improve the performance of code in terms of speed and space

Unit – I

Translators and Compiler: Translator requirement, translator as interpreter, assembler, preprocessor, compiler structure, Cousins of Compiler; *Finite Automata*: Regular expression, finite automata, conversion from regular expression to finite automata, Minimizating number of states of DFA; *Lexical Analysis*: Role of Lexical Analyzer, Detection & recovery of lexical phase errors, Input buffering.

Unit – II

Syntax Analysis: The role of Parser, Context – free grammars, Writing a Grammar, syntactic–phase error detection and recovery; *Parsing Techniques:* Top down parsing, Bottom up parsing, operator-precedence

parsing, LR parsers- SLR parsing Tables, Canonical LR parsing tables, LALR parsing Tables, Using Ambiguous Grammars, parser generators.

Unit – III

Syntax Directed Translation: Syntax Direction Definition, S-attributed and L-attributed definition, *Type Checking*: Introduction to Type Checking, Type systems, Semantic errors; *Intermediate Code Generation*: Intermediate Language, Declaration, Assignment Statement, Boolean Expressions, Case Statements, Procedure Calls.

Unit – IV

Symbol Table: Symbol Table Entries, Data structure, Hash table, Representing scope information; *Code Optimization*: Sources of Optimization, Optimization of basic blocks, Loops in flow graphs. *Code Generation*: Design of code generator, Target machine, Basic blocks & flow graph, Register Allocation & assignment, Generating code from DAG, peephole Optimization.

Practicals: Lab experiments based on theory

Text Books / References

1. Alfered V. Aho, Ravi Sethi, Jeffrey D. Ullman, Compilers Principles, Techniques, and Tools, by, Addison-Wesley Longman.

IT 313 COMPUTER NETWORK AND INTERNET

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand OSI and TCP/IP layered models of computer network and along with various LAN topologies.

CO2 : Understand and analyze various wired and wireless Transmission media used in physical layer of computer network.

CO3 : Analyze and implement error detecting and correcting codes and understand Elementary Data link Layer Protocol.

CO4 : Analyze and Implement various routing algorithms, congestion control and quality of service techniques of network layer.

CO5 : Analyze and understand various functions of transport layer for connectionless (UDP) and connection-oriented (TCP) communication.

CO6 : Analyze the features and operations of various application layer protocols such as DNS, POP3, SMTP and IMAP.

Unit -I

*Physical Layer:*The theoretical basis for data communication: Fourier analysis, Bandwidth Limited signal, The maximum data rate of a channel; Guided Transmission Media: Magnetic Media, Twisted Pair, Coaxial Cable, Fiber Optics; Wireless Transmission: The electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared and Millimeter, Lightwave Transmission,; Communication Satellites: Geostationary Satellites, Medium earth orbit satellites, Low earth orbit satellites, Satellites versus Fiber.

Unit -II

Data Link Layer: Service provided to the Network layer, Framing, Error Control, Flow Control; Error Detection and Correction, Error correcting codes, Error detecting codes; Elementary data link protocols: An Unrestricted Simplex protocol, A Simplex Stop and Wait Protocol, A simplex protocol for a noisy channel; Sliding Window protocol: A one bit Sliding window protocol, A protocol using Go Back N, A protocol using selective Repeat; Example Data Link Protocols: HDLC- High Level Data Link Control, The Data Link Layer in the Internet.

Unit -III

Network layer: Routing principles. Link State routing Algorithm, A distant Vector routing & OSPF algorithm, Internetworking: Concatenated Virtual Circuits, Connectionless Internetworking, and Techniques for Achieving Good Quality of Service: Leaky and Token Bucket Algorithms. Tunneling, Internetwork Routing, Fragmentation. Network layer in the Internet: IP protocol, IP Addresses, Internet Control Protocols.

Unit -IV

The Transport Layer: Transport services, Elements of Transport Protocols, The Internet Transport Protocols: User Datagram Protocol (UDP) and Transmission Control Protocol (TCP). *The Application Layer:* DNS-Domain name system, Electronics Mail: Architecture and service, Message Transfer: Simple Mail Transfer Protocol (SMTP), Final Delivery: POP3, Intermessage Message Access Protocol (IMAP).

Practicals: Lab experiments based on theory.

Text Books/References

1. J.F. Kurose and K.W. Ross-Computer Networking Pearson Education Asia.
2. B.A. Forouzan-Data Communications and Networking, Tata McGraw Hill.
3. Garcia and Widjaja-Communication Networks, Tata McWraw Hill.

IT 314 MANAGEMENT INFORMATION SYSTEM

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	1	0

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

CO1 : Identify and understand the nature of MIS in an organization.

CO2 : Understand and address the issue of information requirement, information collection and decidability.

CO3 : Identify types of MIS systems and ability to reduce complexity of systems.

CO4 : Identify the master data in Personnel, Finance, Production, Material and Marketing.

CO5 : Understand the steps for implementation of Enterprise Resource Planning (ERP).

Unit- I

*Introduction:*MIS concept, Definition, role & Impact of MIS, Process of management, organization structure & behaviour. *Basic of Management Information System:*Decision Making, Information concepts, System concepts & control Types of system handling system complexity System development model.

Unit -II

Development of Management Information System:Requirement and implementation of MIS, Choice of information Technology for Management Information System.

Unit -III

Application of Management Information system: Application in manufacturing sector using for personal management, Financial management, Production Management, Material Management, Marketing Management Application in Service Sector.

Unit -IV

Enterprise Resource Planning (ERP): EMS, ERP, Benefits implementation, EMS & MIS. E-Business Security and control : Threat of accidents and Malfunctions, Threat of Computer Crime, Factors that increase the Risks, Methods of Minimizing Risk..

Text Books/References

1. W.S. Jawadekar-Management Information System, Tata McGraw Hill.
2. Loudon & Loudon-Management Information, Pearson Education Asia.
3. Steven Alter-Information Systems, Pearson Education Asia.

IT 315 DESIGN & PRINCIPLES OF OPERATING SYSTEM

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze the significance and basic architecture of operating systems.

CO2 : Understand and analyze the various processor management issues and challenges of operating system such as process synchronization, concurrency and deadlocks.

CO3 : Understand and analyze the various memory management issues and challenges including virtual memory management, paging, segmentation and thrashing.

CO4 : Understand and analyze the various file system management, I/O management, secondary storage management issues and challenges in an operating system.

CO5 : Design, evaluate and write various C programs to exhibit the use of various available system calls in the Linux operating system.

Unit –I

Introduction of OS : Significance of operating system, Batch systems, multiprogrammed & time sharing systems, storage structure & storage hierarchy, system calls, system programs, process scheduling, operation on processes, cooperating processes, scheduling criteria, scheduling algorithms.

Unit - II

Process Synchronizations: critical section problem, synchronization hardware, Semaphores, classical problems of synchronization, Monitors. Atomic transactions; *Deadlocks*: characterization, Handling, Prevention, Avoidance and Detection, Deadlock Recovery.

Unit – III

Memory Management: logical versus physical Address spaces, Swapping, Contiguous Allocation, Paging, *Virtual Memory*: Demand Paging, performance of demand paging, Page Replacement algorithms, allocation of frames, thrashing, Input-output Hardware, Application I/O Interface, Kernel I/O Subsystem, transforming I/O requests to hardware

operations. *File System Implementation*: File System Structure, Allocation Methods, Free space Management, Directory Implementation, Efficiency and Performance, Recovery.

Unit – IV

File System: File concepts, access methods, directory structure, File System Structure, Allocation Methods, Free space Management, Directory Implementation. *Secondary Storage Structure*: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability, Stable Storage Implementation. *Introduction of Distributed System*: topology, network types, design issues.

Text Books/References

1. Abraham Silerschatz and Peter Baer Galvin, Operating System Concepts, 6th Ed, John Wiley & Sons
2. Dhamdhere D.M., System Programming and Operating System, Tata Mcgrawhill, New Delhi

EC 317 (IT) INFORMATION THEORY & CODING

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	1	0

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

CO1 : To develop fundamental ideas of information theory.

CO2 : To enhance knowledge of probabilities, entropy, measurement of information.

CO3 : To master the basic ideas behind the Shannon Channel Capacity results.

CO4 : TO apply linear block codes for error detection and correction.

CO5 : To obtain an understanding of theoretical principals of source coding.

CO6 : To apply convolution codes for performance analysis & cyclic codes for error detection and correction.

Unit – I

Elements of Information Theory: Meausre of Information, Average Information, Entropy, Information rate. Communication channel, Descrete and continuous channel Shannon-Hartley theorem and its implications. Channel capacity, Gaussian channel, Bandwidth-S/N tradeoff.

Unit – II

Introduction of Coding: Types of effors, Types of codes, Error control coding, Methods of controlling errors.

Unit – III

Linear Block and Binary Cyclic Codes: Matrix decryption of linear block codes, Error detection and error correction capabilities of linear block codes. Hamming codes, structure of cyclic codes, encoding using an (n-k) bit shift register syndrome calculation, its error detection & correction, Special classes of cyclic codes BCH.

Unit – IV

Burst and Convolutional Codes: Burst and random error correcting codes, Encoders for convolutional codes. Decoders for convolutional codes, Performance of convolutional codes, performance of block codes in error correction & detection. Comparison of error rates in coded and uncoded transmission.

Text Books/References

1. K. Sam Shanmugam-"Digital and Analog Communication System", John Wiley Sons.
2. Herport Taub, Donald L. Schilling-"Principal of Communication System", Tata Mc-Graw Hill.

THIRDYEAR B.TECH. (VI SEMESTER)

IT 321 DATA MODELING AND DESIGN

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Demonstrate the functional components of the DBMS and design E-R model of database management systems.

CO2 : Design and Implement database schema using DDL, DML, DCL and TCL commands.

CO3 : Demonstrate and apply SQL to customize database operations along with the use of JDBC and ODBC for Client-Server database architectures.

CO4 : Demonstrate and apply normalization to the database through various case studies. Understand the concepts of triggers and security in database.

CO5 : Design and implement query processing and optimization techniques, backup and recovery features of database management software.

Unit- I

Applications, database system and file system, view, models, database languages, transaction management, system structure, users, *Data models:* Entity relationship model: concepts, constraints, keys, design issues, ERD, weak entity, ER symbols, ER-schema to tables

Unit -II

Relational algebra: Structure, tuple relational calculus, domain relational calculus. *Relational databases:* structured Query language-structure, set operation, aggregate functions, Null values, nested sub queries, views, complex queries, joined relations, DDL, DML, database modification, embedded structured query language, Dynamic structured query language.

Unit -III

Database Integrity and Security: domain constraints, referential integrity, assertions, triggers. *Relational Database design*: First Normal Form, Functional Dependencies, Decomposition-properties, Second Normal

Form, Third Normal Form, Boyce-codd Normal Form, Fourth Normal Form, more normal form, design process.

Unit -IV

Object relational Databases: Nested relations, complex types, inheritance, reference types, query with complex types, functions and procedure, object oriented and object relational. Introduction to object oriented database. Query Processing and Optimization Physical Database Design in Relational Databases, concepts of Database Tuning in Relational Systems.

Practicals: Lab experiments based on theory

Text Books/References

1. Silberschatz, Korth, Sudarshan, Database Systems Concepts, 4th ed, International Ed,McgrawHill.
2. Ramez Elmasri and Shamkant Navathe, Fundamentals of Database Systems 4th Ed,Pearson Education.

IT 322 COMPUTER ALGORITHMS

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze computing complexity of computer algorithm using various mathematical notations especially Big O notation.

CO2 : Design, analyze and apply various popular randomized algorithms, hashing techniques, various tree based data structures and order statistics along with their associated computational complexity.

CO3 : Design, analyze and apply various algorithm designing techniques such as binomial heaps, dynamic programming and linear programming along with their associated computational complexity.

CO4 : Design, analyze and apply various popular approximation algorithms and graph algorithms with their associated computational complexity.

Unit -I

Algorithms concepts, analysis, design, asymptotic notations, recurrences-substitution method, recursion tree method, master method. Probabilistic analysis and randomized algorithms: hiring problem, indicator random variables, randomized algorithms.

Unit -II

Data structures: Hash tables, direct –address tables, hash tables, functions, open addressing. Binary search trees-definition, querying, insertion, deletion, red-black trees: properties, rotation, insertion, deletion. *Order statistics:* Heap sort, quick sort, sorting in linear time, median and order static's

Unit -III

Binomial heaps: binomial trees, binomial heaps, operation. *Advanced Design and analysis technique:* dynamic programming: elements, assembly line scheduling, matrix-chain multiplication, longest common subsequence. *Linear Programming*: standard and slack forms, formulating problems as linear programs, simplex algorithm.

Unit -IV

Approximation algorithm: vertex-cover problem, set covering problem, Floyd-warshall algorithm. graph algorithms, BFS, DFS, topological sort, minimum spanning trees, kruskal and prim algorithm, single source shorted paths-Bellman Ford algorithm, dijkstra's algorithm

Practicals: Lab experiments based on theory

Texts Books/References

1. Rivest and Cormen, Introduction to Algorithms, Prentice Hall India.
2. Aho Alfred V., John E. Hopcroft and Jeffrey D. Ullman, Design and Analysis of Algorithms, Pearson Education.
3. Baase, Computer Algorithms, Pearson Education

IT 323 INTERNET PROGRAMMING IN JAVA

Cr. Hr 5 (3 + 2)

	L	T	P
Credit	3	0	2
Hours	3	0	4

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

CO1 : Understand fundamentals of OOPs in Java including classes, variables, data types, operators, JVM and Java byte code.

CO2 : Understand and implement the object oriented concepts in Java such as inheritance, abstract class, interface and package.

CO3 : Understand and implement exception handling and multithreading in Java.

CO4 : Understand and implement I/O functionality to read from and write to files, creating event-driven GUI using applets, AWT and swing components.

Unit - I

Advantages of java, java virtual machine, java byte code, encapsulation, polymorphism, abstraction, data types, variables & arrays, arithmetic operators, bitwise operators, relational operators, Boolean logical operators, assignment operators? Operator, operator precedence, control statements, Objects and Classes.

Unit - II

Inheritance: member access & inheritance, creating multilevel hierarchy, method overriding, dynamic method dispatch, Abstract classes, using final with inheritance; *packages & interfaces* : packages, access protection, importing packages, interfaces

Unit - III

Exception handling : exception types, uncaught exceptions, using try & catch, multiple catch clauses, nested try statements, throw, throws, finally, java's built-in exception, creating your own exception subclasses, *multithreaded* programming: java thr ad model, thread priorities, synchronization, creating a thread, creating multiple threads, synchronization, interthread communication, deadlock.

Unit – IV

Java I/O classes & interfaces, file, stream classes, byte streams, character streams, stream I/O, serialization; Applets, event handling, AWT, introduction to Swing.

Practicals: Lab experiments based on theory

Text Books/References

1. Horstmann Cornell, Core Jawa Vol 1 & 2, Sun Publication, Pearson Education.

2. Herbert Schildt, Jawa 2: The complete Reference, Tata MCgraw Hill.

IT 324 COMPUTER GRAPHICS

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand the role of computer graphics, different graphics systems and their applications.

CO2 : Understand and implement various algorithms for scan conversion and filling of basic objects.

CO3 : Demonstrate and implement different basic geometric transformation including composite transformation techniques on graphical objects.

CO4 : Understand and analyze various three dimensional geometric and modeling transformations.

CO5 : Demonstrate and implement clipping and view-ports object representation for images.

Unit – I

Video Display Devices: Refresh cathode-ray tubes, Raster-Scan Displays, Random-Scan Displays, Color CRT Monitors, Direct-View Storage Tubes, Flat-Panel Displays, Three-Dimensional Viewing Devices. Raster-Scan Systems: Video Controllers, Raster-Scan Display

Processors, Random- Scan Systems, Graphics Monitors and Workstations. *Input Devices*: like Keyboards, Mouse, Trackball and Spaceball, Joysticks, Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems, Hard-Copy Devices. Graphics software.

Unit – II

Output Primitives: Points and lines, line-drawing algorithms, DDA algorithms, Bresenham's line algorithms, parallel line algorithms, loading the frame buffer, line function, circle-generating algorithms: properties of circles, midpoint circle algorithms, ellipse-generating algorithms, properties of ellipse, midpoint ellipse algorithms. Pixel addressing and object geometry, filled-area primitives: boundary-fill algorithms, flood-fill algorithms. Character generation.

Unit – III

Attributes of Output Primitives: Line, curve attributes color and grayscale levels, area-fill, character attributes. Bundled Attributes, enquiry functions. *Two-Dimensional Geometric Transformations:* Basic Transformations: Translation, Rotation, Scaling. Matrix Representations and Homogeneous Coordinates, Composite Transformations: Translations, Rotations, Scaling. Reflection, Shear. *Three-Dimensional Geometric and Modeling Transformations:* Translation, rotation, scaling, reflections, modeling and coordinate transformations.

Unit – IV

Two-Dimensional Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two-Dimensional Viewing Functions, Clipping Operations, Point Clipping,Line Clipping:Cohen-Sutherland Line Clipping, Liang-Barsky Line Clipping, Nicholl-Lee-Nicholl Line Clipping, Line Clipping using Nonrectangular Clip Windows, Splitting Concave Polygons. Polygon Clipping.

Practicals: Lab experiments based on theory

Texts Books/References

1. D. Hearn and M.P. Baker, Computer Graphics: C Version, 2nd Ed, Pearson Education
2. James D. Foley; Andries Van Dam; Steven K. Feiner; John F. Hughes, Interactive Computer Graphics, Addison Wesley

CS 326 (CS, IT) SOFTWARE ENGINEERING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credits	3	0	1
Hours	3	0	2

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

CO1 : Understand different views of software process, process models including difference between prescriptive and agile process.

CO2 : Understand, analyse and design methods with an emphasis on object oriented technique, UML modeling, pattern based design and design for web application.

CO3 : Understand and evaluate procedures, technique and methods to assess software quality (SQA), review software engineering work products, and apply an effective testing strategy.

CO4 : Understand and apply relevant software management skills to plan, manage and control a software development project.

Unit -I

Software Engineering, Software process, Introduction to CMM. Software process models – Waterfall model, Incremental, prototyping, RAD, Spiral, concurrent development, Component based development. Introduction to Unified and Agile Process.

Requirement Engineering: requirement engineering tasks, requirement engineering process, eliciting requirements, requirement analysis and documentation, validating requirements. Analysis modeling – approaches, data modeling, use cases, activity diagram, swimlane diagrams, Data Flow Diagrams, class diagrams, CRC modeling, behavioral modeling.

Unit - II

Design Engineering: concepts, architecture, patterns, modularity, information hiding, functional independence, refinement. Pattern based software design, Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design, Mapping Data Flow into Software Architecture. Modeling component level design, class based components, design guidelines, cohesion, coupling,

Unit - III

Software Project Management concepts: The management spectrum, People, product, process, project, W^5HH principles. Software Process and Project Metrics: software measurements and metrics, metrics for software quality. Software project planning: Observations on estimating, Project planning objectives, Software scope, Resources, Software project estimation, Decomposition techniques, Empirical estimation models, COCOMO Model, Software equation, The Make buy decision, Automated estimation tools. Project Scheduling: concepts, task sets, defining task network, tracking the schedule, earned value analysis. Risk Management: Software risks, risk identification, projection, mitigation, monitoring and management.

Unit - IV

Software Configuration Management: Baseline, Configuration items, SCM Process. Identification of objects in the software configuration. Version control, Change control, configuration Audit, Status Reporting, SCM Standards. Software Quality Assurance: Quality concepts, Quality movement, Software quality assurance, software reviews, Formal technical reviews, Formal approaches to SQA, Statistical software quality Assurance, Software reliability, the ISO 9000 Quality Standards, The SQA plan.

Software Testing: Software Testing Fundamentals, Black box and white box testing, object oriented testing methods, testing documentation, testing patterns.

Practicals: Lab experiments based on theory

Text Books/References

1. Roger S. Pressman, Software Engineering, 6th ed, Mcgraw Hill.
2. Jalote Pankaj, An Integrated approach to software Engineering, 3rd ed., Narosa Publishing House, New Delhi.

EC 328 (IT) WIRELESS COMMUNICATION

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand the cellular wireless network and various generations of cellular revolutions.

CO2 : Understand various IEEE standards of cordless and wireless local loops and their access protocol.

CO3 : Understand the structure of satellite system and broad casting system including audio & video.

CO4 : Understand IEEE standards of WLAN and HIPER LAN, their access control, networking and security.

Unit -I

*Introduction:*Cellular revolution, Global Cellular Network, Broad band and trouldes with *wireless. Cellular Wireless networks:*Principles of Cellular networks, First generation analog Second generation TDMA and Third generation systems.

Unit -II

*Cordless Systems And Wireless Local Loops:*Cordless systems, Wireless local loop and IEEE 802. 16 Fixed Broadband Wireless Access standard. *Mobile Ip and Wireless Access Protocol:*Mobile IP, Wirelss Application Protocol, Internet Control Message Protocol and Message Authentication.

Unit -III

*Satellite Systems:*Application Basics-GEO, LEO and MEO Introduction to Mobile Satcom. routing, Localization and Handove. *Broad Cast*

*Systems:*Overview, Cyclic repetition of data, Digital audio broadcasting-mobile object transfer protocol. Digital video broadcasting.

Unit -IV

*Wireless Lan:*Infrared vs radio transmission, Infrastructure and ad hoc networks, IEEE 802. 11-System architecture, protocol architecture, Physical layer, Medium access control lyaer and MAC management. HIPER LAN-protocal architecture, physical layer channel access control sublayer, information bases and networking. Bluetooth-User scenarious, Physical layer, MAC Layer, Networking, Security and Link Management.

Text Books/References

1. William Stallings, Wireless Communications and Networks, Pearson Education.
2. John Schiller, Mobile Communications, Pearson Education.
3. Sandeep Singhal and Thomas Bridgman, The Wireless Application Protocol, Pearson Education.
4. Millman C.Y. Lee, Mobile Cellular Telecom.
5. T.S. Rappaport, Wireless Communications, Principles & Practices.

FOURTH YEAR B.TECH. (VII SEMESTER)

IT 411 ADVANCE DATA STRUCTURE

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Implement and analyze the structure and operations of advanced data structures such as BST, height-and-depth balanced trees m-way trees etc.

CO2 : Implement and analyze disjoint set union/find data structure and its applications and to find optimal solution for flow-cut problems.

CO3 : Evaluate the performance of number-theoretic algorithms for large set of input data and to find its applicability in cryptographic schemes that rely on large prime numbers.

CO4 : Analyze different computational geometrical 2D-planar problems which can be applied in graphics, VLSI, statistics regions etc.

CO5 : Design and evaluate parallel algorithms operating on different principles for searching, sorting, merging and list ranking.

Unit I

Advanced trees (properties, insertion, and deletion): 2-4 tree, Avl tree, red black tree, splay tree, Huffman trees. Operations on Disjoint sets and its union-find problem Implementing Sets.

Unit II

Number theoretic algorithm: Number theoretic notation, Division theorem, GCD recursion, Modular arithmetic, Solving Linear equation, Chinese remainder theorem, power of an element, RSA public key Crypto system, primarily Testing and Integer Factorization.

Unit III

Geometric algorithms: Point location, finding the closest pair of points, convex hulls. *Graph algorithms:* Flows and cuts, maximum flow- Ford Fulkerson, maximum bipartite matching.

Unit IV

Parallel algorithms: Basic techniques for sorting, searching, merging, list ranking in PRAMs. *Sorting Networks:* Comparison network, zero-one principle, bitonic sorting and merging network sorter.

Practicals: Lab experiments based on theory.

Text Books/References

1. Thomas H. Cormen. Introduction to algorithms, PHI.
2. Michael T. Goodrich, Roberto Tamassia. Algorithm Design: Foundation, Analysis and Internet Examples, Wiley Publication.

IT 412 MULTIMEDIA TECHNOLOGY & APPLICATION

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze various multimedia attributes such as medium, data streams, QoS, video on demand and internet and multimedia.

CO2 : Understand various optical storage technologies.

CO3 : Understand and apply technologies involved in video and animation and data compression techniques required for sound/audio, image and graphics along with their associated popular formats.

CO4 : Understand and apply multimedia communication across the computer network.

CO5 : Understand and analyze technologies involved in video encoding, inter frame coding, diffserv for video along with legacy packet markers.

Unit- I

Introduction: Media and Data Steams: Medium, Properties of Multimedia, Data stream characteristics of continuous media, Information units, Development of Video on Demand System, Internet Protocol . QoS Fundamentals, QoS parameters.

Unit -II

Optical storage media: CD-ROM Technology, Compact disk digital audio, CDROM blocks, Modes, Sound / *Audio:* Audio formats, MIDI, Speech. *Image and graphics:* Image format, Graphics format, computer Image Processing. *Video and Animation:* Basic concepts, Computer-Based Animation, Data Compression: JPEG, MPEG, H.26X, DVI.

Unit -III

Multimedia Communication Systems: Session management, Transport subsystem: User and application requirements, Transport layer: TCP, UDP, RTP, RCTP, XTP, stream protocol, Quality of service and resource management. The IPv4 ToS octet, Integrated Service (IntServ), Differentiate Services (DiffServ), VoD Service System over DiffServe.

Unit -IV

Video Representation, YUV Representation, Video Hierarchy, Video Encoding, DCT-Based Video Encoding, Inter-frame Coding: Motion Estimation and Compensation, Scalable Video Encoding, MPEG Frames, Group of Pictures (GOP), MPEG Video Coding Standards, MPEG-4 Video Transmission over IP. DiffServ Video: Differentiated Service Scheme for MPEG Video Streams, Diffserv Architecture, DiffServ Model, Legacy Packet Markers: Marking Schemes Based on Token Bucket, Scheduling and Queuing Management system.

Practicals: Lab experiments based on theory

Text Books/References

1. Ralf Steinmetx & Klara Nahrstedt-Multimedia:computing, Communication & Applications, Pearson Education Inc.
2. Prabhat K. Andleigh-Multimedia System Design, Prentic Hall, Kiran Thakrar.

IT 413 INFORMATION & TRANSACTION MANAGEMENT

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understanding the physical file structure and access methods used in database systems.

CO2 : Understand and analyse the various issues and challenges pertaining to concurrency control and transaction management

CO3 : Understand the importance of Data warehousing and Data mining in large databases.

CO4 : Understand the various challenges and issues pertaining to Data recovery.

CO5 : Understand the fundamentals of information retrieval and application development administration.

Unit -I

Storage and File structure: file organization, records in File, RAID, Data-Dictionary. *Indexing and Hashing*: ordered indexes, B+ tree, static hashing , dynamic hashing, multiple key access.

Unit -II

Concurrency Control & Transaction: transaction state, atomicity, durability, concurrent execution, serializability, isolation, recoverability, Lock based, timestamp based & validation based concurrency control, multiple granularity, deadlock handling.

Unit -III

Data analysis: decision support system, OLAP, warehousing & mining; *Recovery System*: failure classification, storage structure, recovery & atomicity, log-based recovery, recovery & concurrent transaction, buffer management;

Unit -IV

Information Retrieval: ranking using terms, hyperlinks, synonyms, homonyms, ontologism, document indexing, retrieval effectiveness, web search engines, retrieval & structured data, directories; *Application Development Administration*: web interfaces, performance tuning, benchmarks, standardization. Advanced Querying and Information Retrieval: decision support system, data analysis, OLAP, data mining, information retrieval system, advanced data types

Practicals: Lab experiments based on theory

Text Books/References

1. Silberschatz, Korth, Sudarshan, Database Systems Concepts, 4th ed, International Ed, McgrawHill.
2. Ramez Elmasri and Shamkant Navathe, Fundamentals of Database Systems 4th Ed, Pearson Education.

IT 414 (a) SIMULATION AND MODELING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze simulation models.

CO2 : Understand and analyze a modeling strategy using discrete event simulation.

CO3 : Understand and analyze modern modeling and simulation software for modeling, simulation and analysis of systems.

CO4 : Interpret the simulation results of an engineering system model, within the context of its capabilities and limitations.

Unit- I

The Nature of Simulation : Simulation Model -Stating ,Dynamic Deterministic Stochastic Continous, Discrete Models.

Unit -II

Discrete Event Simulation **:** Time Advance Mechanism , Components and Organization of a Discrete Evennt Simulation Model, Selected Illustrative Examples of Simultation Application Models.

Unit- III

Simulation Software : Modelling of Complex Systems. Use of a Simulation Language such as GPSS, SIMSCRIPT ,SLAM ,GASP, SIMULA .

Unit -IV

Evaluation os Simulation Output: Random Variables and their properties Estimation Methods. Goodness of Fit, Confidence Intervals, Variance Reduction Techniques .Validation of Simulation Models .

Practicals: Lab experiments based on theory

Text Books/References

1. Kelton W.D. And Law A.M. - Simulation Modeling and Analysis, II Edition Mc-Graw Hill.
2. G.A. -Intractive Dyanamic System Simulation, Mc Graw Hill.

IT 414 (b) IMAGE PROCESSING AND PATTERN RECOGNITION

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and apply the general processes of image acquisition, storage, segmentation, representation, and description.

CO2 : Understand and analyze image enhancement in spatial domain through transformation and filtering.

CO3 : Understand and analyze the concept of image enhancement like contrast enhancement and histogram modification and digital image restoration.

CO4 : Understand various image compression and color coding problems along with data structures for image representation.

Unit- I

Introduction : Introduction of digital image processing, Imaging in ultravoilet and visible band. Fundamental steps and Components in image processing, applications of Image processing.

Unit -II

Digital Image Fundaments: Image peception in eye, light and electromagnetic spectrum, Image sensing and acquisition using sensor array. Image sampling and quantization. Aliasing and Moire patterns, Zooming and Shrinking digital images .Relationship between pixels. *Image*

Enhancement In Spatial Domain : Gray -level transformation image negatives, log transformation, power-low transformation, Histrogram equalization and matching .Smoothing spatial and Sharpening filters .

Unit -III

Image Resortation : Image restoration model, Noise Models- Spatial and frequency properties of noise.moise probability density functions. Noise- only spatial filters -Mean filter order-statistics filter and adaptive filters. Frequency domain filters- Band reject filters, Band Pass filters and Notch filters.

Unit- IV

Image Compression : Compression Fundamentals - Coding Redundancy, Interpixel redundancy, Psychovisual redundancy and Fidelity criteria .Image Compression models-Source encoder and decoder, Channel encoder and decoder, Lossy compression and compression standards .

Practicals: Lab experiments based on theory

Text Books/References

1. Rafael C. Gonzalez- Digital Image Processing ,Pearson Education Asia.
2. Kenneth R. Castleman - Digital Image Processin ,Pearson Education Asia.
3. Nick Effard - Digital Image Processing ,Pearson Education Asia.
4. Jain - Digital Image Processing - PHJ

IT 414 (c) ARTIFICIAL INTELLEGENCE

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.

CO2 : Understand and apply knowledge representation techniques and problem solving strategies to common AI applications.

CO3 : Understand and implement algorithms for symbolic reasoning under uncertainty with a machine.

CO4 : Understand weak slot and filler structures.

Unit - I

Problems and Search: Basic of Artificial Intelligence (AI), AI Problems, Underlying Assumption, AI Technique, Level of the Model, Criteria for Success. *Problems, Problem Spaces, and Search:* Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs. *Heuristic Search Techniques:* Generate-and- Tes, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Unit - II

Knowledge Representation: Issues, Representations and Mappings, Approaches to Knowledge Representation, 3 Issues in Knowledge Representation, The Frame Problem. *Predicate Logic*: Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction. *Representing Knowledge Using Rules:* Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

Unit - III

Symbolic Reasoning under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth-First Search and Breadth-First Search. *Statistical Reasoning:* Probability and Bayes' Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

Unit - IV

Weak Siot-and-Filier Structures: Semantic Nets, Frames. *Strong Siot-and-Filier Structures*: Conceptual Dependency, Scripts. *Knowledge Representation Summary:* Syntactic-Semantic Spectrum of Representation, Logic and Siot-and-Filler Structures.

Practicals: Lab experiments based on theory

Texts Books/References

1. E. Rich, K. Knight : Artificial Intelligence 2nd Ed, Tata McGraw-Hill.
2. Nils J. Nilsson: Artificial Intelligence – A New Synthesis, Morgan Kaufman Publication.

IT 414 (d) DATA MINING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand various warehouse technologies and OLAP schemas and to apply various data preprocessing techniques.

CO2 : Understand and compare various data mining primitives, languages and architectures.

CO3 : Understand and analyze various mining association rules to classify the data in large databases.

CO4 : Evaluate and analyze various classification and prediction models for efficient data mining.

CO5 : Implement, design and compare different techniques used in cluster analysis method.

CO6 : Analyze and apply mining techniques on various spatial, multimedia, time-series and sequence database.

Unit -I

Introduction to Data Mining and Data Processing: Functionalities, classification, issues, data warehouse and OLAP technology-definition, multidimensional data model, data warehouse architecture, data warehouse implementation. Data preprocessing- data cleaning, data integration and transformation, data reduction, discretization and concept hierarchy generation.

Unit -II

Data mining primitives, languages and system and architectures- Data mining Task, query language. Characterization and comparison-concept description, data generalization, summarization- Based Characterization, analytical characterization-attribute relevance analysis methods, mining association rules in large database.-concepts, mining single-Dimensional Boolean association rules from transaction database, constraint based association mining.

Unit -III

Classification and Prediction: definition, decision tree induction classification, Bayesian classification, back propagation, classifier accuracy. Cluster Analysis: definition, data types, categorization, hierarchical methods, density based methods, grid-based methods, model based clustering methods.

Unit -IV

Mining Complex Types of Data: Multidimensional Analysis and descriptive mining of complex objects, mining spatial databases, multimedia databases, time series and sequence data, WWW. Data mining application, trends in data mining

Practicals: Lab experiments based on theory

Texts Books/References

1. Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, Harcourt India Pvt.
2. D. Hand, H. Mannila, and P. Smyth, "Principles of Data Mining", MIT Press.

IT 414 (e) STORAGE AND INFORMATION MANAGEMENT

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand solve numerical in root of nonlinear equations, simultaneous linear equations & Eigen values and Eigen vectors.

CO2 : Understand and solve numerical in interpolation & numerical integration.

CO3 : Understand and solve problems in numerical differentiation like Newton's backward difference, central difference etc.

CO4 : Understand and solve numerical pertaining to ordinary differential equation by Euler method, Ranga Kutta method etc.

Unit - I

Introduction to Storage Technology: Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data center requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

Unit - II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Frontend connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

Unit - III

Introduction to Information Availability: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

Unit - IV

Managing & Monitoring: Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and proactive management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

Practicals: Lab experiments based on theory

Text Books/References

1. Marc Farley Osborne, "Building Storage Networks", Tata McGraw Hill.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill.

IT 415 (a) OPTIMIZATION TECHNIQUES

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand the issues, challenges and application of optimization problems in engineering.

CO2 : Understand and analyze the optimization technique using linear programming.

CO3 : Understand and analyze general sequence problem.

CO4 : Understand and analyze the optimal formulation and solution of Dynamic Programming problems.

Unit -I

Introduction: Introduction, Engineering application of optimization, Statement and classification of optimization problem, single variable and multivariable optimization with and without constraints. *Linear Programming:* Formulation of Linear Programming problem, Graphical Approach.

Unit -II

General Linear Programming problem, Simple Method. Duality in Linear Programming and Transportation Problems. *Project Scheduling*: Project Scheduling by PERT and CPM Network Analysis.

Unit -III

Sequencing Theory: General Sequencing problem n-jobs through 2 machines & 3 machines and 2-jobs through *m* machine.

Unit -IV

Dynamic Programming: Introduction, Principle of Optimal Formulation and solution of Dynamic Programming problems. Traveling Salesman's problem, Application to Transportation problem and Linear programming problems.

Practicals: Lab experiments based on theory

Text Books/References

1. H.A. Taha-Operation Research and Introduction Mcmillan Co.
2. S.S. Rao-Optimization - Theory & Application, Wiley Eastern.
3. S.K. Jain & D.M. Metha - Operations Research (Theory & Applications) Galgotia.
4. Vanger - Principles of Operations Research, Prentice Hall of India.

IT 415 (b) INFORMATION SECURITY

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and Implement various substitution and transposition techniques for encryption and decryption of data.

CO2 : Identify and classify computer security threats and security models to prevent, detect and recover from such threats.

CO3 : Evaluate and analyze the strengths and weaknesses of popular symmetric and asymmetric cryptographic algorithms.

CO4 : Evaluate the key differences of stream and block cipher.

CO5 : Understand and apply digital signature security mechanism.

CO6 : Understand and analyze various internet security protocols like SSL, SET and TLS.

Unit - I

Need for security, security approaches, principle of security, Types of attacks. *Cryptography Techniques*: Plain Text and Cipher text, Substitution techniques, Transposition techniques, Encryption & decryption, symmetric & asymmetric cryptography, steganography, key range and key size.

Unit-II

Computer based Symmetric key Cryptography Algorithms: Algorithms types and modes, overview of symmetric key cryptography, data encryption standards (DES), international data encryption algorithms (IDEA), advance encryption standards (AES), *Computer- based Asymmetric key Cryptographic Algorithms*: RSA algorithms, Digital Signature. MD5.

Unit - III

Public Key Infrastructure (PKI): Message authentication code (MAC), Digital Certificates, private key management, *Authentication*: password, authentication tokens, certificate based authentication, biometric authentication, Kerberos.

Unit -IV

Internet Security Protocols: Secure socket layer (SSL), Secure electronic transaction (SET), SSL verses SET, electronic money, E-Mail Security. Wireless application protocol (WAP) security. *Network Security*: IP security, firewalls, Virtual Private networks (VPN).

Practicals: Lab experiments based on theory

Text Books/References

1. Atul Kahate. Cryptography and Network Security, Tata McGraw- Hill Publishing.
2. William Stallings. Cryptography and Network Security, 2nd Ed, Pearson.

IT 415 (c) PROGRAMMING PRINCIPLES

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand the fundamental concepts of general programming languages & the tradeoff between language design and implementation.

CO2 : Demonstrate the semantic issues associated with function implementations, variable binding, scoping rules, parameter passing and exception handling for different programming languages.

CO3 : Understand and analyze different programming paradigms such as principles of imperative, object- oriented, functional and logic programming.

CO4 : Understand and identify syntax and semantic related issues associated with types, declaration, function implementations, variable binding, scoping rules, parameter passing, and exception handling.

Unit- I

Programming paradigms, language description: syntactic structure-expression notation, abstract syntax trees, lexical syntax, context free grammars, variants of grammars, structural programming: need, syntax-directed control flow, special cases of loops, invariant programming.

Unit -II

Data Representation: types, arrays, named fields, union, variant records, sets, pointers-efficiency and dynamic allocation, error checking. *Procedure activations:* parameter passing methods, scope rules, nested scopes, activation records, lexical scope- C and nested procedure.

Unit -III

Object oriented programming: grouping of data and operations-information hiding, modules in program design, modules and defined

types, class declaration, dynamic allocation, templates, inheritance, object , derived classes. Concurrent programming: parallelism, implicit synchronization, concurrency and interleaving, liveness properties, shared data access, synchronized access of shared variables.

Unit -IV

Functional programming: functional programming elements, types, function declarations, expression evaluation, lexical scope, type checking. Typed languages- list exploration, function declaration, ML: implicit types, data types, exception handling in ML. Lists- structure of lists, list manipulation, storage allocation.

Practicals: Lab experiments based on theory

Text Books/References

1. Ravi Sethi, Programming Languages Concepts and Constructs, Addison Wesley.
2. T.W. Pratt, Programming Languages : Design and Implementation, Prientice Hall.
3. Ghezzi Carlo & M. Jizayeri, Programming Language Concepts, John Wiley & Sons.

IT 415 (d) EMBEDDED REAL-TIME SYSTEMS

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand Embedded Systems its characteristic, design challenges, processor IC and design technology.

CO2 : Understand design of single purpose processor and peripherals.

CO3 : Understand Common and advanced memory types and their hierarchy.

CO4 : Understand and analyze serial, parallel and wireless communication protocols.

CO5 : Understand the design issues of real time computing systems such as task scheduling, interrupt management, memory management, concurrency and consistency management etc.

Unit - I

Introduction: Application areas and Categories of embedded systems. Embedded systems architecture, Specilities: Reliability, performance, power consumption, cost, size. Recent trends in embedded systems: Processor power, memory, operating system, communication interface and networking capability. Design Challenges, Processor, Technology, IC Technology, Design Technology.

Unit - II

Custom Single purpose processor and peripherals: Custom single purpose processor design, operation, programmer view, development environment, Application specific instruction set processor, selecting a microprocessor. *Standard single purpose processor peripherals*, Timers counters, watchdog timers, UART, Pulse with modulator, LCD controller, Keypad controller, APC, Real time clocks. *Memory*: Memory write ability and storage performance. Common memory types, composing memories, memory hierarchy and cache, advanced RAM: DRAM, FPMDRAM, EDO DRAM, SDRAM, RDRAM, Memory management unit.

Unit – III

Control Systems and Interfacing: Arbitration, Multi-level bus architectures, *Serial Protocols*: 12C bus, CAN bus, Fire Wire Bus, USAB, *Parallel Protocols*: PCI and ARM Bus, wireless protocols: 1rdA, Bluetooth, IEEE 802.11. Control Systems: Open loop and closed loop systems, General control systems and PID controllers, Fuzzy control, Practical issues related to computer based control, Benefits of computer based control implementations.

Unit – IV

Embedded/Real-Time Operating System: Architecture of kernel, Tasks and Task schedilar, Interrupt service routines, semaphores, mutex, mailboxes, message queues, event registers, pipes, signals, timers, memory management. Examples of embedded operating system. Embedded system applications: JPEG and MPEG Encoder.

Practicals: Lab experiments based on theory

Text Books/References

1. Frank Vohid and Tomy Givargi, Embedded System Design: A Unified Hardware/ Software Introduction, Wiley 2001.
2. KVKK Prasad "Embedded/Real-Time Systems: Concepts, Design and Programming" Dreamtech Press, New Delhi.

IT 415 (e) NEURAL COMPUTING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze artificial neural system, application, models, neural processing and learning rules.

CO2 : Understand and apply Back propagation training algorithm and perceptrons.

CO3 : Understand and apply linearly non-responsible pattern classification and various delta learning rules of multilayer feed forward networks.

CO4 : Understand and analyze concept of dynamics system and Hopfield network for single layer feedback networks and concept of associative memory.

CO5 : Understand and analyze matching and self organizing networks such as hamming net, counter propagation network and cluster discovery network.

Unit - I

Introduction: Concepts of Neural networks, computation: Some examples and applications of neural network. Biological Neurons and their artificial models, Models of Artificial Neural networks, Neural processing, Learning and adaptation, Supervised and Unsupervised Learning, Neural network learning rules.

Unit - II

Perceptron and Back propagation: Perceptron: Single and Multi-Layer Preceptrons. *Multilayer Feedforward Networks:* Linearly nonseparable pattern classification, Delta learning rule for multiperceptron layer, Generalized delta learning rule, Introduction, back propagation training algorithm.

Unit - III

Matching and Self-organizing Networks: Hamming net and MAXNET, Unsupervised learning of clusters, Counter propagation network. Cluster discovery network (ARTI).

Unit - IV

Associative Memory and Hopfield net: Associative Memories: Basic concepts, Linear associator, Basic concepts of recurrent auto associative memory, Bidirectional associative memory. Single-Layer Feedback Networks: Basic concepts of dynamical systems, Hopfield networks.

Practicals: Lab experiments based on theory

Texts/References

1. Jacek M. Jurada "Introduction to artificial neutral systems", Jaico publishing house
2. Simon Haykin "Neural Networks" Pearson Education; Indian Branch.
3. LiMin Fu, "Neural Network in Computer Intelligence" Tata McGraw-Hill Publishing Company Limited. New Delhi.

FOURTH YEAR B.TECH. (VIII SEMESTER)

IT 421 NET CENTRIC COMPUTING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand the distributed system architecture, design challenges & issues.

CO2 : Evaluate & implement RPC and RMI along with data marshalling.

CO3 : Evaluate & analyse different distributed file systems such as Sun NFS & Andrew File System.

CO4 : Understand the role of DNS, directory & discovery services in distributed systems.

CO5 : Demonstrate capability to synchronize distributed clocks and mutual exclusion in concurrent processes.

CO6 : Evaluate & understand replication for fault tolerance, sequential and release consistency in distributed systems.

Unit – I

Network and internetworking: types of network, network principles, internet protocols, Characterization of Distributed computing, design issues of Distributed computing, IPC in unix, External Data Representation, remote procedure calls, remote method invocation. Distributed garbage collection.

Unit –II

Distributed File System: file service architecture, sun network file system, Andrew file system, *Name Services*: domain name system, Directory & discovery services, global name service, X.500 directory service.

Unit – III

Time & Global States: clocks, events, process states, synchronizing physical clock, Logical time and logical clocks, Coordination and Agreement: Distributed Mutual exclusion, Elections.

Unit- IV

Transaction & Concurrency control: transactions, nested transactions, locks, optimistic concurrency control, timestamp ordering; *Distributed transactions* : flat and nested distributed transactions, atomic commit

protocols, concurrency control in distributed transactions, distributed deadlocks, transaction recovery.

Practicals: Lab experiments based on theory

Texts Books/References

1. George Coulouris, Jean Dollimore, Tim Kindberg : Distributed Systems, Concepts and Design, 3rd Ed, Addission Wesley.
2. A.S. Tanenbaum, M.S. Steen : Distributed System – Principles and Paradigms, Pearson Education

IT 422 e – COMMERCE

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand and analyse the concepts of e-commerce and trade cycle

CO2 : Analyse various business strategy in electronic age

CO3 : Understand business to business e-commerce and analyse advantages, disadvantages and usage of electronic markets

CO4 : Understand and analyse EDI and evaluate inter-organizational e-commerce

CO5 : Understand and analyse business to consumer e-commerce and website evaluation model

Unit–I

Introduction: Scope of electronic commerce, trade cycle, electronic markets, electronic data interchange, Internet commerce and e-commerce in perspective. Business Strategy in an Electronic Age: Value Chain-supply chains, Porter's value chain, model and Inter Organizational value chains. Competitive Advantage-Competitive strategy, Porter's Model, First Mover advantage and competitive advantage using e-commerce Business strategy, Introduction to Business Strategy, Strategic Implications of IT technology, e-commerce: Implementation and evaluation.

Unit–II

Web booking systems and competitive outcomes. Business to Business Electronic Commerce: Inter-organizational Transactions, The credit Transaction Trade cycle. A variety of transactions, Electronic markets-

markets and electronic markets, usage of electronic markets, Advantages and dis-advantages of electronic markets.

Unit– III

Electronic Data Interchange (EDI):Definition and benefits of EDI. EDI technology, standards, communications, Implementation, agreements and securities. EDI trading pattern and transactions , EDI Adoption and EDI Maturity, IOS, EDI, and Internet e-commerce. Inter – organizational e-commerce: Transactions, Purchasing Online, After Sales Online, e-commerce in Desktop Facilities Management.

Unit–IV

Business to Consumer Electronic Commerce: Consumer Trade Transactions, A Page on Web, HTML, Client side Scripting, Server side Scripting. The Elements of e – commerce: e- Visibility, The e – shop, Online Payments, Delivering the goods, After Sales Service, Internet e-commerce Security, A Website Evaluation Model.

Text Books/References

1. David Whiteley-E-Commerce Strategy, Technology and Applications, Tata McGraw Hill. .
2. Kalakota-Frontiers of Electronic Commerce, Pearson Education.

IT 423 (a) HIGH SPEED NETWORKS

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand the building blocks and operation of high speed networking technology.

CO2 : Apply the concept to optimize and troubleshoot high-speed network through congestion control and traffic management in Data network and Internet.

CO3 : Understand and analyze network planning and optimization in ATM networks.

CO4 : Understand Lossless and Lossy compression design challenges and issues.

Unit – I

High Speed Networks: Frame Relay: Packet Switching Networks, Frame Relay Networks; Asynchronous Transfer Mode: ATM Protocol Architecture, ATM Logical Connection, ATM Cells, ATM Service Categories, ATM Adaptation Layer(AAL); High Speed LAN's: The Emergence of High- Speed LAN's, Ethernet, Fiber Channel, Wireless LAN's.

Unit – II

Congestion and Traffic Management: Congestion Control in Data Networks and Internets: Effects of Congestion, Congestion and Control, Traffic Management, Congestion Control in Packet – Switching Networks, Frame Relay Congestion Control. *Link – Level Flow and Error Control:* The need for Flow and Error Control, Link Control Mechanisms, APQ Performance; TCP Traffic Control: TCP Flow Control, TCP Congestion Control, Performance of TCP over ATM;.

Unit – III

Congestion Control in ATM Network and IP: Requirement of ATM Traffic and Congestion Control, ATM Traffic Related Attributes, Traffic Management Framework, Traffic Control, ABR Traffic Management, GFR Traffic Management; Quality of Service in IP Networks: Integrated and Differentiated Services: Integrated Services Architecture(ISA), Queuing Discipline, Random Early Detection, Differentiated Services; Protocol for QoS Support: Resources Reservation :RSVP, Multiprotocol Label Switching, Real Time Transport Protocol(RTP).

Unit – IV

Compression: Overview of information Theory: Information and Entropy, Coding; Lossless Compression: Run Length Encoding Technique Facsimile Compression, Arithmetic Coding, String Matching Algorithms; Lossy Compression: Discrete Cosine Transform, Wavelet Compression, JPEG Image Compression, MPEG Video Compression; Video over IP, Video over DiffServ.

Practicals: Lab experiments based on theory

Text Books/References

1. William Stallings- High- Speed Networks and Internets, Pearson Education.

IT 423 (b) PERVASIVE COMPUTING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand different applications that use pervasive computing and also compare the different available device technology.

CO2 : Understand the various device connectivity and management protocols.

CO3 : Understand and analyze the various wireless application protocols and architectures.

CO4 : Understand and analyze the characteristic, architecture, issue and application to personal digital assistant (PDA) and pervasive web application architecture.

Unit – I

Pervasive Computing Introduction : The Vine and fig tree dream, Pervasive Computing, The pervasive computing market, m – Business, Conclusions and Challenges; Device Technology: Hardware, Human Machine interface, Biometrics, Operating System, Java for pervasive device.

Unit – II

Device Connectivity: Protocols, Security, Device Management; Web Application Concept: History of the World Wide Web, World Wide Web architecture, Protocols, Transcoding, Client authentication via the internet.

Unit – III

WAP and Beyond: Introduction, Components of the WAP architecture, WAP infrastructure, WAP security issues, Wireless Markup language, WAP push, Products, i-Mode, Outlook; Voice Technology: Basics of speech reorganization, Voice Standards, Speech Applications, Speech and pervasive Computing, Security.

Unit – IV

Personal Digital Assistants: History, Device categories, Personal Digital assistant operating system, Device Characteristics, Software Components, Standards, Mobile applications, Personal Digital assistant browsers; Pervasive Web Application architecture: Scalability and

availability, Development of pervasive computing Web applications, Pervasive application architecture.

Practicals: Lab experiments based on theory

Text Books/References

Jochen Burkhardt- pervasive Computing, Pearson Edition.

IT 423 (c) OPERATING SYSTEM DESIGN

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Understand and analyze the fundamental concept of unix operating system its architecture and system view.

CO2 : Understand and analyze the buffer cache, header and structure of cache, reading and writing to and from the cache, unix file system including structure, directories, inode, superblock, etc.

CO3 : Analyze and implement the process control namely creation, termination, awaiting processes including special process such as shell and INIT.

CO4 : Understand and analyze process scheduling, memory management techniques like swapping, demand paging in unix operating system.

Unit - I

Kernel introduction: architecture of UNIX operating system, system concepts, system administration, kernel data structure. *Buffer Cache*: buffer header, structure of the buffer pool, buffer retrieval, reading & writing disk blocks, advantages & disadvantages of the buffer cache.

Unit - II

Internal representation of files : Inodes, structure of a regular file, directories, path name & inode, super block, inode assignment,

allocation of a disk blocks; *System Calls*: open, read, lseek, close, file creation, changing directory and root, change owner, change root, STAT, pipes, link, unlink.

Unit - III

Process structure: states & transitions, layout of system memory, context of a processes, manipulation of process address space, sleep; *Process Control*: process creation, signals, process termination, awaiting process termination invoking other programs, the user ID of a process, changing the size of a process, shell, system boot and the INIT process.

Unit - IV

Process schedulin: Process scheduling, system Calls for time clock, Memory management: swapping, Demand paging; *Interprocess communication*: process tracing, network communication, sockets.

Practicals: Lab experiments based on theory

Texts Books/References

1. Maurice J. bach : The Design of the Unix Operating System, Pearson Education.

IT 423 (d) DISCRETE-TIME SIGNAL PROCESSING

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Represent discrete-time signals analytically and visualize them in the time domain.

CO2 : Understand the meaning and implications of the properties of systems and signals.

CO3 : Understand the Transform domain and its significance and problems related to computational complexity.

CO4 : Specify and design popular digital filters using MATLAB / Scilab.

Unit -I

Introduction: The concepts of signal and system, Digital processing of analog signals, Basic components of a DSP system, Pros and cons of DSP, Discrete-time signal processing (DTSP), Applications of DSP. Discrete-time signals and systems : Discrete-time (DT) signals, DT systems , Linear time-invariant (LTI) systems, systems described by linear constant coefficient difference equations (LCCDE).

Unit -II

Discrete-time Fourier transform (DTFT) and Fourier: The DTFT and its inverse , Convergence of the DTFT, Properties of the DTFT, Frequency analysis of LTI systems. *Fourier Analysis of Periodic and Aperiodic Continuous*: Time Signal and Systems: Introduction , Trigonometric Fourier Series, Complex or Exponential form of Fourier Series, Parseval's Identity for Fourier Series, Power Spectrum of a Periodic Function, Fourier Transform, Properties of Fourier Transform, Fourier Transform of Power and Energy Signals.

Unit -III

Discrete Fourier Transform and the Z-transform (ZT): The discrete Fourier Transform (DFT), The DFT and its inverse, Relationship between the DFT and the DTFT, Fast Fourier Transform (FFT). Study of the ROC and ZT examples, Properties of the ZT, Inverse ZT, Z-domain analysis of LTI systems.

Unit -IV

Structures for the realization of DT systems: Signal flow-graph representation, Realizations of IIR systems, Direct form I,Direct form II, Cascade form, Parallel form, Transposed direct form II. Realizations of FIR systems: Direct forms, Cascade form, Linear-phase FIR systems,Lattice realization of FIR systems. *Filter Design:* Introduction, Problem statement, Design of IIR filters. Review of analog filtering concepts, Basic analog filter types, Impulse invariance method, Bilinear transformation, Design of FIR filters, Design of FIR filter via windowing.

Practicals: Lab experiments based on theory

Text Books/References

1. Proakis J.G., Manolakis G. D., Digital Signal Processing, 3rd ed., Pearson Education Asia.
2. S Salivahanan, A Vallavaral, and C Gnanapriya, Digital Signal Processing,Tata MCGraw-Hill.
3. Oppenheim A.V., Schafer Roland W., Discrete- Time Signal Processing, Prentice Hall India.

IT 423 (e) PARALLEL AND DISTRIBUTED DATABASE

Cr. Hrs. 4 (3 + 1)

	L	T	P
Credit	3	0	1
Hours	3	0	2

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

CO1 : Apply, analyze and understand parallel database architecture, functionality, design techniques and query processing strategies.

CO2 : Analyze and understand various distributed database designs, architectures, issues and challenges.

CO3 : Understand and apply semantic data control in distributed database such as integrity control, query processing, database decomposition and localization.

CO4 : Understand and apply various distributed transaction management issue particularly concurrency control and data consistency and durability.

Unit -I

Parallel database systems: architecture, functional aspects. parallel DBMS techniques: data placement, query parallelism, parallel data processing, parallel query optimization. Parallel execution: initialization, interferences and convoy effect, load balancing, load balancing and performance evaluation for hierarchical architecture.

Unit -II

Distributed database issues and challenges, distributed database architecture: models-autonomy, distribution, heterogeneity, architectural alternatives, client/server architecture, peer-to-peer architecture, MDBS architecture.

Distributed database design: top-down design, bottom-up design, horizontal fragmentation, vertical fragmentation, hybrid fragmentation, allocation issues, information requirements, allocation model.

Unit -III

Semantic data control: view management, data security, semantic integrity control, Query processing, Decomposition and Localization: query processing objectives, query processors characterization- types of optimization, optimization timing, statistics, decision sites, network topology and query processing, replicated fragments, use of semi joins. Query processing layers, query decomposition- normalization, analysis,

redundancy, Localization- primary horizontal fragmentation, vertical fragmentation, derived fragmentation, hybrid fragmentation.

Unit -IV

Distributed transaction management : definition , transaction properties- atomicity, consistency, isolation, durability. Transaction issues- flat transaction, nested transactions, workflows. Distributed concurrency control: serializability, taxonomy of concurrency control, locking-based concurrency control, timestamp-based concurrency control, optimistic concurrency control, relaxed concurrency control, deadlock management-prevention, avoidance, detection and resolution.

Practicals: Lab experiments based on theory

Texts Books/References

1. M. Tomer Ozsu, P. Valduriez: Principles of Distributed Database Systems 2nd Ed, Pearson Education.
2. S. Ceri, G. Pelagapati : Distributed Database, Principles and Systems, McGraw Hill Publication.

IT424 (a) INTEGRATED CIRCUIT DESIGN

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand and analyze the design of MOS and CMOS logic circuits.

CO2 : Understand and analyze the various steps of VLSI design methodology.

CO3 : Understand and analyze the design of dynamic logic circuits.

CO4 : Understand and analyze the design of MOS and BIMOS circuits and memory.

CO5 : Understand integrated system testing and design for manufacturability.

Unit - I

MOS Logic Circuits: Introduction, Classification of CMOS digital circuit types, Circuit design procedures. Metal-Oxide Semiconductor (MOS) Logic: Enhancement-Type MOSFET,The p-channel MOSFET, Depletion MOSFET. NMOS Inverter, NMOS NAND gate, NMOS NOR gate, Complementary metal oxide semiconductor (CMOS) Logic: CMOS Inverter, CMOS NAND Gates, CMOS NOR Gate, Pass-Transistor logic circuits, Complex logic circuits, CMOS characteristics. Sequential *Logic Circuits:* Introduction, CMOS Bistable Elements, The SR Latch Circuit based on NAND and NOR gates, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.

Unit - II

VLSI Design Methodologies: Introduction, VLSI Design Flow, Design Hierarchy, Concepts of Regularity, Modularity and Locality, VLSI Design Styles, Design Quality, Packaging Technology, Introduction of Computer-Aided Design Technology. *Dynamics Logic Circuits:* Dynamics logic circuit techniques, High-performance CMOS circuits: Domino CMOS Logic, NORA CMOS Logic, and TSPC Dynamic CMOS.

Unit - III

MOS and BiMOS Circuit and Memories: Memory-Chip Organization, Random-Access Memory (RAM) Cells, Read-Write Operation of Static Memory and Dynamic Memory Cell. Sense Amplifiers and Address Decoders. Read Only Memory (ROM): A MOS ROM, EPROM Cell. BiCMOS *Logic Circuits* : Bipolar Junction Transistors (BIT): Structure and Operation. Basic BiCMOS Circuits, Switching Delay in BiCMOS Logic Circuits, BiCMOS NOR gate and NAND Gate.

Unit - IV

Testability of Integrated Systems: Design Constraints, Testing, Terminology, Failures in CMOS, Combinational Logic Testing, Practical Ad-Hoc DFT Guidelines, Built-In Self Test Techniques, Scan Design Techniques. *Design for Manufacturability:* Introduction, Process Variations, Basic Concepts and Definitions, Design of Experiments and Performance Modeling, Chip Input and Output (I/O) Circuits.

Texts Books/References

1. Sung -Mo Kang, Yusuf Leblebici,"CMOS Digital Integrated Circuits Analysis and Design" Tata McGrawHill Edition.
2. Dauglas A. Paucknell, Kamran Eshraghian " Basic VLSI Design" PHI, New Delhi.

IT 424 (b) PARALLEL COMPUTER ARCHITECTURE

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand series of popular parallel programming applications along with conversion of sequential program to parallel program.

CO2 : Understand and analyze performance of parallel programs based on partitioning, load balancing, inherent communication and data access.

CO3 : Understand and analyze cache snooping protocols and architectures.

CO4 : Understand Programming model for network transaction, shared address space and message passing.

Unit - I

Parallel programs: parallel applications, parallelization processes, parallezing computation versus data, goals of parallelization processes; *Programming for performance*: partitioning for performance, load balance, reducing inherent communication, data access and communication in a multi-memory system.

Unit - II

Workload –Driven evaluation: scaling workloads and machines, key issues in scaling, scaling models and speedup measures, scaling workload parameters, evaluating a real machine, performance isolation, choosing workloads, choosing performance metrics *Shared memory* multiprocessors: cache coherence problem, cache coherence through bus snooping, memory consistency, snooping protocols.

Unit - III

Snoop-Based multiprocessor design: correctness requirement, cache controller, reporting snoop results, dealing with write backs, nonatomic state transitions, serialization, deadlocks, livelocks & starvation, multilevel cache hierarchies, split transaction bus, snoop results & conflicting requests, path of cache miss, serialization & sequential consistency, split transaction bus with multiple caches, shared cache design, coherence for virtually indexed caches, translation lookaside buffer coherence.

Unit – IV

Scalable Multiprocessosr: scalability, network transaction, shared address space, message passing, active messages, physical DMA, node to network interface, dedicated message passing, shared physical address space, cluster & network of workstations, network transaction

performance, shared address space operations, message passing operations, application level performance, synchronization, algorithms for locks, algorithms for barriers.

Texts Books/References

1. David E. Culler, Jaswinder Pal Singh : Parallel Computer Architecture, ELSEVIER.
2. Hwang and Briggs: Computer Architecture and Parallel Processing, Mcgraw- Hill.
3. V. Rajaraman: Parallel Computers Architecture and Programming.

IT 424 (c) REAL TIME COMPUTING

Cr. Hrs.3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Characterize real-time systems and describe their functions.

CO2 : Apply formal methods to the analysis and design of real-time systems and for scheduling real-time systems.

CO3 : Understand detailed difference between real time and general purpose database.

CO4 : Understand real time communication with its protocols and algorithms.

Unit - I

Introduction: Definition, Typical Real Time Applications, concept of tasks, types of tasks and real time systems, block diagram of RTS, and tasks parameters –Release Times, execution time, period, Deadlines, and Timing Constraints etc. RTS requirements. Hard Real Time Systems and Soft Real Time Systems.

Unit - II

Reference Models for Real Time Systems: processors and Resources, Temporal Parameters of Real-Time Workload, Periodic and Aperiodic Task Model, Precedence Constrains and Data Dependency, Other Types of Dependencies, Functional Parameters, Resource Parameters.

Unit - III

Real Time Scheduling: Classification of Real Time Scheduling, scheduling criteria, performance metrics, schedulability analysis,

Introduction to Clock Driven scheduling, Weighted Round Robin Approach and Priority Driven Approach. Dynamic Versus Static systems, Offline Versus Online Scheduling. Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

Unit - IV

Resources Access Control: Effect of Resource Contention and Resource Access Control (RAC), Non-pre-emptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol.

Texts Books/References

Jane W. S. Liu: Real Time Systems, Pearson Education India.

IT 424 (d) GEOGRAPHICAL INFORMATION SYSTEM

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand the nature, components and applications of GIS and remote sensing.

CO2 : Understand the fundamental types of GIS data.

CO3 : Develop skills in sourcing, manipulating and interpreting spatial data.

CO4 : Understand the limitations of geographic information systems and of geographic data.

CO5 : Understand and analyze geographic information that is available on the internet and for personal and professional decision making.

Unit - I

GIS definition, components of GIS, Geographical concepts, input data for GIS, type of output products, application of GIS, introduction of remote sensing, multi-concept of remote sensing, advantages & disadvantages of remote sensing.

Unit - II

GIS data types, data representation, data source, GIS data sets, Data acquisition, data verification & editing, Georeferencing of GIS data, spatial data errors, spatial data models, spatial data structures, modeling surfaces, modeling networks, GIS database & database management system.

Unit - III

Spatial data analysis, data analysis terminology, measurement of length, perimeter & area, queries, reclassification, buffering and neighbourhood functions, map overlays, spatial interpolation, surface analysis, network analysis, digital terrain visualization.

Unit - IV

GIS application, Problem identification, designing a data model, project management, project evaluation, advances in remote sensing, internet GIS, mobile GIS, decision support system.

Texts Books/References

1. A M Chandra, S K Ghosh, Remote Sensing and Geographical Information System, Narosa publication

IT 424 (e) AUTOMATA THEORY

Cr. Hrs. 3 (3 + 0)

	L	T	P
Credit	3	0	0
Hours	3	0	0

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

CO1 : Understand the need and significance of computational theory, formal machines, languages and computations in computer engineering.

CO2 : Understand, design and analyze the role of finite automaton in recognizing a regular language.

CO3 : Understand, analyze and apply the context free grammar and push-down automaton with its advantages and limitations.

CO4 : Understand, analyze and design turing machine model for computable languages with its strength and limitations.

CO5 : Understand and analyze universal turing machine and its un-decidability issues.

Unit- I

Introduction: Sets, Relations and functions, Graphs and Trees, Three fundamental proof techniques, closures and algorithms, alphabets, languages, Finite representation of languages.

Unit -II

Theory of Automata: definition, description, transition system-properties, string acceptability, nondeterministic finite state machine, DFA and NDFA equivalence, mealy and Moore models, minimization of finite automata, regular expression, finite automata, pumping lemma for regular set, closure properties, regular grammar.

Unit -III

Context – free Languages: context free language, ambiguity, context free grammar simplification , Normal forms, pumping lemma. *Pushdown automat*: definitions, pda acceptance, parsing and pushdown automata.

Unit -IV

Turing machines: Turing machine, computing with turing machine, extensions of turing machine, random access turing machine, nondeterministic turing machines, grammars, numerical functions.

Undecidability: The church- turing thesis, universal turing machines, halting problem, unsolvable problems about turing machine, unsolvable problems about grammars, unsolvable tiling problem, recursive languages-properties.

Text Books/References

1. K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science (Automata, Languages and Computation), 2nd edition, Prentice Hall India.
2. John E. Hopcroft and Jeffrey D. Ullman, Introduction to Automata Theory, Laguages and Computation, 2nd edition, Pearson Education Asia.Harry R. Lewis and Cristos H. Papadimtriou, Elements of the Theory of Computation, 2nd edition, PHI.
3. Martin, J.C., Introduction to Languages and the Theory of Computation, McGraw-Hill International Editions, Computer Science Series.

Notes

Information Technology

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