मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी   مولانا آزاد نیشنل اُردو یونیورسٹی

MAULANA AZAD NATIONAL URDU UNIVERSITY

(A Central University established by an Act of Parliament in 1998)

Accredited with 'A' grade by NAAC

PROGRAMME: INTEGRATED B.TECH-M.TECH (COMPUTER SCIENCE)

DURATION: 6 YEARS

REGULATIONS, CURRICULUM & SYLLABUS

Department of CS & IT

School of Computer Science & Information Technology

Maulana Azad National Urdu University, Hyderabad (India)

1. **Definitions**

   a. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

   b. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

   c. **Course:** Usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures, tutorials, laboratory work, field work, outreach activities, project work, vocational training, viva, seminars, term papers, assignments, presentations, self-study etc. or a combination of some of these.

   d. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.

   e. **Credit Point (CP):** The numerical value obtained by multiplying the grade point (GP) by the no. of credit(C) of the respective course i.e. CP= GP X C.

   f. **Credit(C):** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week, i.e. a course with assigned L-T-P: 3-0-2 or 3-1-0 will be equivalent to 4 credits weightage course.

   g. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

   h. **Grade Point (GP):** It is a numerical weight allotted to each letter grade on a 10 point scale.

   i. **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

   j. **Programme:** An educational programme leading to award of a degree, diploma or certificate.

   k. **Semester Grade point Average (SGPA):** It is a measure of performance of work done in a semester. It is ratio of total credit points (CPs) secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed upto two decimal places.

   l. **Semester:** Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.

   m. **Transcript or Grade Card (GC) or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester the grade certificate will display the course details (code, title, no. of credits, grades secured) along with SGPA of that semester and CGPA earned till date semester.

   n. **Sessional:** The internal assessments in theory papers conducted normally through two-tests, assignments, seminar / demonstrations and attendance with **15%, 5%, 5% and 5%** marks respectively. Sessional weightage shall be uniformly 30% and shall be normally performed by the

concerned teacher.

o. **Semester Examinations:** The comprehensive examinations conducted for summative evaluation of course. The duration of these examinations shall be 3 and 4 hours for theory and practical courses respectively; and the weightage shall be 70% for theory and 50% for practical uniformly for all the courses.

p. **L-T-P:** The prescribed hours/week during a semester for Lecture-Tutorial-Practical to a particular course, in accordance with curriculum prescriptions based on respective nature.

q. **Programme Span (PS):** The programme's maximum time for completion shall be additional two (2) years (4 semesters).

2. General

a. An academic year will consist of two semesters; namely odd and even semesters commencing normally from July and January respectively.

b. Promotion from odd-to-even semester shall be automatic for normal cases, otherwise shall be governed by Section 7 clauses.

c. All the calculations of SGPA and CGPA shall be rounded to two decimal places.

3. Attendance

Attendance requirement for appearing in examination of each of the semesters shall be 75%. Otherwise the student will be detained in semester examination. However, students having attendance from 65% to 75% may be allowed by a special permission from competent authority after showing the certified proofs with valid reasons for medical, sports, extra-curricular activities etc.

4. Performance Evaluation

a. **Sessional:** The laboratory course sessional evaluations shall be performed continuously based on practical performed by a student. Such evaluation may involve periodic assessment of documentation of the practical exercise/experiment, precision of experiment etc. In the case of Project /Dissertation the Internal Assessment may be based on periodical progress report.

b. **Semester Examination:** The Semester Examination shall commence during the first week of December/May for the Odd semester/Even semester courses, respectively.

c. **Appointment of Examiners:** Head of the department shall normally appoint the examiners for different courses, selecting at least two other than the concerned teachers, randomly for theory courses in each of the semesters. In case of Lab/Projects/Viva-Voce examinations there shall be one internal and one external examiner. A sizable panel of external examiners shall be approved by the BOS on annual basis to facilitate the appointment of external examiners.

d. **Moderation:** A committee duly constituted by BOS as follows, shall moderate the examination papers and shall have the right to improve / change the questions to a considerable extent:
  i. Dean (Chairman)
  ii. Head of the department (Convener)
  iii. Three Faculty Members nominated by the Dean

e. **Evaluation:** All the evaluations shall be performed in terms of marks, adding finally for each

Department of Computer Science & Information Technology, MANUU, Hyderabad

course out of 100 marks. The marks obtained by each student in courses shall be converted to Letter-Grades / Grade-Points using Grading Assignment Table, described in Section 5.

5. Grading System:

The grades and their description, along with equivalent numerical grade points are listed in the Grading Assignment Table as follows:

Grade Assignment Table

Range of Marks	Description	Grade	Grade Point
85 – 100	Outstanding	O	10
75 – 84	Excellent	A+	9
65 – 74	Very Good	A	8
55 – 64	Good	B+	7
50 – 54	Above Average	B	6
45 – 49	Average	C	5
40 – 44	Pass	P	4
0 – 39	Fail	F	0
Otherwise	Absent	Ab	0

a. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

b. For non credit courses **'Satisfactory' or 'Unsatisfactory'** shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

6. Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):
a. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\textbf{SGPA } (Si) = \sum(\text{Earned Credits } Ci \times \text{Grade Point } Gi)/\sum\text{Earned Credits } Ci;$$

Where Ci is the number of credits of the ith course and Gi is the Grade Point Scored by the student in the ith course.
b. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\textbf{CGPA } (Ci) = \sum(\text{Earned Credits } Ci \times \text{SGPA } Si)/\sum Ci;$$

Where Si is the SGPA of the ith semesters and Ci is the total number of credits in that semester.
c. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
 Illustration of the computation of SGPA and CGPA and Format for Transcripts

   i. Computation of SGPA and CGPA
        Illustration for SGPA

Course	Credits	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			139

Thus, **SGPA = 139/20 = 6.95**

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4
Credit : 20 SGPA : 6.9	Credit : 22 SGPA : 7.8	Credit : 25 SGPA : 5.6	Credit : 26 SGPA : 60
Semester 5	**Semester 6**		
Credit : 26 SGPA : 6.3	Credit : 25 SGPA : 8.0		

Thus, **CGPA** = $\frac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144}$ = 6.73

ii. **Transcripts (Format):**

Based on the above recommendations on Letter grades, grade points, SGPA and CGPA, the Higher Education Institutions may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

7. Programme Continuation / Discontinuation:

The continuation / discontinuation and Exit with Degree shall be governed as follows:

a) A candidate shall be allowed to continue the programme provided he/she maintains a CGPA of 5.0 both in all theory and lab courses at the end of the even semesters (e.g. 2nd, 4th and 6th for the academic programmes). Otherwise, the candidate shall remain in the same year till he/she pass the back paper with minimum credits required to attain the CGPA as 5.0.

b) A candidate shall have to re-appear in semester examination of the courses with Fail/Absent grade (as per Grade Assignment Table in section 5 clause), when the same course is offered next time in the department during the programme span. Such students shall retain their sessional marks.

8. Division and Position:

Division shall be awarded in the following manner, to the candidates on the basis of their respective CGPA:

CGPA ≥ 8	1st Division with Distinction
6.5 ≤ CGPA < 8	1st Division
Otherwise	2nd Division

However, First, Second or Third position shall be awarded to the candidates, provided they meet the following conditions:

a) Rank shall be solely decided on the final CGPA, on completion of degree credit requirement.

b) The candidate has completed all the prescribed requirements, in the prescribed programme duration.

c) The candidate has passed / secured valid grades in all the prescribed courses, in the first attempt.

d) No disciplinary action is pending or has ever been lodged against him/her.

e) In case of an exceptional tie, both candidates shall be awarded the same rank.

9. Review and Re-evaluation:

Review and re-evaluation of the answer sheets shall be as per the university rules.

10. Grade Card:

At the end of each semester, a student will be given a 'Grade Card' which will contain Course Code, Title, Credits, Grades Awarded, Earned Credits and Earned Point secured by him/her in each course, together with his/her SGPA in that semester. On the completion of the programme, a Final Grade Card will be issued to the student, giving full semester-wise details about the absolute marks and grades obtained by him/her in each course together with his/her SGPA and also the CGPA and Division awarded to him/her.

11. Equivalence:

Percentage (P) equivalent to CGPA earned by a candidate may be calculated using the following formula:

$$P = 9.5 \times CGPA$$

12. Conduct of Teaching

a. **Course Co-ordinator**

Every course will be taught by one or more teachers. The Head of the department with consultation of Dean will allocate the teaching load to the teacher(s) and will also designate a course co-ordinator for each course. If more than one department is involved in the teaching of the course, the course co-ordinator will be from the coordinating department. The course co-ordinator will coordinate all the work related to attendance, course work, examination and evaluation. It is necessary that the students are informed about the course co-ordinator so that they may contact him/her about any problems regarding the course.

b. **Display of Attendance, Marks etc.**

It is essential that the attendance should be displayed to the students twice in a semester, once in the middle and then at the end of a semester by the teacher(s) concerned. The sessional marks should be displayed to students normally within 15 days of the examination. The total Sessional marks should be displayed to the students before the beginning of the end-semester examinations. The course co-ordinator will ensure that the teachers associated with the course make such displays.

c. **Offering Courses**

Courses will be offered by the department concerned as per the schedule given in the relevant Curriculum. More choices in elective courses will be offered depending on the availability of the staff

and other facilities and therefore any particular elective course may not be offered even though it may exist in the list of possible elective courses. Department may also offer a course in both the semesters even though it may be shown in particular semesters.

d. **Syllabus**

Each course syllabus which will be distributed to the students. The teacher(s) concerned should ensure that some portion, beyond the syllabus, should also be covered in the class.

13. **Correction of Errors**

In case of any error is detected in the marks recorded on the award list, the examiner(s) concerned shall make a request to correct the mistake to the Dean, School of CS & IT through the Head of the department, and shall attach relevant documentary evidence. A committee consisting of the following members shall take suitable remedial measures depending upon the merit of the case.

   a. Dean (Chairman)
   b. Head of the department.
   c. Two Faculty Member nominated by the Dean

14. **Examinations**

e. **Sessional Examination**

Sessional examination(s) of each course is one hour duration and shall be conducted as per norms and schedule notified by the office of the Head of department in each semester.

f. **End-Semester Examination**

End-semester examination(s) of each theory course shall be of three hours duration and will be conducted as per norms and schedule notified by the Controller of Examination. The end semester examinations of laboratory/practical courses, and other courses such as seminar, colloquium, field work, project, dissertation etc. shall be conducted as notified by the HOD.

15. **Degree Requirement**

A student who earns total specified credits according to the curriculum and fulfills such other conditions as may be mentioned in the curriculum of the programme, shall be awarded the degree. He/she must also pay all University dues as per rules. Moreover, there should be no case of indiscipline pending against him/her.

Department of Computer Science & Information Technology, MANUU, Hyderabad

CODING SCHEME: INTEGRATED B.TECH.-M.TECH. IN COMPUTER SCIENCE

Theory Course

Every theory course has a course number consisting of 5 characters. This can be explained as below:-

e.g. BT125
>   (a) The first two alpha characters will mean the following:
>   BT = Bachelor level
>   (b) The third character will be for the year as 1 for first year.
>   (c) The fourth character will be semester as 2 for 2nd semester.
>   (d) The fifth character will be course number as 5 for 5th theory course.

e.g. MT125
>   (a) The first two alpha characters will mean the following:
>   MT = Masters level
>   (e) The third character will be for the year as 1 for first year.
>   (f) The fourth character will be semester as 2 for 2nd semester.
>   (g) The fifth character will be course number as 5 for 5th theory course.

Lab Course

Every Lab course has a course number consisting of 5 characters. This can be explained as below:-

e.g. BTL21
>   (a) The first two alpha characters will mean the following:
>   BT = Bachelor level
>   (b) The third character will mean the following:
>   L = Laboratory course
>   (c) The fourth character will be for the semester as 2 for second semester.
>   (d) The fifth character will be the lab number as 1 for first Lab.

e.g. MTL21
>   (a) The first two alpha characters will mean the following:
>   MT = Masters level
>   (b) The third character will mean the following:
>   L = Laboratory course
>   (c) The fourth character will be for the semester as 2 for second semester.
>   (d) The fifth character will be the lab number as 1 for first Lab.

Elective Course

Every elective theory course has a course number consisting of 5 characters. This can be explained as below:-

e.g. BTE31
>   (a) The first two alpha characters will mean the following:
>   BT = Bachelor level
>   (b) The third character will mean the following:
>   E = Elective course
>   (c) The fourth character will be for the semester as 3 for third semester.

Department of Computer Science & Information Technology, MANUU, Hyderabad

(d) The fifth character will be the course number as 1 for 1st elective course.

e.g. MTE31

    (a) The first two alpha characters will mean the following:

              MT = Masters level

    (b) The third character will mean the following:

              E = Elective course

    (c) The fourth character will be for the semester as 3 for third semester.

    (d) The fifth character will be the course number as 1 for 1st elective course.

Open Elective Course

Every elective theory course has a course number consisting of 5 characters. This can be explained as below:-

e.g. MTO31

    (a) The first two alpha characters will mean the following:

              MT = Masters level

    (b) The third character will mean the following:

              O = Open Elective course

    (c) The fourth character will be for the semester as 3 for third semester.

    (d) The fifth character will be the course number as 1 for 1st elective course.

    (d) The fifth character will be the lab number as 1 for first Lab.

Project Work:-

e.g. BTD71

    (a) The first two alpha characters will mean the following:

              BT = Bachelor level

    (b) The third character will mean the following:

              D = Design based industry project

    (c) The fourth character will be for the semester as 7 for seventh semester.

    (d) The fifth character will be the course number as 1 for 1st project.

Dissertation Work:-

e.g. MTR41

    (a) The first two alpha characters will mean the following:

              MT = Masters level

    (b) The third character will mean the following:

               R = Dissertation

    (c) The fourth character will be for the semester as 4th for fourth semester as master's level.

    (d) The fifth character will be the course number as 1 for 1st dissertation.

CURRICULUM AND SYLLABUS OF INTEGRATED B.TECH-M.TECH IN COMPUTER SCIENCE

1. **Programme Title:**

   Integrated B.Tech–M.Tech in Computer Science.

2. **Duration and Mode:**

   Duration of programme for a student shall be six (6) years with twelve consecutive semesters after admission. The mode of the programme is Regular (semester system).

3. **Objective:**

   To produce, theoretically and practically well-equipped, skilled professionals to cater to the requirements of Software, Hardware and Network Engineer, and state-of-the-art software development practices in the fast changing IT-enabled systems.

4. **Eligibility Criteria:**

   The eligibility of the candidate is Intermediate (10+2) with Mathematics, Physics and Chemistry (M.P.C) as a group or Mathematics, Physics, Chemistry and Biology (M.Bi.P.C) as another Group with 45% marks in aggregate. Polytechnic diploma engineers of all branches are also eligible. The knowledge of Urdu for the candidate is essential.

5. **Integrated B.Tech-M.Tech (CS) Exit Scheme (Minimum Degree Requirement):**

   Student can exit the Integrated B.Tech- M.Tech programme after four years with B.Tech (CS) degree if he/she obtains the total number of 202 credits in four academic years. The minimum degree requirements of the programme are as follows:
   a. B.Tech (CS) - Total Credits =202 & minimum CGPA = 5.0 after completing four years.
   b. Integrated B.Tech- M.Tech (CS) – Total Credits =282 & minimum CGPA = 5.0 after completing six years.
   A student shall obtain both B.Tech (CS) and M.Tech (CS) degrees, after completing Integrated B.Tech- M.Tech (CS) programme.

6. **Intake:**

   The number of seats for the program is fifty (50) for the first year and ten (10) more seats would be allocated for lateral entry into second year.

7. **Admission:**

   The admission in to the Integrated B.Tech- M.Tech (CS) programme is based on the rank secured by the candidate in a written test conducted by the University. Minimum qualifying marks shall be 30% in Entrance Test. The written test will be of 100 marks. Ten seats will be admitted in second year through Lateral entry on merit basis in his/her qualifying examination.

8. **Lateral Entry into second year:**

   This is an option to a candidate with the Polytechnic Diploma engineers with CSE/IT/Electrical and Electronics with minimum 50% marks in aggregate from any recognized university or institution. The admission will be based on the merit in the qualifying polytechnic diploma.

9. **Syllabus:** Each theory or lab courses shall have prescribed syllabus approved by BOS from time to time, as per following prescriptions:

   a. **Theory Courses:** Five (5) units largely based on ONE standard textbook and two Reference

Books prescribed by the concerned teacher.

b. **Lab Courses:** At least TEN (10) individual generic assignments and ONE Mini-Project, to be prescribed by the concerned teacher and approved by HoD.

10. Evaluation of Project/Dissertation:

a. **Project at Bachelor Level:**

Every candidate shall be required to submit project report as per the following details:-

   i. **A Project Review Committee** (PRC) shall be constituted with Head of the Department as chair person and at-least two other faculty members from the department.

   ii. **Registration of Project Work:** A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).

   iii. After satisfying clause 11.a (ii), a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Project Review Committee for its approval. Only after obtaining the approval of Project Review Committee the student can initiate the Project work.

   iv. Three copies of the Project Report certified by the supervisor shall be submitted to the Department.

   v. The project report shall be examined by one examiner selected by the University. For this, Head of the Department shall submit a panel of 3 examiners, who are eminent in that field with the help of the concerned guide.

   vi. If the report of the examiner is not favorable, the candidate shall revise and resubmit the report, in the time frame as described by PRC. If the report of the examiner is unfavorable again, the report shall be rejected.

   vii. If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner. The Board shall jointly report candidates work as:
   1. Excellent
   2. Good
   3. Satisfactory
   4. Unsatisfactory

   Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination.

   viii. If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination within three months.

b. **Evaluation of Dissertation at Masters Level:**

Every candidate shall be required to submit Dissertation as per the following details:-

   i. **A Departmental Research Committee (DRC)** shall be constituted with Head of the Department as chair person and at-least two other faculty members.

   ii. **Registration of Dissertation:** A candidate is permitted to register for the Dissertation after satisfying the attendance requirement of all the subjects (theory and practical subjects).

   iii. After satisfying clause 11.b (ii), a candidate has to submit, in consultation with his

Dissertation supervisor, the title, objective and plan of action of his project work to the DRC for its approval. Only after obtaining the approval of DRC the student can initiate the Dissertation.

iv. A candidate shall submit status report (in a spiral binding) in two stages at least with a gap of 3 months between them.

v. The work on the dissertation shall be initiated in the beginning of the master level second year and the duration of the dissertation is for two semesters. A candidate is permitted to submit thesis only after successful completion of theory and practical courses with the approval of DRC not earlier than 40 weeks from the date of registration of the dissertation. For the approval of DRC the candidate shall submit the draft copy of thesis to the Head of the Department and shall make an oral presentation before the DRC.

vi. Three copies of the thesis certified by the supervisor shall be submitted to the Department.

vii. The thesis shall be examined by one examiner selected by the University. For this, Head of the Department shall submit a panel of 3 examiners, who are eminent in that field with the help of the concerned guide.

viii. If the report of the examiner is not favorable, the candidate shall revise and resubmit the thesis, in the time frame as described by DRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

ix. If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner. The Board shall jointly report candidates work as:
1. Excellent
2. Good
3. Satisfactory
4. Unsatisfactory

Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination.

x. If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination within three months.

Semester I

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT 111	English Communication	3	1	0	4	30	70	100
2	BT 112	Engineering Mathematics-1	3	1	0	4	30	70	100
3	BT 113	Engineering Physics	2	1	0	3	30	70	100
4	BT 114	Engineering Chemistry	2	1	0	3	30	70	100
5	BT 115	Basic Electrical Engineering	3	1	0	4	30	70	100
6	BT116	Computer Fundamentals and Programming	3	1	0	4	30	70	100
7	BTL 11	Engineering Physics Lab.	0	0	3	2	50	50	100
8	BTL 12	Engineering Chemistry Lab.	0	0	3	2	50	50	100
9	BTL 13	Basic Electrical Engineering Lab	0	0	3	2	50	50	100
10	BTL 14	Basic Programming Lab	0	0	3	2	50	50	100
11		Tarseel-e-Urdu.	2	0	0	-	30	70	100
		Total				30	410	690	1100

Semester II

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT 121	Mathematics – II	3	1	0	4	30	70	100
2	BT 122	Basic Engineering Mechanics	3	0	0	3	30	70	100
3	BT 123	Engineering Graphics	2	0	3	4	30	70	100
4	BT 124	Basic Electronics	3	1	0	4	30	70	100
5	BT 125	Environmental Studies	3	0	0	3	30	70	100
6	BT 126	Computer Programming using C++	3	1	0	4	30	70	100
7	BTL 21	English Language Communication Skills Lab	0	0	3	2	50	50	100
8	BTL 22	Engineering workshop & IT work shop	0	0	3	2	50	50	100
9	BTL 23	Computer Programming using C++ Lab	0	0	3	2	50	50	100
		Total				28	330	570	900

Semester III

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT 231	Probability & Statistics	3	1	0	4	30	70	100
2	BT 232	Mathematical Foundations of Computer Science	3	1	0	4	30	70	100
3	BT 233	Data Structures	3	1	0	4	30	70	100
4	BT 234	Computer Organization	3	1	0	4	30	70	100
5	BT 235	Digital Logic Design	3	1	0	4	30	70	100
6	BTL 31	Data Structures Using C/C++ Lab.	0	0	3	2	50	50	100
7	BTL 32	Computer Organisation and Digital Logic Design Lab.	0	0	3	2	50	50	100
		Total				24	250	450	700

Semester IV

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT 241	Java Programming	3	1	0	4	30	70	100
2	BT 242	Data Base Management System	3	1	0	4	30	70	100
3	BT 243	Operating System	3	1	0	4	30	70	100
4	BT 244	Formal Languages and Automata Theory	3	1	0	4	30	70	100
5	BT 245	Managerial Economics And Financial Analysis	3	1	0	4	30	70	100
6	BTL 41	Java Programming Lab	0	0	3	2	50	50	100
7	BTL 42	Data Base Management Systems Lab	0	0	3	2	50	50	100
		Total				24	250	450	700

Semester V

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT 351	Data Communication & Computer Networks	3	1	0	4	30	70	100
2	BT 352	Design Analysis and Algorithms	3	1	0	4	30	70	100
3	BT 353	Compiler Design	3	1	0	4	30	70	100
4	BT 354	Principles of programming Languages	3	1	0	4	30	70	100
5	BT 355	Microprocessors & Assembly Language	3	1	0	4	30	70	100
6	BTL 51	Compiler Design & Computer Networks Lab	0	0	3	2	50	50	100
7	BTL 52	Microprocessors & Assembly language Lab	0	0	3	2	50	50	100
		Total				24	250	450	700

Semester VI

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT 361	Object Oriented Analysis and Design	3	1	0	4	30	70	100
2	BT 362	Computer Graphics	3	1	0	4	30	70	100
3	BT 363	Software Engineering	3	1	0	4	30	70	100
4	BT 364	Data Ware Housing and Data Mining	3	1	0	4	30	70	100
5	BT 365	E-Commerce / Operation Research	3	1	0	4	30	70	100
6	BTL 61	Unified Modeling Language Lab	0	0	3	2	50	50	100
7	BTL 62	Computer Graphics Lab	0	0	3	2	50	50	100
		Total				24	250	450	700

Semester VII

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT471	Linux Programming	3	1	0	4	30	70	100
2	BT472	Software Testing Methodologies	3	1	0	4	30	70	100
3	BT473	Web Technologies	3	1	0	4	30	70	100
4	BTL71	Linux Programming Lab	0	0	3	2	50	50	100
5	BTL72	Web Technologies Lab	0	0	3	2	50	50	100
6	BTD71	Minor Project	0	0	8	4	50	50	100
		ELECTIVE – I	3	1	0	4	30	70	100
		Total				24	270	430	700

S.No.	ELECTIVE – I
1	BTE71- Cloud Computing
2	BTE72- Distributed Computing
3	BTE73- Mobile Computing
4	BTE74- Software Project Management
5	BTE75 – Soft Computing

Semester VIII

S. No	Course Code	Course Name Subject	L	T	P	Credits	Internal Marks	External Marks	Total Marks
1	BT481	Network Security	3	1	0	4	30	70	100
2	BTD81	Major Project	0	0	24	12	200	200	400
3		ELECTIVE – III	3	1	0	4	30	70	100
4		ELECTIVE – IV	3	1	0	4	30	70	100
		Total				24	290	410	700

S.No.	ELECTIVE – III	ELECTIVE – IV
1	BTE81- Web Services	BTE86-Adhoc and Sensor Networks
2	BTE82-Semantic Web and Social networks	BTE87-Storage area Networks
3	BTE83-Scripting Languages	BTE88-Database Security
4	BTE84-Multimedia and Rich Internet applications	BTE89-Embedded System
5	BTE85 – Artificial Intelligence	

Semester IX

Course No.	Course Title	Contact periods per week			Credits	Internal Marks	External Marks	Total Marks
		Lecture L	Tutorial T	Practical P				
MT111	Network and Computer Security	3	1	0	4	30	70	100
MT112	Advanced Computer Architecture	3	1	0	4	30	70	100
MT113	Neural Networks	3	1	0	4	30	70	100
MT114	Distributed Databases	3	1	0	4	30	70	100
	Elective-I	3	1	0	4	30	70	100
MTL11	Distributed Databases Lab	0	0	4	2	50	50	100
MTL12	Seminar	0	0	4	2	50	50	100
	Total	15	5	8	24	250	450	700

Semester - X

MT121	Advanced Operating Systems	3	1	0	4	30	70	100
MT122	Data Structure and Algorithm Design	3	1	0	4	30	70	100
MT123	Distributed Systems	3	1	0	4	30	70	100
	Elective-II	3	1	0	4	30	70	100
	Open Elective	3	1	0	4	30	70	100
MTL21	Data Structure and Algorithm Design Lab	0	0	4	2	50	50	100
MTL22	Comprehensive Viva	-	-	-	2	50	50	100
	Total	15	5	4	24	250	450	700

Semester - XI

MTR31	Dissertation Part - I	-	-	-	12	200	400	600
	Total	-	-	-	12	200	400	600

Semester - XII

MTR41	Dissertation Part - II	-	-	-	20	200	400	600
	Total	-	-	-	20	200	400	600
	Grand Total				80	830	1570	2400

List of electives at Masters Level

Course No.	Course Title	Contact periods per week			Credits
		Lecture L	Tutorial T	Practical P	
	Elective-I				
MTE11	Parallel Algorithm	3	1	0	4
MTE12	Pattern Recognition	3	1	0	4
MTE13	Wireless Mobile Network	3	1	0	4
MTE14	Wireless & Mobile Communication	3	1	0	4
MTE15	Machine Learning	3	1	0	4
MTE16	Fuzzy Systems	3	1	0	4
	Elective-II				
MTE21	Real Time System	3	1	0	4
MTE22	Software Metrics	3	1	0	4
MTE23	Software Quality Engineering	3	1	0	4
MTE24	Cluster and Grid Computing	3	1	0	4
MTE25	Natural Language Processing	3	1	0	4
MTE26	Applied Cryptography	3	1	0	4
	Open Elective				
MTO21	Human Computer Interaction	3	1	0	4
MTO22	Bioinformatics	3	1	0	4
MTO23	Information Security and Cyber Laws	3	1	0	4

Semester I

S. No	Course Code	Course Name Subject	L	T	P	Credits
1.	BT 111	English Communication	3	1	0	4
2.	BT 112	Engineering Mathematics-1	3	1	0	4
3.	BT 113	Engineering Physics	2	1	0	3
4.	BT 114	Engineering Chemistry	2	1	0	3
5.	BT 115	Basic Electrical Engineering	3	1	0	4
6.	BT116	Computer Fundamentals and Programming	3	1	0	4
7.	BTL 11	Engineering Physics Lab.	0	0	3	2
8.	BTL 12	Engineering Chemistry Lab.	0	0	3	2
9.	BTL 13	Basic Electrical Engineering Lab	0	0	3	2
10.	BTL 14	Basic Programming Lab	0	0	3	2
11.		Tarseel-e-Urdu.	2	0	0	-
		Total				30

Semester I

BT111-ENGLISH COMMUNICATION

L T P: 4-0-0

UNIT 1
1. Writing paragraphs
2. Reading for subject
3. Types of nouns and pronouns
4. Homonyms, homophones, synonyms and antonyms

UNIT 2
1. Reading for theme and gist
2. Describing people, places objects, events
3. Verb forms
4. Noun, verb, adjective and adverb

UNIT 3
1. Note-taking
2. Reading for details
3. Note-making, information transfer
4. Present tense

UNIT 4
1. Reading for specific details and information
2. Writing formal letters and CVs
3. Past and future tenses
4. Vocabulary – Idioms and phrases

UNIT 5
1. Technical reports, project reports
2. Adjectives, prepositions and concord
3. Collocations

Text Book:
1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.

Reference Books:-
1. English Grammar Practice, Raj N Bakshi, Orient Longman.
2. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
3. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
4. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
5. Enjoying Every day English published by sangam books, Hyderabad

BT112-ENGINEERING MATHEMATICS – I

L T P: 3-1-0

UNIT II:
Differential Calculus Rolle's theorem-Lagrange's and Cauchy's mean value theorems – Generalized mean value theorem – Curvature, radius of Curvature, Centre of curvature –Evolutes and Involutes – Envelopes in Cartesian and parametric coordinates – Jacobians and their properties.

UNIT II:
Improper Integration: Beta and Gamma functions,Beta function,various forms of beta function,properties of gamma function,Relation between beta and gamma function,complete function of gamma function

UNIT III:
Multiple Integration and applicatications- Double integrals in Cartesian coordinates,double integral in polar coordinates,change of variables, – Change of order of integration.Triple integration .Application of multiple integration.

UNIT IV:
Differential Equations I-Differential equations an overview –Exact and equations reducible to exact form using Integrating factors - Linear, Bernoulli 's equations – Applications to Newton's Law of Cooling – Law of natural growth and decay – Orthogonal Trajectories in Cartesian and polar form

UNIT V:

Differential equations II-Linear differential equations of higher order with constant coefficients – complementary function and Particular Integrals - General form of Particular Integrals and special types such as e^{ax} ,cosax, sinax, x^m, $e^{ax}V$, xV, method of variation of parametersfor a second order differential equation – Applications to bending of beams, electrical circuits and simple harmonic motion.

Text Books:
1. Advanced Engineering Mathematics by B.S Grewal.
2. Advanced Engineering Mathematics by Kreyzsig

Reference Books:
1. Differential Calculus by shantinarayana
2. Engineering Mathematics by B.V Ramana

BT113-ENGINEERING PHYSICS

L T P: 2-1-0

UNIT-I

Physics of Motion: Conservative & non conservative forces, Potential energy function in one, two and three dimensions, equation of motion for a conservative system (in one dimension), effect of friction on simple harmonic motion.

Special theory of relativity: Non relativistic view point, inertial and non-inertial frames, Galilean transformations, principle of relativity, Lorentz transformations and their consequences, mass, momentum and energy in relativity.

UNIT-II

Optics: Interference of light, Double slit and triple slit interference, Newton's rings, interference in thin films, single slit diffraction, N slit diffraction.

Introduction to lasers: qualitative introduction to lasers, uses of lasers. Principle of laser action, population inversion, Einstein coefficients, elementary laser types, applications of lasers.

UNIT-III

Electromagnetism: Maxwell's equations, wave equation, plane electromagnetic wave, Poynting vector, electromagnetic spectrum.

Quantum theory: Wave function, probability density, Schordinger equation, free article, particle in a box, system of two dissimilar particles, system of two identical particles.

UNIT-IV

Quantum Ideas: Photoelectric effect, Compton effect, Planck hypothesis, Bohr

theory, de Broglie hypothesis, wave particle duality, uncertainty principle and its implications.

Physics of Solids: Classification of solids, Bragg diffraction technique, Electrical properties of solids, thermal properties, classical free electron model for metals, critical assessment of the model. Classical and quantum statistics, quantum free electron model of metals, critical assessment of the model, Fermi energy, intrinsic and extrinsic semiconductors, electron and hole densities, properties of semiconductors.

UNIT-V

Frontiers of Physics: Big bang model of the universe, critical assessment of the model, elementary particles and conservation laws, Last Nobel Prize in Physics.

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Precipitation, Combustion Methods; Top-down **Fabrication:** Chemical Vapour Deposition, Physical Vapour Deposition, Pulsed Laser Vapour Deposition Methods, Characterization(XRD&TEM) and Applications.

Text Books:
1. Beiser : Modern Physics
2. Mani and Damask : Modern Physics
3. Garcia and Damask : Physics for computer science
4. Thyagrajan : Laser

Reference Books:
1. Resnick and Halliday : Physics
2. M. Ratner & D. Ratner (Pearson Ed.): Nanotechnology
3. A.J. Decker (Macmillan): Solid State Physics
4. C. Kittel (Wiley Eastern): Introduction to Solid State Physics

BT114-ENGINEERING CHEMISTRY

UNIT I: **L T P: 2- 1-0**
Water Treatment: Hardness of water, types of hardness, unites of hardness of water, determination of hardness of water by EDTA method. Boiler troubles - scale and sludge formation in boilers, caustic embrittlement, priming and foaming, Softening of water- Lime soda, permutit and ion exchange process. Problems

UNIT II:
Reactivity of Organic Molecules & Types of Reaction and Mechanism : Inductive effect, Resonance or Mesomeric effect, Electromeric effect, Hyper conjugation,Carbocation, Carbanion & Free radical. Substitution, Addition and Elimination reaction. Mechanism of the following reactions Aldol condensation, Cannizzaro reaction, Hoffmann reaction & Diels-Alder reaction

UNIT III
Fuels and Combustion: Classification of fuel and Characteristic of a good fuel-conventional fuels (solid, liquid, gaseous). Solid fuels- Coal – analysis- (proximate and ultimate) and their significance. Liquid fuels – petroleum and its refining – Cracking – types – fixed bed catalytic cracking. Knocking – octane and cetane number. Synthetic petrol – Bergius and Fischer Tropsech's process, Gaseous fuels: Constituents, characteristics and applications of natural gas, LPG and CNG. Calorific value of fuel – HCV, LCV, determination of calorific value by Bomb Calorimeter, theoretical calculation of calorific value by Dulong's formula – Numerical problems on combustion.

UNIT IV
Corrosion and its control: Causes, Theories of corrosion – Chemical and electrochemical corrosion, Water line and pitting corrosion; Factors affecting rate of corrosion – Nature of metal and Nature of environment. Corrosion control Methods: using pure metal and alloys, modifying the environment, cathodic protection (sacrificial anodic and impressed current cathodic). Surface coatings: Metallic coatings & methods of application of metallic coatings – hot dipping (galvanization & tinning), electroplating.

UNIT V
Lubricants: Classification – solid, semi-solid and liquid lubricants, characteristics of a good lubricant. Mechanism of lubrication – (Hydrodynamic, boundary and extreme pressure) - Properties of lubricants: viscosity, flash and fire points, cloud and pour point.
Refractories: Classification – acidic, basic and neutral refractories, characteristics Of good refractory, properties of Refractories: refractoriness, refractoriness under load (RUL), porosity, thermal spalling and thermal conductivity, applications of refractories

Text Books:-

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008)
2. Engineering Chemistry by R.P Mani and K.N.Mishra, B. Rama Devi /CENGAGE learning

Reference Books
1. Engineering Chemistry by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi(2006)
2. Enginering Chemistry J.C. Kuriacase & J. Rajaram, Tata McGraw Hills co., New Delhi (2004).
3. Chemistry of Engineering Materials by CV Agarwal,C.P Murthy, A.Naidu, BS Publications.
4. Text of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co,New Delhi(2006)
5. Applied Chemistry – A text for Engineering & Technology – Springar (2005).
6. Text Book of Engineering Chemistry – Shasi Chawla, Dhantpat Rai publishing Company, NewDelhi (2008).
7. Engineering Chemistry – R. Gopalan, D. Venkatappayya, D.V. Sulochana Nagarajan Vikas Publishers (2008).

BT115-BASIC ELECTRICAL ENGINEERING

L T P: 3-1-0

UNIT – I
Introduction to Electrical Circuits: Essence of electricity, conductors, semiconductors and insulators, electric current, electromotive force, electric power, potential difference, ohm's law,active and passive circuits,branch and loop in a circuit,types of sources, Kirchhoff's laws ,network reduction techniques– series, parallel and series parallel combination– Source transformation – star-to-delta ,delta-to-star transformation,Thevenin's theorem,Norton theoremand with simple related problems.

UNIT – II
Single Phase A.C Circuits: Principle of a.c ,sinusoidal emf equation, relationship between poles ,speed and frequency ,average value, RMS, form factor ,peak factor, phasor representation of alternating quantities ,the J -operator and phasor algebradifference,J- notation for alternative quantity, analysis ac circuits with single basic network element, single phase series circuits,single phase parallel circuits,single phase series parallel circuits, power in ac circuits and with simple related problems.

UNIT – III
Transformers: Principle of operations, construction details ,emf equation of transformer, types of transformer, ideal transformer and practical transformer, losses in a transformer, transformer test-open circuit ,short circuit, voltage regulation,effieiency and with simple related problems.

UNIT – IV
D.C Generators: Working principle of generator and constructional of dc generator, types of dc armature windings- lap and wave windings ,types of dc generators: methods of excitation, separately excited and self excited dc generators ,emf equation of a dc generator ,constant and variable losses,efficiency and condition for maximum efficiency and with simple related problems.

UNIT – V
D.C Motors: Working principle of dc motor ,significance of back emf equation, types of dc motors-shunt ,series and compound wound motor, production of torque in a dc motor, Characteristics of series, shunt and compound motor,losses in a dc motor, efficiency and maximum efficiency, application of dc motor and with simple related problems.
Induction Motors: Working principle, constructions of three phase Induction Motor, synchronous speed, torque, slip, rotor frequency, torque, torque-speed characteristic, application, and with simple related problems.

Text Books:
1. Network Analysis by Vanvalkenburg, PHI.
2. Network Theory: - N.C. Jagan & C.Lakshminarayana, B.S Publications.
Reference Books:
1. Electrical machines: P.S.bimbra, khanna publishers.
2. Electrical Circuits: S.Sudhakar, P.S.M.Satyanarayana, TMH Publication.
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata McGraw – Hill Publishers, 3rd edition,2004.

BT116-COMPUTER FUNDAMENTALS AND PROGRAMMING

L T P: 3-1-0

UNIT – I
Introduction to Computers – Role of computers, Definition, Characteristics and Applications, Generations of Computer, Basic block diagram. CPU, Primary and Secondary storage devices and I/O Devices. **Information Concepts:** Data and its representation, Information and its characteristics, categories of information, Introduction System software and Application Software. Generation of computer languages, types of languages, language translators – Assembler, Interpreter, Compiler, Link and Loader. Introduction to Computer Networks, History and usage of Internet, Browser and its types, Domain Name System (DNS), WWW, Electronic Mail (e-mail), Search Engines and Intranets.

UNIT-II
Introduction to programming – definitions and developing Algorithms and flowcharts for simple programs. Introduction to C Programming: Origin and history of c programming character set, Identifiers and keywords data types, constants, variables operators, symbolic constants, Expressions, compound statements, structure of C program, Input and output function.

UNIT – III
C Statements – selection statements – if nested if's, the if-else –if ladder the conditional expressions, switch statement nested switch statements, iteration statements – the for loop, for loop variations, the while loop, the do-while loop, declaring variable with in selection and iteration statements, jump statement, the return statement, the go to submit, break statement, exit ( ) function, the continue statement, expression statement. Block statements

UNIT – IV
Arrays – Array what is an array? – Array Declaration, Array Initialization – Accessing individual elements of an array – Two Dimensional Arrays – Passing an array element to a function – Rules of using an array. What are strings? String I/O, string Manipulation Functions – The General Form of a Function, elements of function, function categories, types of functions, Function Arguments Call by value, Call by Reference, return statement. Uses of functions. C pre – processor, storage classes – Automatic – Register, Static and external.

UNIT – V
Pointers – definition, pointer variables, pointer expressions, arithmetic pointers, pointers and arrays, initializing pointers and functions and problems with pointers. **Structures** – definition, accessing structure members, structure assignments, array of structures, passing structures, structure pointers, uses of structures **Unions** – definitions, difference between structure and union, type def. **Files** – introduction to streams and files, basics of files – file pointer, opening and closing files, writing and reading character, file functions.

Text Books:
1. Let Us C by Yashwanth Kanethar.
2. "Programming in ANSI C" by E. Balaguruswamy.
3. Programming in C, 2nd Edition, Oxford by Pradip Dey, Mannas Ghosh.

Reference Books:
1. Introduction to Computers by Peter Norton.
2. Introduction to Information Technology – Breaking Wave.

BTL11-ENGINEERING PHYSICS LAB

L T P: 0-0-3

List of Experiments

1. Dispersive power of the material of a prism – Spectrometer

2. Determination of wavelength of a source – Diffraction Grating.

3. Newton's Rings - Radius of curvature of plano convex lens.

4. Melde's experiment – Transverse and longitudinal modes.

5. Time constant of an R-C circuit.

6. L-C-R circuit.

7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.

8. Study the characteristics of LED and LASER sources.

9. Study the characteristics of p-i-n and avalanche photodiode detectors.

10. Bending losses of fibres.

11. Evaluation of numerical aperture of given fibre.

12. Energy gap of a material of p-n junction.

13. Thermo electric effect – Seebeck effect and Peltier effect.

14. Torsional pendulum.

15. Single slit diffraction using laser.

BTL12-ENGINEERING CHEMISTRY LAB

L T P: 0-0-3

List of Experiments

1. Determination of carbonate and bicarbonate in a given mixture
2. Determination of temporary and permanent hardness in water sample using EDTA as standard solution
3. Determination of copper using standard sodium thiosulphate
4. Determination of chloride content in bleaching powder
5. Determination of iron content in the given water sample by Mohr's methods
6. pH- metric titration of acid and base
7. Conductometric titration of acid and base
8. Titration of acid and base by Potentiommetry
9. Recording of Cu^{+2} Spectrum, absorptivity (demo only) determination of λ_{max} and molar concentration by Spectrophotometer
10. Preparation of organic compound benzoic acid

Text Books:
1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

Reference Books:
1. Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

BTL13-BASIC ELECTRICAL ENGINEERING Lab

L T P: 0-0-3

List of Experiments

1. Verification of Thevenin's and Norton Theorems
2. Study of Single –Phase R,L & C Series & Parallel Circuits
3. To Determine the Performance Characteristics of a Series Motor
4. To Determine the Performance Characteristics of a Shunt Motor
5. To Determine the Performance Characteristics of a Compound Motor
6. Speed Control of DC Shunt Motor
7. To Determine the Load Characteristics of a Shunt Generator
8. To Determine the Load Characteristics of a Single Phase Induction Motor
9. Measurement of Three Phase Power by Two Wattmeter Method
10. To Determine the Performance Characteristics of a Three Phase Induction Motor

Text Books:-

1. Basic Electrical Engineering, S.N. Singh, PHI, Learning Private Limited.
2. Electrical Machines M. N. Bandyopadhya, PHI, Learning Private Limited.

Reference Books:-

1. Electrical Machines, Ashfaq Husain, Dhanpatrai Company, 4th edition.
2. Basic Electrical Engineering, D.C. Kulshreshtha, revised 1st edition, Tata Mc-Graw Hill education pvt. Ltd.
3. Testing Commissioning Operation & Maintenance Of Electrical Equipment – S. Rao Khanna Publication

BTL14-PROGRAMMING LAB in C

LTP: 0-0-3

List of Experiments

1. Write C program to input and output the text message.
2. Write C Program to perform all arithmetic operations.
3. Write C Program to utilize the math function.
4. Write C Program to perform the mathematical expressions.
5. Write C Program for Local and Global Variables.
6. Write C Program for internal static and external static variables.
7. Write C Program to find the roots of a Quadratic equation.
8. Write C Programs for all the Operators. (Arithmetical, Logical, Relational, Bitwise).
9. Write C Programs for Increment and Decrement Operators.
10. Write C Programs to implement the Ternary Operator.
11. Write C Programs for special Operators.
12. Write C Programs for all the Control Structures. (Sequential Control Structures, Conditional Control Structures, Iterative Control Structures).
13. Write C Programs to display the different types of patterns using nested for loop.
14. Write C Program for Statements. (switch, break, goto, continue etc.,).
15. Write C Program to print biggest number from n numbers.
16. Write a C Program to find the given integer number is even or odd number.
17. Write a C Program to calculate the factorial of a given number.
18. Write a C Program to swap the two numbers using temp variable and without using temp variable.
19. Reading and Printing a single dimensional array of elements.
20. Ascending and descending of an array.
21. Sum of all odd numbers and sum of all even numbers in a single dimensional array.
22. Mathematical operations on single dimensional arrays.
23. Reading and Printing a multi-dimensional array of elements.
24. Mathematical operations on multi-dimensional array of elements.
25. Passing an array element to a function.
26. Reading and Printing a string.
27. C Programs on String functions.
28. Write a C program to calculate string length by writing the user-define function.
29. Function declaration and initialization.
30. C Program to differentiate the parameters and arguments in functions.
31. Programs for different types of inbuilt functions.
32. Call by value and Call by reference programs in functions.
33. Write a program to swap the given 2 number using passing by reference.
34. Write C Programs to perform all valid arithmetic operations using pointers.
35. C programs on Structures and accessing of members of the structures.
36. Write a C program to print a book information (Book name, Book no, author name) by writing a structure.
37. Write a C program by passing structure elements to a function and display employee Information (emp no, emp name, emp salary, and emp address).
38. C Programs on Reading a file from the secondary storage device.
39. C Program on writing and appending a file on the secondary storage device.
40. C Program on Opening and closing a file

Text Books:

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications.
2. Let Us C by Yashwanth Kanethar.

Reference Books:

1. Programming in ANSI C by E. Balaguruswamy.
2. Programming in C, 2nd Edition, Oxford by Pradip Dey, Mannas Ghosh.

Semester II

S. No	Course Code	Course Name Subject	L	T	P	Credits
1.	BT 121	Mathematics – II	3	1	0	4
2.	BT 122	Basic Engineering Mechanics	3	0	0	3
3.	BT 123	Engineering Graphics	2	0	3	4
4.	BT 124	Basic Electronics	3	1	0	4
5.	BT 125	Environmental Studies	3	0	0	3
6.	BT 126	Computer Programming using C++	3	1	0	4
7.	BTL 21	English Language Communication Skills Lab	0	0	3	2
8.	BTL 22	Engineering workshop & IT work shop	0	0	3	2
9.	BTL 23	Computer Programming using C++ Lab	0	0	3	2
		Total				28

BT121- MATHEMATICS – II

L T P: **3-1-0**

Unit I:

(Matrices I)- Rank of a Matrix and methods of finding the rank, Inverse of a matrix by elementary row transformations (Gauss_Jordan) method, Linear system of homogeneous and non-homogeneous equations – consistency, Linear transformations, Eigenvalues and Eigen vectors, Cayley – Hamilton Theorem and its application to find the inverse of a square matrix.

Unit II:

(Matrices II)-Linear Transformations, Diagonalization of matrices, symmetric, Skew symmetric, Hermitian and Skew Hermitian matrices, Orthogonal matrices and their properties, Quadratic and canonical forms and their nature, - rank, signature and index of quadratic forms, Complete matrices.

Unit III:

Partial differential equations -Formation of Partial differential equations by eliminating the arbitrary constants and arbitrary functions, Solution of partial differential equations (Lagranges method), Non- linear differential equations of order one (Special forms), Method of Separation of variables for solving one dimensional wave equation and heat equation and problems.

Unit IV:

Laplace Transforms-Laplace transform of standard functions-inverse transform-first shifting theorem, transform of derivatives and integrals-unit step function-second shifting theorem-diracs delta function-convolution theorem-periodic function-differentiation and integration of transforms- application of Laplace transform to ordinary differential equations.

Unit V:

Numerical Analysis-Numerical Differentiation, Numerical Integration-Trapezoidal rule, Simpson's One-Third rule, Simpson's Three-Eighth rule and Weddle's rule, fitting of curves like straight line, parabola and exponential by the method of least squares, numerical solution of ordinary differential equations by Euler's method, modified Euler's method and Runge -kutta methods.

Text Books:-

1. Matrices by A. R Vasistha
2. Partial Differential Equation by Sneddon
3. Laplace Transform by Schwaum series

Reference Books:-

1. Numerical Analysis by Shastry
2. Engineering Mathematics by B.V Ramana

BT122-BASIC ENGINEERING MECHANICS

L-T-P: 3-1-0

UNIT I:
Fundamental of Engineering Mechanics: Basic Concepts. **System of forces:** Resultant Coplanar Concurrent forces, Moment of force, Principle of Transmissibility, Varignon's theorem, Moment of couples and Resultant of forces systems. **Equilibrium of systems of forces:** Equations of equilibrium of coplanar systems, Lami's theorem and conditions for equilibrium, Application in solving the problems on static equilibrium of bodies.

UNIT II:
Centroid and Moment of Inertia: Locating of centroid, Centroid of lines elements, plane areas and composite areas, Moment of inertia, First moment of inertia, Second moment of inertia, Polar moment of inertia, Radius of gyration, Parallel axis theorem, Mass Moment of Inertia.

UNIT III:
Friction: Introduction, Types of friction, Limiting friction, Static & Dynamic friction, Laws of friction, Angle of friction, Friction of motion of bodies, Application of fiction- Ladder, Wedge, Screw -jack, and Differential screw jack.

UNIT IV:
Kinematics: Rectilinear motion of particles-Equations of motion for constant acceleration-motion under gravity-Variable acceleration, Curvilinear motion of particles- Equation of motion in rectangular- cartesian coordinate, tangential-normal coordinate and radial-transverse coordinate, Motion of projectile, Kinematics of rigid bodies: Translation- Rotation and General plane motion.

UNIT V:
Kinetics: Newton's second law of motion, Motion of lift, D'Alembert's principle, Work energy principle, Principle of conservation of energy, Linear Impulse & Momentum, Conservation of momentum, Direct central impact and coefficient of restitution, Impulse - momentum principle, Kinetics of rigid bodies in translation and rotation, Equation of circular motion-Fixed axis of rotation.

Text books:-

1. Engineering Mechanics by R.K. Bansal **,** Laxmi Publications.
2. Engineering Mechanics by Chandramouli P.N, PHI Learning Pvt. Ltd

Reference Books:-

1. Engineering Mechanics by R.S.Khurmi ,S.Chand Publications.

BT123-ENGINEERING GRAPHICS

L T P: 2- 0- 3

UNIT – I:
Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Drawing Instruments and their Use, Conventions in Drawing, Lettering, BlS Conventions.
Curves Used in Engineering Practice & their Constructions: a) Cycloid, Epicycloid and Hypocycloid. b) Involutes. **Scales:** Construction of different types of Scales, Plain, Diagonal, Vernier scale.

UNIT–II:
Drawing of Projections or Views Orthographic Projection in First Angle Projection: Principles of Orthographic Projections-Conventions-First and Third Angle projections. **Projections of Points.** Including Point in all quadrants**. Projection of Lines-** Parallel, perpendicular, inclined to one plan and inclined to planes. True lengths and true angle of a line. Traces of a line.

UNIT–III:
Projections of Planes: Projections of regular planes parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference plane.
Projections of Solids: Projections of regular solids, cube, prism, pyramids, tetrahedron, cyclinder and cone, axis inclined to both plane.

UNIT – IV:
Sections and Sectional Views: Right Regular Solids- Prism, Cylinder, Pyramid, Cone -use of Auxiliary views.
Development of Surfaces: Development of Surfaces of Right Regular Solids- Prisms, Cylinder, Pyramid, Cone and their parts. Frustum of Solids.

UNIT – V:
Isometric Projections: Principles of Isometric Projection, Isometric scale, Isometric views-Conventions- Plane Figures, Simple and Compound Solids. **Transformation of Projections:** Conversion of Isometric Views to Orthographic views, Conventions Orthographic views to Isometric Views - simple objects.

Text Books:-

1. Engineering Drawing - Basant Agrawal. TMH.
2. Engineering Drawing, N.D. Bhat / Charotar.
3. Engineering Drawing and Graphics, Venugopal / New age International.

Reference Books:-

1. Engineering Drawing- P.J. Shah. / S. Chand.
2. Engineering Drawing- Narayana and Kannaiah / Scitech Publishers.
3. Engineering Drawing- Johle / Tata Mcgraw Hill.
4. Computer Aided Engineering Drawing- Trymbaka Murthy / I.K. International.
5. Engineering Drawing- Grower.Age Publications.

BT124-BASIC ELECTRONICS

L T P: 4 -0-0

UNIT – I
Semi-Conductor Theory: Energy Levels, Intrinsic and Extrinsic semi conducts, Mobility, Diffusion and Drift current. Hall Effect, Characteristics of P – N Junction diode, Parameters and Applications. **Rectifiers:** Half wave and Full wave Rectifiers (Bridge, Centre tapped) with and without filters, ripple regulation and efficiency.

UNIT – II
Transistors: Bipolar and field effect transistors with their h – parameters equivalent circuits.
Basic amplifiers classification and their circuits (Qualitative treatment only).**Regulators and Inverters:** Zener Diode regulator, Transistorized an IC regulators and simple Inverter circuits.

UNIT – III
Feedback Concepts: Properties of Negative Feedback Amplifiers, Classification, Parameters Applications. Oscillators – LC Type and RC Type Oscillators and Crystal Oscillators (Qualitative treatment only)

UNIT – IV
Operational Amplifiers: Basic principle – Characteristics and Applications (Summer Adder, Integrator, Differentiator, Instrumentation Amplifier).**Digital Systems:** Basic Logic Gates, half, Full Adder and Subtractors.

UNIT – V
Data Acquisition Systems: Study of transducer (LVDT, Strain gauge, Temperature, Force). Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD SCR, TRAIC, DIAC, UJT Construction and Characteristics only. **Display Systems:** constructional details of C.R.O and Applications.

Text Books:-

1. Jocob Millman, Christos C. Halkias and Satyabrata Jit, Electronics Devices and Circuits, McGraw Hill, 3/e., 2010.
2. Rama Kanth A. Gaykward, Op-AMPS and linear Integrated Circuits – EEE, 3/e., 1998.

Reference Books:-

1. Morris Mano, Digital Design, PHI, 3/e., 2009.
2. Cooper, Electronic Measurements and Instrumentations, 3/e., 1998.
3. S. Shalivahnan, N. Suresh Kumar, A Vallavea Raj, Electronic Devices and Circuits, RMH, 2003.

BT125-ENVIRONMENTAL STUDIES

L T P: 3-0-0

UNIT-1:
Evironmental Studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; use and over utilization of surface and ground water, floods, drought, conflicts over water, dams - benefits and problems, water logging, salinity. Energy resources, growing energy needs, renewable and non – renewable energy sources.

UNIT – II
Ecosytems: Concepts of an ecosystem, structure and functions of an ecosystem, producers,consumers and decomposers, energy flow in ecosystem, food chains, aquatic ecosystem (ponds, lakes, streams, rivers, oceans, estuaries).

UNIT – III
Biodiversity: Genetic, species and ecosystem diversity, bio-geographical classification of India.Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT – IV
Enivornmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste management.
Environment Protection Act: Air, water, forest and wild life acts, issues involved in enforcement of environmental legislation.

UNIT – V
Social Aspects and the Environment: Water conservation   and environmental ethics: Climate change, global warming, acid rain, ozone layer depletion.
Disaster Management: Types of disasters, impact of disasters on environment, infrastructure and development. Basic principles of disaster mitigation. disaster management cycle, and disaster management in India.

Text Books:-

1. A.K. De, Environmental Chemistry, New Age Publications, 2002.
2. E.P. Odum, Fundamentals of Ecology, W.B. Sunders Co., U.S.A.

Reference Books:-

1. G.L. Karia and R.A. Christain, Waste Water Treatment, Concepts and Design Approach, Prentice Hall of India, 2005.
2. Benny Joseph, Environmental Studies, Tata McGraw – Hill, 2005.
3. V.K. Sharna, Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 1999.

BT126-COMPUTER PROGRAMMING USING C++

L T P: 3 -1-0

UNIT – I
Principles of OOP: Programming paradigms, basic concepts, benefits of OOP, applications of OOP Introduction to C++: History of C++, structure of C++, basic data types, type casting, type modifiers, operators and control structures, input and output statements in C++. Classes and objects: class specification, member function specification, scope resolution operator, access qualifiers, instance creation.

UNIT-II
Functions: Function prototyping, function components, passing parameters, call by reference, return by reference, inline functions, default arguments, overloaded function. Pointers: Array of objects, pointers to objects, this pointer, dynamic allocation operators, dynamic objects.

UNIT – III
Constructors: Constructors, parameterized constructors, overloaded constructors, constructors with default arguments, copy constructors, static class members and static objects. Operator overloading: Overloading unary and binary operator, overloading the operator using friend function, stream operator overloading and data conversion.

UNIT – IV
Inheritance: Defining derived classes, single inheritance, protected data with private inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance, multi - path inheritance, constructors in derived and base class, abstract classes, virtual function and dynamic polymorphism, virtual destructor.

UNIT –V
Exception Handling: Principle of Exception handling, exception handling mechanism, multiple catch, nested try, rethrowing the exception. Streams in C++: Stream classes, formatted and unformatted data, manipulators, user defined manipulators, file streams, file pointer manipulation, file open and close. Templates: Template functions and Template classes.

Text Books:
1. Complete Reference of C++ by Herbert Schilde
2. Object Oriented Programming with C++ By E.Balaguruswamy

Reference Books:
1. Object Oriented Turbo C Plus Plus by Robert Lafore
2. Programming with C Plus Plus by D.RaviChandra
3. Object Oriented Turbo C Plus Plus by Balaguruswamy
4. C Plus Plus Premier Plus by Stephen Prata

BTL21-ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

L T P: 0-0-3

The following course content is prescribed for **the English Language Laboratory** sessions**:**

UNIT 1 Introduction to Phonetics – Speech Sounds – Vowels & Consonants
UNIT 2 Structure of Syllables – weak forms & strong forms
UNIT 3 Minimal pairs – word accent and stress shifts
UNIT 4 Intonation and common errors in pronunciation
UNIT 5 Conversation practice – oral presentation skills

      a. Greeting and leave taking, introducing oneself and others
      b. Apologizing, interrupting, requesting and making polite conversation
      c. Giving instructions and directions: speaking of hypothetical situations
      d. Narrating, expressing opinions and telephone interactions

Text Books:-

1. "Enjoying Every day English", Published by Sangam Books, Hyderabad
2. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.
3. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.

Reference Books:-

1. English Grammar Practice, Raj N Bakshi, Orient Longman.
2. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
3. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
4. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
5. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
6. Technical Communication, Meenakshi Raman, Oxford University Press
7. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education

BTL22-IT WORKSHOP & ENGINEERING WORKSHOP

L T P: 0-0-3

PC Hardware

Lab 1:

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Lab 2:

Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC.

Lab 3:

Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Hardware Troubleshooting:

Lab 4:

Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Lab 5:

Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email.

Lab 6:

Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Productivity tools

Word
Lab 7:

Word Orientation

The mentor needs to give an overview of Microsoft (MS) office 2007: Importance of MS office 2007 Word as word Processors, Details of the tasks that would be covered in each, MS word:

Formatting, Character Spacing, Borders and Colors, Inserting Header and Footer, Inserting table, Bullets and Numbering, Spell Check, Images from files and clip art, Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel
Lab 8:   **Excel Orientation**

The mentor needs to give an overview of Microsoft (MS) office 2007. Details of the tasks that would be covered using MS Excel:

Gridlines, Format Cells, Summation, Formatting Text, Formulae in excel – average, Rank, Result, Division, Charts, Renaming and Inserting worksheets, Conditional formatting.

Power Point
Lab 9:   **Power Point Orientation**

Students will be working on basic power point utilities and tools which help them to create basic power point presentation. Details of the tasks that would be covered using MS Power Point:

Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts, Background, textures, Design Templates, Hidden slides.

Text Books:-

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill Publishers.

Reference Books:-

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
3. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

ENGINEERING WORKSHOP

L T P: 0-0-3

List of Experiments

1. **Carpentry:** Study of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints. Practice in planning, chiselling, marking and sawing. Joints – Cross joint, T joint, Dove tail joint.

2. **Fitting**: Study of different fitting tools. Use and setting of fitting tools for marking, center punching, chipping, cutting, filing, drilling, their use, different measuring tools, Files – Material and Classification. Practice in filing, cutting, drilling and tapping. Male and female joints, Stepped joints.

3. **Plumbing:** Study of different plumbing tools. Details of plumbing work in domestic and industrial applications. Study of pipe joints, cutting, threading and laying of pipes different fittings using PVC pipes. Use of special tools in plumbing work. Practice of a domestic line involving fixing of a water tap and use of coupling, elbow, tee, and union etc.

TRADES FOR DEMONSTRATION & EXPOSURE:

1.   **House Wiring:** Study of wiring tools, industrial wiring, accessories, earthing, and safety precaution. Practice to make parallel and series connection of three bulbs, stair case wiring, florescent lamp fitting.
2. **Machine Tools**: Study and demonstration on working of machine tools. Lathe and Drilling machine.

 Text Books:-
                    1.   Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
                    2.   Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition
Reference Books:-
                    1.   Elements of Workshop Technology (Volume - 1): Hajra Choudhury

BTL23-COMPUTER PROGRAMMING USING C++ Lab

L T P: 0 -0-4

List of Experiments

1. Program on Pointers and structure
2. Program on type def.
3. Handling array elements using pointers.
4. Swapping of two numbers using pointers and a function
5. Sorting of any array using pointers and functions.
6. Pointer Arithmetic.
7. Sorting and array of structures.
8. Passing of individual elements of a structure to a function.
9. Passing of entire structure to function.
10. Structures – Arrays – Pointers.
11. Inline Function.
12. Function Overloading.
13. Programs on Classes.
14. Constructors, Destructors
15. Static Members.
16. Friend Function, Friend Class
17. Dynamic Memory Allocation using new and delete.
18. Pointer to object.
19. Overloading unary operator, Overloading binary Operators
20. Overloading binary operators using Friend function.
21. Single and Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance.
22. Constructors and Destructors in derived classes.
23. Virtual Function.
24. Programs on file handling using classes.

Semester III

S. No	Course Code	Course Name Subject	L	T	P	Credits
1.	BT 231	Probability & Statistics	3	1	0	4
2.	BT 232	Mathematical Foundations of Computer Science	3	1	0	4
3.	BT 233	Data Structures	3	1	0	4
4.	BT 234	Computer Organization	3	1	0	4
5.	BT 235	Digital Logic Design	3	1	0	4
6.	BTL 31	Data Structures Using C/C++ Lab.	0	0	3	2
7.	BTL 32	Computer Organisation and Digital Logic Design Lab.	0	0	3	2
		Total				24

BTL231-PROBABILITY & STATISTICS

L T P: 3-1-0

Unit I: Probability

Axioms of Probability, some elementary theorems, Addition theorem on probability, conditional Probability & problems, Baye's Theorem ,Random variables, types of random variables and their distribution functions.

Unit II: Distributions

Binomial Distribution, Poisson's distribution, Normal Distribution and its properties moment generating functions, coefficient of skewness, kurtosis. Sampling distribution, Distribution of mean (variance is known and unknown).

Unit III: Estimation and Testing of Hypothesis

Definitions, properties of good estimator, types of estimations, Large and small samples, Null Hypothesis and alternative hypothesis, types of errors, critical region. Z-test and t-tests for means and differences of means, chi-square test of goodness to fit and test of independence.

Unit IV: Correlation and Regression

Bivariate distribution, correlation, coefficient of correlation, regression coefficients, lines of regression, relation between regression coefficient and the two correlation coefficient, Karl Pearson's and Spearman's methods of finding correlation coefficients.

Unit V: Queuing Theory

Definition and types of queues, arrival pattern, Pure Birth and death processes, M/M/1 models.

Text Books:-
1. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text book of Probability & Statistics, Shahnaz Bathul, V. G. S. Book Links.
3. Fundamentals of statistical methods S.S. Gupta and V.C. Kapoor, S. Chand & Company.

Reference Books:-

1. Probability & Statistics, Arnold O. Allen, Academic Press.
2. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
3. Probability & Statistics, Mendan Hall, Beaver Thomson Publishers.
4. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

BTL232-MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

L T P: 3-1-0

UNIT I
Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT II
Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function, Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

UNIT III
Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorem, the principles of Inclusion – Exclusion.

UNIT IV
Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of Inhomogeneous Recurrence Relations.

UNIT V
Graph Theory: Representation of Graphs, DFS, BFS, Spanning Trees, Planar Graphs. Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text books:-

1. Mathematical Foundation of Computer Science – Shahnaz Bathul, PHI.
2. Elements of Discrete Mathematics- A Computer Oriented Approach,C.L.Liu, D.P. Mohapatra,3edition,TMH.
3. Discrete Mathematics for Computer Scientists & Mathematicians, second edition, J.L.Mott, A. Kandel, T.P. Baker, PHI
4. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition– Ralph. P.Grimaldi, Pearson Education.

Reference books:-

1. Discrete Mathematics and its applications, 6th edition, K.H.Rosen, TMH.
2. Discrete Mathematical Structures, Mallik and Sen, CengageLearning.
3. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI/ Pearson Education.
5. Discrete Mathematics with Applications,ThomasKoshy,Elsevier.
6. Logic and Discrete Mathematics, Grass Man and Tremblay,Pearson Education.

BT233-DATA STRUCTURES

L T P: 3-1-0

UNIT I:
Introduction to data structures and objectives, basic concepts Arrays: one dimensional, multi-dimensional, Elementary Operations.
Analysis of Algorithm: Time Complexity and Space Complexity, Big-O Notation, Omega Notation, Theta Notation.

UNIT II:
Stacks: Representation, elementary operations and applications such as infix to postfix, postfix evaluation, parenthesis matching **Queues:** Simple queue, circular queue, dequeue, elementary operations and applications. Recursion Technique, Tower of Honoi Problem.

UNIT III:
Linked lists: Linear, circular and doubly linked lists, elementary operations and applications such as polynomial manipulation.

UNIT IV:
Trees: Binary tree representation, tree traversal, complete binary tree, heap, binary search tree, height balanced trees like AVL tree, Huffman Tree, B Tree, B+ Tree and other operations and applications of trees.

UNIT V:
Graph: Undirected Graph, Directed Graph, Representation of Graph, Operation on Graph, Traversal in Graph, BFS (Breadth First Search), DFS (Depth First Search), Spanning Tree.
Algorithm: Warshall's Algorithm, Shortest Path Algorithm (Dijkstra), Prim's Algorithm, Kruskal's Algorithm.
Sorting: what is sorting, Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merging, Merge Sort, Radix Sort, Quick Sort, Heap Sort, Binary Tree Sort, Address Calculation Sort, Sequential Search, Binary Search.
Text Books:-

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

Reference Books:-

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

BTL234-COMPUTER ORGANIZATION

L T P: 3-1-0

Unit I:
Introduction: Function and structure of computer Functional components of a computer, Interconnection of components, Performance of a computer. Computer Organization and Architecture Basic structure of General purpose Computer with instruction set, Basic Computer and registers, Hardware Organization.

Unit II:
Registers Microoperations and Arithmetic Logic Structure: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Adder-Subtractor, Arithmetic Logic Shift Unit.

Unit III:
CPU Organization: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control Organization of a control unit-Operations of a control unit, Hardwired control unit, Microprogrammed control unit.

Unit IV:
Input Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA controlled I/O, Direct Memory Access, Input-Output Processor

Unit V:
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware

Text Books:-

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI

Reference Books:-

1. Computer Organization and Architecture–William Stallings Sixth Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
4. Fundamentals o r Computer Organization and Design, -Sivaraama Dandamudi Springer Int. Edition.
5. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
6. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

BT235-DIGITAL LOGIC DESIGN

L T P: **3-1-0**

UNIT I
Digital Computers and digital systems. Binary Numbers. Number based conversion. Octal and Hexadecimal Numbers. Signed Binary Numbers. Complements. Arithmetic Operations (Add and Subtract).

UNIT II
Logic Gates: NOT, AND, OR, NAND, NOR, Exclusive-OR and Equivalence. Logic Circuits. Binary Codes: BCD, ASCII and EBCDIC. Boolean Algebra. Basic Definition. Basic Theorems. Boolean Functions. Canonical Forms: Minterms & Maxterms. Simplification using SOP and POS. Simplification Using Map Method: Two- and Three- Variables Maps. Four-Variable Map. NAND and NOR Implementation. Don't Care conditions.

UNIT III
Combinational Logic Circuits: Adders and Sub tractors. Multilevel NAND. Multilevel NOR. Combinational Logic Circuit with MSI and LSI Binary Adders, Binary Sub tractor, Decoders, Multiplexers.

UNIT IV
Sequential Circuits: Flip-Flops. Analysis of Clocked Sequential Circuits. Flip-Flops: RS, D, JK and T. Flip-Flop Excitation Tables. Design Procedure.

UNIT V
Registers, Counters, Synchronous Counters, Shift Registers, Ripple Counter, Random Access Memory, Memory Decoding, Error correcting codes, PLA, PAL.

Text Books:-
1. DIGITAL DESIGN – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. FUNDAMENTALS OF LOGIC DESIGN, Roth, 5th Edition, Thomson.

Reference Books:-

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D. Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

BTL31-DATA STRUCTURES USING C/C++ LAB

L T P: 0-0-3

List of Experiments

1. Implementation of array operations, Structures & Unions.
2. Stacks, Queues, Circular Queues, Priority Queues, Multiple stacks and queues.
3. Infix to postfix expression using stack
4. Implementation of linked lists: stacks, queues, single linked lists.
5. Implementation of polynomial operations. Doubly linked lists.
6. Tree traversal: AVL tree implementation, application of trees.
7. Implementation of Hash Table.
8. Searching and sorting
9. Traversal of graph

BTL32- CO & DIGITAL LOGIC DESIGN LAB.

L T P: 0-0-3

List of Experiments

1. Bread Board Implementation of various logic gates

2. Bread Board Implementation of various logic gates using NAND gate.

3. Bread Board Implementation of various logic gates using NOR gate.

4. Bread Board implementation of Binary Adder (Half and Full) using general gates.

5. Bread Board implementation of Adder/Subtractor.

6. Bread Board Implementation of Flip-Flops.

7. Experiments with clocked Flip-Flop.

8. Design of Counters.

9. Bread Board implementation of counters & shift registers.

10. Implementation of Arithmetic algorithms.

Semester IV

S.No	Course Code	Course Name	Lectures	Tutorials	Practicals	Credits
1.	BT 241	Java Programming	3	1	0	4
2.	BT 242	Data Base Management System	3	1	0	4
3.	BT 243	Operating System	3	1	0	4
4.	BT 244	Formal Languages and Automata Theory	3	1	0	4
5.	BT 245	Managerial Economics And Financial Analysis	3	1	0	4
6.	BTL 41	Java Programming Lab	0	0	3	2
7.	BTL 42	Data Base Management Systems Lab	0	0	3	2
					TOTAL	24

BT241-Java Programming

L T P: 3 -1-0

UNIT I
Java Basics - Review of OOP concepts, History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this keyword, overloading methods and constructors, recursion, garbage collection, String Handling, Enumerations.

UNIT II
Inheritance – Inheritance concept, benefits of inheritance ,Super classes and Sub classes, Member access rules, Inheritance hierarchies, super keyword, preventing inheritance: final classes and methods, casting, polymorphism - dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

UNIT III
Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface. **Inner classes** – Uses of inner classes, local inner classes, anonymous inner classes, static inner classes.
Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

UNIT IV
Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally , re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions.
Multi-threading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, daemon threads.

UNIT V
APPLETS, JAVA GUI AND DATABASE CONNECTIVITY, Networking - Applets – Applet
life cycle methods – Applets based GUI – AWT Introduction - GUI components – Basics of Swings – Accessing database with JDBC basics- Types of Drivers – Basics of Network Programming, Addresses, Ports, Sockets, Simple Client and Server Program, Multiple Clients and Single Server.

Text Books:-
1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

Reference Books:
1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, seventh Edition, Pearson Education.
4. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education
5. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

BT242-Database Management Systems

L T P: **3 -1-0**

UNIT I:

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT II:

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT III:

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement – Problems Caused by redundancy Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Base Protocols – Multiple Granularity. Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT V:

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Text books :
1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.
3. Fundamentals of Database Systems , Elmasri,Navathe, Addison Wesley

Reference Books:
1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education

BT243-Operating System

L T P: 3 -1-0

UNIT I:
Introduction : Operating system and functions, Clasification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocesor Systems, Multiuser Systems, Multiproces Systems, Multihreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Rentrant Kernels, Monolithic and Microkernel Systems.

Unit – II
Concurent Proceses: Proces Concept, Principle of Concurency, Producer /Consumer Problem, Mutual Exclusion, Critcal Section Problem, Deker's solution, Peterson's solution, Semaphores, Test and Set peration; Clasical Problem in Concurrency- Dining Philosopher Problem, Sleping Barber Problem; Inter Proces Communication models and Schemes, Proces generation.

Unit – III
CPU Scheduling: Scheduling Concepts, Performance Criteria, Proces States, Proces Transiton Diagram, Schedulers, Proces Control Block (PCB), Process address space, Proces identification information, Threads and their management, Scheduling Algorithms, Multiprocesor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

UNIT IV:
Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partions, Multiprogramming with variable portions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit – V
I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O bufering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and aces mechanism, File directories, and File sharing, Filesystem implementation isues, File system protection and security.

Text Books:-

1. 1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. 2. SibsankarHalder and Alex A Aravind, "Operating Systems", Pearson Education

Reference Books:-

1. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
2. D M Dhamdhere, "Operating Systems :A Concept basedAproach", McGraw Hil. 5. Charles Crowley, "Operating Systems: A Design-Oriented Aproach", Tata McGraw Hil
3. Education". 6. Stuart E. Madnick & John J. Donovan. Operating Systems. McGraw Hil

BT244-Formal Languages and Automata Theory

L T P: 3 -1-0

UNIT I
Models of computation, classification, properties and equivalences, automata: Introduction to formal proof, additional forms of proof, inductive proofs, finite automata (FA), deterministic finite automata (DFA), non-deterministic finite automata (NFA) , Finite Automata with Epsilon transitions.

UNIT II
Regular expression and languages: Introduction to regular expression, building regular expression, converting DFA to a regular expression, converting regular expression to DFA, pumping lemma and its applications to prove languages not to be regular, closure properties of regular languages, minimization of automata.

UNIT III
Context free grammars (CFG) and languages: Definition, derivations, parse trees, ambiguity in grammars and languages, pushdown automata (PDA): Definition, Graphical notation, deterministic and nondeterministic, instantaneous descriptions of PDAs, language acceptance by final states and by empty stack, equivalence of the CFG and PDAs, pumping lemma for CFLs, closure properties of CFLs, decision problems for CFLs.

UNIT IV
Turing machines: Introduction to Turing machines, instantaneous descriptions, language acceptance by Turing machines, Turing machine transition diagrams, Church-Turing hypothesis, Chomsky hierarchy, recursively enumerable sets, existence of non-recursively enumerable notion of undecidable problems, universality of Turing machine, separation of recursive and recursively enumerable classes, notion of reduction, undecidable problems of Turing machines.

UNIT V
Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility,

Text Books:-

1. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D. Pearson Education
2. Introduction to Theory of Computation –Sipser 2nd edition Thomson
3. Theory of Computer Science: Automata, Languages and Computation, K.L.P.Mishra, N.Chandrasekaran.

Reference Books:-

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. "Elements of Theory of Computation", Lewis H.P. & Papadimition C.H. Pearson /PHI.

BT245-Managerial Economics and Financial Accountancy

L T P: 3 -1-0

UNIT I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.
Elasticity of demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand or casting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb- Douglas Production function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT III

Introduction to Markets & Pricing Policies: Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.
Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT IV

Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario
Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).
Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

Text books:
1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

Reference Books:
1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Edition.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.

BTL41-Java Programming Lab

L T P: 0-0-3

List of Experiments

1. Write a program to print the Fibonacci series upto a given number?
2. Write a Java Program to find the maximum of two numbers using command line arguments?
3. Write a Java Program to demonstrate the operation of super keyword in Java?
4. Write a Java Program to demonstrate the concept of method overriding?
5. Write a Java Program to describe about abstract class?
6. Write a Java Program to demonstrate about the final method?
7. Write a Java Program to define and implements an interface?
8. Write a Java Program to describe about try and catch blocks for handling exceptions?
9. Write a Java Program to demonstrate about throw and throws keywords?
10. Write a Java Program to raise and handle custom or user defined exceptions in java?
11. Write a Java Program to demonstrate about switch case?
12. Write a Java Program to find whether the given number is palindrome or not?
13. Write a Java Program on the operation of this keyword?
14. Write a Java Program on concept of method overloading?
15. Write a Java Program to explain single inheritance concept?
16. Write a Java program to demonstrate the operation of scanner class?
17. Write a Java Program to create threads in java by extending Thread Class?
18. Write a Java Program to create threads in java by implementing Runnable Interface?
19. Write a Java Program to define and import the user defined package?
20. Write a Java program to print a message using applet concept?
21. Write a Java Program to pass the parameters using applet concept?
22. Write a program to generate random numbers sequence in Java?
23. Write a program to swap the numbers without using third variable in Java?
24. Write a Java Program to find the sum and product of digits of a given number?
25. Write a Java Program to display multiplication table?

BTL42-Database Management Systems Lab

L T P: 0-0-3

List of Experiments

1. Write the queries for Data Definition and Data Manipulation Language.
2. Write SQL queries using logical operations (=, <,>,etc.)
3. Write SQL queries using SQL operators
4. Write SQL query using character, number, date and group functions
5. Write SQL queries for relational algebra
6. Write SQL queries for extracting data from more than one table
7. Write SQL queries for sub queries, nested queries
8. Write programme by the use of PL/SQL
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Create VIEWS, CURSORS and TRIGGERS & write ASSERTIONS.
11. Create FORMS and REPORTS

Semester V

S.No	Course Code	Course Name	Lectures	Tutorials	Practicals	Credits
1.	BT 351	Data Communication & Computer Networks	3	1	0	4
2.	BT 352	Design Analysis and Algorithms	3	1	0	4
3.	BT 353	Compiler Design	3	1	0	4
4.	BT 354	Principles of programming Languages	3	1	0	4
5.	BT 355	Microprocessor & Assembly Language	3	1	0	4
6.	BTL 51	Compiler Design & Computer Networks	0	0	3	2
7.	BTL 52	Microprocessor & Assembly language Lab	0	0	3	2
					TOTAL	24

BT351-Data Communication & Computer Networks

L T P: 3 -1-0

UNIT I
Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design. Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

UNIT II
Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

UNIT III
Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP - IP packet, IP address, IPv6.

UNIT IV
Transport Layer: Transport Layer - Design issues, connection management, session Layer Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

UNIT V
Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks - Internet and Public Networks.

Text books:-

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, "Computer Networks", 3rd Edition, Prentice Hall India, 1997.

Reference Books:-

1. S. Keshav, "An Engineering Approach on Computer Networking", Addison Wesley, 1997
2. W. Stallings, "Data and Computer Communication", Macmillan Press, 1989.

BT352-Design Analysis and Algorithms

L T P: 3-1-0

UNIT I
Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- O notation, Omega notation, Theta notation
Divide and Conquer: Structure of divide-and-conquer algorithms; Binary search; Merge Sort; Quick sort.

UNIT- II
Greedy Method: General method- Knapsack problem – job sequencing with deadlines– minimum-cost spanning trees: Prim's and Kruskal's algorithms – Single source shortest paths: Dijkstra's algorithm.

UNIT-III
Dynamic Programming: General method – Multistage Graphs – All pairs shortest paths, Single source shortest paths – optimal binary search trees – 0/1 Knapsack problem traveling sales person problem.

UNIT-IV
Back Tracking: General method – n-queen problem – sum of subsets problem – graph colouring – Hamiltonian cycles – Knapsack problem.

UNIT-V
Branch and Bound: Least Cost (LC) search, bounding – LC branch and bound – FIFO branch and bound – Travelling sales person problem.

Text Books:-

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, 2007.

Reference Books:-

1. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", Mc Graw Hill, 2005.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Berman, Paul," Algorithms", Cengage Learning.
3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

BT353-Compiler Design

L T P: 3 -1-0

UNIT 1

Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

UNIT II

Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

UNIT III

Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations, case statements.

UNIT IV

Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

UNIT V

Introduction to code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Text Books:-

1. Compilers, Principles, techniques and tools –Aho Ullman, Ravisethi
2. Principles of compiler design - A.V. Aho . J.D. Ullman; Pearson Education.
3. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

Reference Books:-

1. Lex &yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.

BT354-Principles of programming Languages

L T P: **3-1-0**

UNIT I
Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments.
Syntax and Semantics: general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features.

UNIT II:
Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.
Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands

UNIT III:
Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static anddynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub- program names, design issues for functions user defined overloaded operators, co routines.

UNIT IV:
Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95 Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads. **Exception handling :** Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

UNIT V:
Logic Programming Language : Introduction and overview of logic programming, basic elements of prolog, application of logic programming.
Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

Text Books :
1. Concepts of Programming Languages Robert .W. Sebesta 6/e, Pearson Education.
2. Programming Languages –Louden, Second Edition, Thomson.
Reference Books :
1. Programming languages –Ghezzi, 3/e, John Wiley
2. Programming Languages Design and Implementation –
   Pratt and Zelkowitz, Fourth Edition PHI/Pearson Education
3. Programming languages –Watt, Wiley Dreamtech
4. LISP Patric Henry Winston and Paul Horn Pearson Education.

BT355-Microprocessor & Assembly Language

L T P: 3-1-0

UNIT I
Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram. Interfacing devices. Architectural advancement of microprocessor. Typical microprocessor development schemes.

UNIT-II
Bit Microprocessors:
Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & statu, interrupt and machine cycle. Instruction sets. Addressing modes. Instruction formats Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives.

UNIT-III
16-bit Microprocessor:
Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, memory segmentation. Operating modes. Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts.

UNIT-IV
Programming:
Assembly language programming based on intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions

UNIT-V
Peripheral Interfacing:
Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254 programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C.

Text Books:-

1. Gaonkar , Ramesh S , "Microprocessor Architecture, Programming and
2. Applications with 8085", Penram International Publishing.
3. Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH

Reference Books:-

1. Hall D V ,"Microprocessor Interfacing', TMH
2. Liu and Gibson G A , " Microcomputer System: The 8086/8088 family'' ,PHI
3. Aditya P Mathur, " Introduction to Microprocessor", TMH
4. Brey, Barry B, "INTEL Microprocessors", PHI
5. Renu Sigh & B.P.Sigh, "Microprocessor, Interfacing and Applications
6. M Rafiqzzaman, "Microprocessors, Theory and Applications"

BTL51-Compiler Design & Computer Networks Lab

L T P: 0-0-3

List of Experiments

1. Simulation of a Finite state Automata to recognize the tokens of various control statements.
2. Simulation of a Finite state machine to distinguish among Integers, Real Numbers & Numbers with Exponents.
3. Program in LEX tool to recognize the tokens and to return the token found for a C like Language
4. Parsing of arithmetic and algebraic expressions and equations.
5. Use of YACC tool to parse the statements of C like Language.
6. Implementation of the Data Link Layer framing method such as character stuffing and bit stuffing in C.
7. Implementation of CRC algorithm in C.
8. Implementation of a Hamming (7, 4) code to limit the noise. We have to code the 4 bit data in to 7 bit data by adding 3 parity bits. Implementation will be in C.
9. Implementation of LZW compression algorithm in C.
10. Write a socket program in C to implement a listener and a talker.
11. Simulation of a network of 3 nodes and measure the performance on the same network.
12. Write a program in C to encrypt 64-bit text using DES algorithm.

BTL52-Microprocessors & Assembly language lab

L T P: 0-0-3

List of Experiments

1. To study 8085 microprocessor System
2. To study 8086 microprocessor System
3. To develop and run a programme to find out largest and smallest number
4. To develop and run a programme for converting temperature from F to C degree
5. To develop and run a programme to compute square root of a given number
6. To develop and run a programme for computing ascending/descending order of a number.
7. To perform interfacing of RAM chip to 8085/8086
8. To perform interfacing of keyboard controller
9. To perform interfacing of DMA controller
10. To perform interfacing of UART/USART

Semester VI

S.No	Course Code	Course Name	Lectures	Tutorials	Practicals	Credits
1.	BT 361	Object oriented Analysis and Design	3	1	0	4
2.	BT 362	Computer Graphics	3	1	0	4
3.	BT 363	Software Engineering	3	1	0	4
4.	BT 364	Data Ware Housing and Data Mining	3	1	0	4
5.	BT 365	E-Commerce / Operation Research	3	1	0	4
6.	BTL 61	Unified Modeling Language Lab	0	0	3	2
7.	BTL 62	Computer Graphics Lab	0	0	3	2
					TOTAL	24

BT361-Object Oriented Analysis and Design

L T P: 3-1-0

UNIT-I
UML Introduction: Why we Model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.
Advanced Structural Modeling: Advanced Classes, Advanced Relationships, interfaces, Types and Roles, Packages, Instances, Object Diagrams, Components.

UNIT-II
Basic behavioral Modeling: Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams.
Advanced Behavioral Modelling: Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

UNIT-III
Architecture Modeling: Artifacts, Deployment Collaborations, Patterns and Frame Works, Artifact Diagrams, Deployment Diagrams, Systems and Models.

UNIT-IV
Unified Software Development Process: The Unified Process, The Four P's, A Use Case Driven Process, An Architecture, An Architecture-Centric Process, An Iterative and Incremental Process.

UNIT-V
Core Workflows: Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, and Test.

Text Books:-

1. Grady Booch, James Rumbaugh, Ivor Jacobson, "The Unified Modeling Language-user
2. Guide", (Covering UML 2.0), 2nd Edition, Pearson Education, India, 2007.
3. Ivor Jacobson, Grady Booch, James Rumbaugh, "The Unified Software Development
4. Process", Pearson Education, India, 2008.

BT361-Object Oriented Analysis and Design

BT362-Computer Graphics

L T P: 3 -1-0

UNIT I
Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

UNIT II
2-D geometrical transforms: Translation, scaling, rotation, other transformations, matrix representations and homogeneous coordinates, transformations between coordinate systems.
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm

UNIT III
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods

UNIT IV
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT V
Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Text Books:-

1. "Computer Graphics *C version*", Donald Hearn and M.Pauline Baker, Pearson Education.
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

Reference Books:
1. "Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc- Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

BT363- Software Engineering

L T P: 3-1-0

UNIT I
Software Engineering Fundamentals: Definition of software product and process, Software Characteristics, Components, Applications, Layered Technologies, Processes and Product, Methods and Tools, Generic View of Software Engineering, Software Crisis, Software development paradigms, Techniques of Process Modelling, Software Process and lifecycle models: Build & Fix Model, Waterfall Model, Prototyping Model, Iterative Enhancement Model, Evolutionary Development Model and Spiral Model, Incremental, and Concurrent Development Model.

UNIT II
Software Requirements Analysis & Specification: System specification, Software requirements specification (SRS) standards, Formal specification methods, Specification tools, Requirements validation and management. Problem Recognition, Evaluation and Synthesis, Modelling, Specifications and Review Techniques. Analysis Modelling: Difference between Data and Information, ER Diagram, Dataflow Model, Control Flow Model, Control and Process Specification, Data Dictionary.

UNIT III
Software Design: Software architecture, Modular Design-cohesion and coupling, Process-oriented design, Process and Optimization, Data-oriented design, User-interface design, Real-time software design, Architectural Designing, Interface Design, Procedural Design, Object Oriented Design.
CASE Tools: Computer-aided software engineering, Introduction to CASE, Building Blocks of CASE, Relevance of CASE tools, High-end and low-end CASE tools, automated support for data dictionaries, DFD, ER diagrams, Integrated Case Environment, CASE workbenches.

UNIT IV
Coding and Testing: Choice of Programming languages, Coding standards, Introduction to Testing Process, Functional & Structural Testing, Testing Activities like Unit, Integration & System Testing, Testing tools and workbenches.
User Interface Design: Concepts of Ui, Interface Design Model, Internal and External Design, Evaluation, Interaction and Information Display.

UNIT V
Configuration Management: Concepts in Configuration Management, The Configuration Management Process: Planning and Setting up Configuration Management, Perform Configuration Control, Status Monitoring and Audits.
Software Maintenance: What is software maintenance, Maintenance Process & Models, Reverse Engineering, Software re- engineering, Configuration Management issues and concept, Configuration planning & techniques, Software versions and change control process, Documentation.

Text Books:
1. R. Pressman, "Software Engineering", 7th Edition, 2002, McGraw-Hill.
2. W.S. Jawadekar, Software Engineering – A Primer, TMH-2008

Reference Books:
1. Shari Pfleeger, "Software Engineering", 2001, Pearson Education.
2. Stephen Schach, Software Engineering, TMH, 2007
3. Sommerville I., Software Engineering, Addision-Wesley.

BT364-Data Ware Housing and Data Mining   L T P: 3-1-0

UNIT-I

Introduction: What is Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining. Data Preprocessing: Needs Preprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT-II

Data Warehouse and OLAP Technology: What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture and Implementation, from Data Warehousing to Data Mining.Mining Frequent Patterns, Associations Rules: Basic Concepts, Efficient and Scalable Frequent Item Set Mining Methods, Mining Various kinds of Association Rules.

UNIT-III

Classification and Prediction: Introduction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule based Classification, Classification by Back Propagation, Support Vector Machines, Prediction, Accuracy and Error Measures

UNIT-IV

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

UNIT—V

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

Text Books:-
1. Han J &Kamber M, "Data Mining: Concepts and Techniques", Harcourt India, Elsevier India,   Second Edition.
2. Pang-NingTan. MichaelSteinback,VipinKumar, "Introduction to Data Mining", Pearson Education, 2008.

References:

1. Margaret H Dunham,S.Sridhar, "Data mining: Introductory and Advanced Topics", Pearson Education, 2008.
2. Humphires,hawkins,Dy, "Data Warehousing: Architecture and Implementation", Pearson Education, 2009.
3. Anahory, Murray, "Data Warehousing in the Real World", PearsonEçiucation, 2008.
4. Kargupta,Joshi,etc., "Data Mining: Next Generation Challenges and Future Directions" Prentice Hall of IndiaPvtLtd, 2007

BT365-E-Commerce

L T P: 3-1-0

UNIT – I

Introduction to Electronic Commerce – E-Commerce Framework- Anatomy of E-Commerce Applications – E-Commerce Consumer & Organization Applications- E- Commerce and World Wide Web – Internet Service Providers – Architectural Framework for Electronic Commerce – WWW as the Architecture- Hypertext publishing.

UNIT – II

Electronic Payment Systems – Types of Electronic Payment Systems – Digital Token Based Electronic Payment System – Smart Cards – Credit Cards – Risk in Electronic Payment Systems – Designing Electronic Payment Systems

UNIT – III

Corporate Digital Library – Document Library, Digital Document Types, Corporate Data Warehouse, Advertising and Marketing – Information based Marketing, Advertising on Internet, On-Line Marketing Process, Market Research.

UNIT –IV

Consumer Search and Resource Discovery – Information Search and Retrieval, Commerce Catalogues, Information Filtering Multimedia – Key Multimedia Concepts, Digital Video and Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing .

UNIT - V

Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda

Text Books

1. Ravi Kalakota & A. B. Whinston - "Frontiers of Electronic Commerce", Pearson Education, India, 1999.
2. Daniel Minoli, Emma Minoli: "Web Commerce Technology Handbook", Tata McGraw Hill
3. Bajaj and Nag. "E-Commerce the cutting edge of Business". TMH.
4. E-Business & Commerce: Brahm Cazner, Wiley dreamtech.

BTL61-Unified Modeling Language Lab

L T P: 0-0-3

List of Experiments

Students have to perform the following OOAD steps on a given Case Study:

- Use Case Modeling
- Structural Modeling
- Behavioural Modeling
- Architecture Modeling

The output should consist of:

- Use Case Diagrams
- Class Diagrams
- Sequence Diagrams
- Collaboration Diagrams
- State Chart Diagrams
- Activity Diagrams
- Deployment Diagrams
- Component Diagrams

Students should form into groups. They should carry out the Case Study as a group activity. The lab should be carried out using a CASE Tool. Finally they should submit a report.

BTL62-Computer Graphics Lab

L T P: 0-0-3

List of Experiments

1) Write a C Program to draw a line using Bresenhams Line Drawing Algorithm.
2) Write a C Program to draw a line using Digital Differential Analyzer Line Drawing Algorithm.
3) Write a C Program to draw a Circle using Mid-Point Circle Algorithm.
4) Write a C Program to draw an Ellipse using Mid-Point Ellipse Algorithm.
5) Write a C Program to draw user defined Polygon at run time.
6) Write a C Program for Scan Line Polygon Filling Algorithm.
7) Write a C Program for Boundary Fill Algorithm.
8) Write a C Program for Flood Fill Algorithm.
9) Write a C Program for Basic Transformations.
10) Computer Graphics Functions:
   i) Line Function.
   ii) Circle and arc Functions.
   iii) Ellipse Function.
   iv) floodfill and setfillstyle Functions.
   v) setcolor Function.
   vi) Rectangle Function.
   vii) putpixel Function.
   viii) outtext and outtextxy Functions.
11) Write a C Program to draw a Square, Rectangle and Triangle using Graphics Functions.
12) Write a C Program to draw an Ellipse, Circle and Arc using Graphics Functions.
13) Write a C Program to draw a Fish with different color using Graphics Functions.
14) Write a C Program to draw a Flag with orange, white and green colors using Graphic Functions.
15) Write a C Program to draw a Flag with user defined colors at run time.
16) Write a C Program to draw a Star using line function.
17) Write a C Program to draw a Cylinder using ellipse and line functions.
18) Write a C Program to construct a clock.
19) Write a C Program to draw Umbrella using line and ellipse functions.
20) Write a C Program to Construct an Animated Car/Truck.

Semester VII

S. No	Code	Course Name	Lectures	Tutorials	Practical's	Credits
1.	BT471	Linux Programming	3	1	0	4
2.	BT472	Software Testing Methodologies	3	1	0	4
3.	BT473	Web Technologies	3	1	0	4
4.	BTL71	Linux Programming Lab	0	0	3	2
5.	BTL72	Web Technologies Lab	0	0	3	2
6.	BTD71	**Mini Project**	0	0	8	4
7.		**ELECTIVE – I**	3	1	0	4
						24

	ELECTIVE – I
1	BTE71: Cloud Computing
2	BTE72: Distributed Computing
3	BTE73: Mobile Computing
4	BTE74: Software Project Management
5	BTE75: Soft Computing

BT471 - Linux Programming

L T P: 3-1-0

UNIT I
Introduction – Short History - Why is Linux So Successful?- UNIX Flavors - BSD, SysV, Linux - Standards - System Architecture - The Kernel - The Shell - Utilities - Tools and Applications – **Linux Programming Security** – Users and Groups - PUID & PGID - Real and Effective IDs - Authenticating Users - File System Permissions.

UNIT II
Programming under Linux- Privileged Execution Mode - Kernel Mode Vs. User Mode System calls. **Files** - Using Files - Using Links - Working With Directories - Obtaining File Information – File Permissions - Special Permissions – **Signals** - The Way the Kernel Handles Signals- Types of Signals- Results of a Process - Receiving a Signal - Handling Signals - Signals List - Sending Signals - Handling Signals - Response to Signals - Activation of pause, signal - System Call for Signal Handling - Error Handler.

UNIT III
Process - Programs and Processes - The Process IDs - The Process Table - The Process State PS Report - Process Status - Context Switch - The Process Environment - Process Group - Job and Processes - Process Termination - Creating a New Process - The wait Function Family - Executing a Program - The system C Library Function - Redirection of Input and Output - The vfork System Call.

UNIT IV
Threads - Thread Creation - Thread Cancellation - Thread-Specific Data Synchronization and Critical Sections - GNU/Linux Thread Implementation - Processes Vs. Threads - **Inter-Process communication (IPC)** - Pipes - Named Pipes - Shared Memory - Message Queue - csh Level commands - **Synchronization Mechanisms** - File locking - Semaphore.

UNIT V
Sockets - What Is A Socket? - A Brief History Of Sockets - Communication Protocols - communication Capabilities - Endpoint Addresses - The Internet Protocol (IP) - Internet Addresses - Address Classes - Connection Oriented Communications And TCP - Connectionless communications And UDP - Stream Sockets - The Basic Model - Sending Data(send) - Receiving Data(recv.) - Shutting Down A Socket - Related files - The select( ) System Call - Broadcast and Datagram Sockets

TEXT BOOKS:-

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education, 2003.

REFERENCE BOOKS:-

1. Unix Network Programming, W.R.Stevens, PHI.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

BT472-Software Testing Methodologies

L T P: 3 -1-0

UNIT I:
Introduction : Software program and its objective, Software development techniques, top-down Vs. bottom-up approach, modular and structures programming. A brief introduction about object oriented approach.
Importance of Software Testing: Software testing and its importance, software development life cycle verses software testing life cycle, Deliverables, version and error control.

UNIT II
Testing Techniques and Strategy: Unit testing, Integration testing, System testing, Acceptance testing White-Box testing: Flow Graph notation, Cyclomatic Complexity, Graph matrices, control structure and loop testing. Black-Box testing: Equivalence partitioning, Boundary Value Analysis, Orthogonal Array Testing

UNIT III
Verification and Validation: Requirement verification, Coding standards, Walk through, Formal Inspection, Design validation and verification, Function test, Design metrics, correctness proof and its requirement.

UNIT IV
Building Test Cases and Plans: Format of test cases, Du, dc and other data paths, Test data selection, branch coverage,statement coverage, pre-condition and post-condition, Test schedule and check pointing, suitable exercises for creating test cases for each type of techniques.

UNIT V
Quality Assurance and Standards: Basic software quality parameters and its metrics, Software Configuration Change and types of errors, Quality management models: ISO, SPICE, IEEE, CMM
Debugging Technique and Tools: Integrated development environment, debugging, tracing, data inspection, exception errors, code and data redundancy, unreachable code.
External Source of Errors: Main memory, conflicting dll and unknown interface as source of error and their rectification.
Note: Any open-source Software Tools may be utilized, such as "winrunner".

Text Books:-

1. Desikan S, Ramesh G, "Software Testing", Pearson Education, 2008.
2. Tamres L, "Introducing Software Testing", Pearson Education, 2007.
3. Dustin E, "Effective Software Testing", Pearson Education, 2007.
4. Mathur A.P, "Fundamentals of Software Testing", Pearson Education, 2008.

Reference Books:-

1. Brian Marick, "The Craft of Software Testing", Pearson Education, 2008.
2. Rajani & Oak, "Software Testing Methodology, Tools and Processes" Tata McGraw-Hill, 2007.
3. R. Pressman, "Software Engineering", 6th Edition, Tata McGraw-Hill.

BT473-Web Technologies

L T P: 3-1-0

UNIT 1
Collections : Collection Interfaces, Concrete Collections, The Collections Framework
Multithreading : Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread

UNIT 2
Enterprise Java Bean: Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean
Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining,   Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C

UNIT 3
Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession
Java Server Pages (JSP): Introduction, JavaServer Pages Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

UNIT 4
Remote Method Invocation: Defining the Remote Interface, Implementing the Remote   Interface, Compiling and Executing the Server and the Client
Common Object Request Broker Architecture (CORBA): Technical/Architectural Overview, CORBA Basics, CORBA services

UNIT 5
Introduction Smart   Phone Application Development: Introduction to android platform, Creating application template, adding activity, intent, services to application, using Google map API.

Text Book:-

1. "Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall
2. "Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional" by Antonio Goncalves – Apress publication

Reference Book:-

1. The complete Reference Java 7th Edition , Herbert Schildt., TMH.
2. Java Server Pages,Hans Bergsten, SPD, O'Reilly.
3. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers.
4. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp – 2008.

BTL71- Linux Programming Lab

L T P: 0-0-3

List of Experiments

1. Write a shell script that accepts a file name, starting and ending numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing the specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given number.
8. Implement in C the following Unix commands and System calls.
   a. Implement in C the cat Unix command using system calls
   b. Implement in C the following ls Unix command using system calls
   c. Implement in C the Unix command mv using system calls
9. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file.
   a) file type
   b) number of links
   c) read, write and execute permissions
   d) time of last access
10. Write a C program to emulate the Unix ls – l command.
11. Write a C program that redirects a standard output to a file. Ex: ls >f1.
12. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.
13. Write a C program to create a zombie process.
14. Write a C program that illustrates how an orphan is created.
15. Write a C program that illustrates the following.
    1. Creating a message queue.
    2. Writing to a message queue.
    3. Reading from a message queue.
16. Write a C program that implements a producer-consumer system with two processes.(using semaphores)
17. Write a C program that illustrates inter process communication using shared memory.
18. Write a C program that illustrates file locking using semaphores.
19. Write a C program that counts the number of blanks in a text file using standard I/O.
20. Write a C program that illustrates communication between two unrelated processes using named pipe.

BTL72- Web technologies Lab

L T P: 0-0-3

List of Experiments

1. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com The website should consist the following pages.Home page, Registration and user Login, User profile page, Books catalog, Shopping cart,   Payment By credit card, order confirmation.
2. Validate the registration, user login, user profile and payment by credit card pages using JavaScript.
3. Write an XML file which will display the Book information which includes the following:
   a. Title of the book
   b. Author Name
   c. ISBN number
   d. Publisher name
   e. Edition
   f. Price
4. Write a Document Type Definition (DTD) to validate the above XML file.Display the XML file as follows. The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose.
5. Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click.
6. Install TOMCAT web server. While installation assign port number 8080. Make sure that these ports are available i.e., no other process is using this port.
7. Access the above developed static web pages for books web site, using these servers by using the urls :http://localhost:8080/rama/books.html
8. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 And, pwd4 respectively. Write a servelet for doing the following.
      a. Create a Cookie and add these four user id's and passwords to this Cookie.
   Read the user id and passwords entered in the Login form (Program 1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user(i.e., user-name and password match) you should welcome him by   name(user- name) else you should display " You are not an authenticated user ".
9. Install a database(Mysql or Oracle).
   Create a table which should contain at least the following fields: name,password, email-id, phone number(these should hold the data from the registration form). Practice 'JDBC' connectivity. Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (Program 1).
10. Write a JSP which does the following job:
   Insert the details of the 3 or 4 users who register with the web site (Program 7) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

BTE71-Cloud Computing

L T P: **3-1-0**

UNIT I
Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

UNIT II
Cloud Services and File System
Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service- Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT III
Collaborating With Cloud
Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

UNIT IV
Virtualization
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.
Hardware and Infrastructure
Clients, Security, Network, Services. Accessing the Cloud – Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage – Overview, Cloud Storage Providers, Standards – Application, Client, Infrastructure, Service.

UNIT V
Security in the Cloud
Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Text Books:
1. Cloud Computing "A Practical Approach" Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw-Hill.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

Reference Books:
1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009. Kumar Saurabh, "Cloud Computing – insights into New -Era Infrastructure", Wiley India,2011.
2. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.

BTE-72 Distributed Computing

L-T-P: 3-1-0

UNIT 1
Basic Concepts
Characterization of Distributed Systems – Examples – Resource Sharing and the Web Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking Types of Networks – Network Principles – Internet Protocols – Case Studies

UNIT II
PROCESSES AND DISTRIBUTED OBJECTS
Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study

UNIT III
OPERATING SYSTEM ISSUES
The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System

UNIT IV
OPERATING SYSTEM ISSUES
Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems

UNIT V
DISTRIBUTED TRANSACTION PROCESSING
Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems

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

Reference Books
1. Sape Mullender, "Distributed Systems", 2nd Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", Springer, Verlag, 1994.
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.
4. Mugesh Singhal, Niranjan G Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill Edition, 2001.

BTE73-Mobile Computing

L T P: 3-1-0

UNIT 1
Introduction to Mobile Communications and Computing : Mobile Computing (MC) : Introduction to MC, novel applications, limitations, and architecture. GSM : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT 2
(Wireless) Medium Access Control : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. Mobile Network Layer : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT 3
Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP. Database Issues : Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT 4
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, pushbased mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques. Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs

UNIT 5
Protocols and Tools : Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

Textbooks:-

1. Jochen Schiller,"Mobile Communications",Addison-Wesley. (Chapters 4,7,9,10,11),second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

Reference books:-

1. Yi-Bing Lin & Imrich Chlamtac, "Wireless and Mobile Networks Architectures", John
b. Wiley & Sons, 2001.
2. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India, 2001.
3. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech, 2004.

BTE74-Software Project Management

L T P: 3 -1-0

UNIT I

Principles of software engineering, features of good software, Quality Requirement in different Application Areas Software Process and Models, Tools and techniques of Process Modelling, Product and Process.

UNIT II

Introduction to Project Management: Definition of the project, Project specification and parameters, Principles of Project management,

Project management life cycle

Software Project Planning. Project activities and Work-Breakdown-Structure(WBS),Criteria for completeness in the WBS, Activity Resource Requirements and Cost, Joint Project Planning Session, Project Management Plan

UNIT III

Project Economics Project Costing, Empirical Project Estimation Techniques, Decomposition Techniques, Algorithmic methods, Automated Estimation Tools

Project Scheduling and Tracking Techniques Why are projects delayed? Effort Estimation Techniques, Task Network and Scheduling Methods, Monitoring and Control Progress, Graphical Reporting Tools

UNIT IV

Risk Analysis and Management Risk Concepts and Identification, Risk Assessment and Control, Risk Components and Drivers, Risk Tracking and Monitoring, Risk Mitigation and Management **Software Metrics and Project Management** Measures, Metrics and Indicators, Process and project metrics, Statistical Metrics and Process Monitoring, Function-point and project management

UNIT V

Project Control and Closure Defect Collection and Audit, Causal and Pareto Analysis, Project Closure Analysis

Project Management Issues with regard to New Technologies Object-oriented Methodology, Web- based Projects, Embedded Systems

Text books:-

1. John J. Rakos, "Software Project Management for Small to Medium Sized Projects", 1998, Prentice Hall, ISBN: 0138261733.
2. Walker Royce, "Software Project   Management: A   Unified Framework", 2001, AddisonWesley Professional, ISBN-10: 0201309580, ISBN-13: 9780201309584.
3. Pankaj Jalote, "Software Project Management in Practice", 2001, Addison-Wesley Professional, ISBN-10:0-201-73721-3, ISBN-13: 9780201737219.

Reference Books:-

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", 7th Edition, McGraw Hill, ISBN: 0073375977.
2. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education, 2006.
3. A Guide to the Project Management Body of Knowledge (4th Edition), 2008, Project Management Institute, ISBN-13: 97819306994580.

<div align="center">**BTE75- Soft Computing**</div>

L-T-P: 3-1-0

Unit- 1
Neural Networks-1(Introduction & Architecture)
Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

Unit 2
Neural Networks-II (Back propogation networks)
Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

Unit 3
Fuzzy Logic-I (Introduction)
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit 4
Fuzzy Logic –II (Fuzzy Membership, Rules)
Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

Unit 5
Genetic Algorithm (GA)
Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Books:

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.

Reference Books:

1. Siman Haykin,"Neural Netowrks"Prentice Hall of India
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill
4. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

Semester VIII

S. No	Course Code	Course Name Subject	L	T	P	Credits
1.	BT481	Network Security	3	1	0	4
2.	BTD81	Major Project	0	0	24	12
3.		ELECTIVE – III	3	1	0	4
4.		ELECTIVE – IV	3	1	0	4
		Total				24

S.No.	ELECTIVE – III	ELECTIVE – IV
1.	BTE81- Web Services	BTE86-Adhoc and Sensor Networks
2.	BTE82-Semantic Web and Social networks	BTE87-Storage area Networks
3.	BTE83-Scripting Languages	BTE88-Database Security
4.	BTE84-Multimedia and Rich Internet applications	BTE89-Embedded System
5.	BTE85 – Artificial Intelligence	

BT481-Network Security

L T P: 3-1-0

UNIT 1
CONVENTIONAL AND MODERN ENCRYPTION
Services-Attacks-Steganography-Classical Encryption Techniques-SDES-DES-Differential and Linear Cryptanalysis-Modes of Operation-Encryption Algorithms-Triples DES-Blowfish AST128- RC5-Traffic Confidentiality.

UNIT 2
PUBLIC KEY ENCRYPTION
Uniqueness-Number Theory concepts-Primality-Modular Arithmetic-Fermet & Euler theorem-Euclid Algorithm-RSA-Elliptic Curve Cryptography-Diffie Hellman Key Exchange.

UNIT 3
AUTHENTICATION
Digest-Requirements-MAC-Hash Function-Security of Hash and MAC-Birthday Attack-MD5-SHA- RIPEMD-Digital Signature Standard-Proof of DSS.

UNIT 4
SECURITY PRACTICE
Authentication applications-Kerberos-Kerberos Encryption Techniques-PGP-Radix64-IP Security Architecture-Payload-Key Management-Web Security requirement-SSL-TLS-SET.

UNIT 5
SYSTEM SECURITY
Resources-Intruders and Intrusion-Viruses and Worms-OS Security-Firewalls-Design Principles Packet Filtering-Application Gateways-Trusted Systems-Counter Measures.

Text Book:-

1. William Stallings: "**Cryptography and Network Security**"-Pearson Education, New Delhi, 5th Edition, 2011.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay: "**Cryptography and Network Security**"- Tata McGraw-Hill Education Pvt Ltd, 2nd Edition, 2011.

Reference books:-

1. Charles Pfleeger-**Security in Computing**-PHI, 4th Edition, 2006.
2. Charlie Kaufman, Radia Perlman, Mike Speciner, "**Network Security, Private Communication in a Public World**", PHI, 2nd Edition.
3. Douglas R. Stinson, "**Cryptography-Theory and Practice**", CRC Press.
4. Bruce Schneier, Niels Ferguson, "**Practical Cryptography**," Wiley Dreamtech India Pvt Ltd.

BTE81-Web Services

L T P: 3-1-0

UNIT I
Evolution and Emergence of Web Services -Evolution of distributed computing, Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA).

UNIT II
Web Services
Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. Ajax – Improving web page performance using Ajax, Programming in Ajax. CORBA

UNIT III
WEB SERVICES AND SOA:
The Web services framework; Services (as Web Services); Service Registry; Service descriptions (with WSDL); Messaging (with SOAP), Transactions, Coordination, Business Activity, Orchestration, Choreography; Addressing, Reliable Messaging, Policies, Metadata, Security, Notification and Events; Semantic Web Services; REST full Services;

UNIT IV
Web 2.0
Interactive and social web: Blogs, wikis, and social networking sites – The technology behind these applications- AJAX, RSS and syndication, Ruby on Rails, Open APIs,

UNIT V
Web 3.0: Semantic Web, Widgets, drag & drop mashups (iGoogle) - The technology behind these applications- RDF Web based Information Systems, Search engines, Recommender Systems, Web Mining

References:
1. Understanding SOA with Web Services – Eric Newcomer, Greg Lomow, Pearson Education,
   2005.
2. Developing Enterprise Web Services– An Architect's Guide – Sandeep Chatterjee, James
   Webber Pearson Education, ISBN 81-297-0491-9
3. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech Joel Sklar.

BTE82-Semantic Web & Social Networks

L T P: 3-1-0

UNIT –I
Web Intelligence
Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT –II
Knowledge Representation for the Semantic Web
Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT-III
Ontology Engineering
Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV
Semantic Web Applications, Services and Technology
Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT-V
Social Network Analysis and semantic web.
Development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

Text books:-

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

BTE83-Scripting Languages

L T P: 3-1-0

UNIT I
Introduction: What is a scripting language? Motivation for and applications of scripting; How scripting languages differ from non-scripting languages; Biased, native, and thoughtful position papers and debates on the merits of scripting languages; Types of scripting languages.
Overview Of Popular Scripting Languages: Important features of and sample code in bash, Ruby, JavaScript, Perl, Python, Tcl. A list of other scripting languages with uninformative but possibly interesting synopses.

UNIT II
CLIENT-SIDE WEB SCRIPTING: The DOM; JavaScript; DHTML Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, Writing to a different frame, Rollover buttons, Moving images, Multiple pages in a single download, A text-only menu system, Floating logos.

UNIT III
XML –Introduction –Document Type Definition or DTD – uses of DTD – Tags – Elements – Attributes – PCDATA – CDATA – Basics of entities – XML Elements – Elements Declaration –usage of #REQUIRED – usage of #IMPLIED – usage of #FIXED – Internal Entities – External Entities – XML Schema – Defining, Accessing XML Document.

UNIT IV
JAVA SCRIPT – Introduction – Usage of variables – operations – control structures – looping structures – predefined keywords – arrays – predefined functions – user defined functions – arrays and functions – mathematical functions – string functions – objects – expressions –pattern matching using RegEXp Class – String Class – Exception Handling – Built–in objects – Bgcolor/Fgcolor – Date Object – Events and Event Handling – Validations – Window – Confirmation, alert messages.

UNIT V
SERVER-SIDE WEB SCRIPTING: PHP The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments.
Working with Arrays: What are Arrays? Creating Arrays, Some Array-Related Functions.
Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP. Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads.
Text Books:
1. David Flanagan, JavaScript: The Definitive Guide, 4th edition, O'Reilly,2001.(ISBN 0596000480)
2. Julie C. Meloni, PHP MySQL and Apache, SAMS Teach yourself, Pearson Education (2007).
3. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley (2007)
Reference Books:
1. Programming PHP, 3rd edition. Rasmus Lerdorf, Kevin Tatroe, and Peter MacIntyre. ISBN 1449392776, O'Reilly, 2013.
2. JavaScript: The Definitive Guide, 6th edition. David Flanagan. ISBN 0-596-80552-7, O'Reilly, 2011.

BTE84-Multimedia & Rich Internet Applications

L T P: 3-1-0

UNIT I
Multimedia System Design: An Introduction
Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Databases.

UNIT II
Multimedia Input and Output Technologies
Key Technology Issues, Pen Input, Video and Image Display Systems, Print Output technologies, Image Scanners, Digital Voice and Audio, Video Images and Animation, Full Motion Video.

UNIT III
Compression and Decompression Techniques
Types of Compression, Binary Image Compression Schemes, Color, gray scale, still-video image compression, Discrete Cosine Transform, Video Image compression, MPEG Coding tethodology, Audio Compression, Data and File format standards- RTF, TIFF,RIFF, MIDI, JPEG, AVI, JPEG, TWAIN Architecture.

UNIT IV
Multimedia Application Design
Types of Multimedia systems - Virtual Reality Design - Components of Multimedia system - Distributed Application Design Issues – Multimedia Authoring and User Interface - Hypermedia Messaging – Distributed Multimedia Systems

UNIT V
Storage and Retrieval Technologies
Magnetic Media Technology, RAID-Level-0 To 5, Optical Media, WORM optical drives, Hierarchical Storage Management, Cache Management for storage systems.

Text Books:-

1. Andleigh PK and Thakrar K, *"Multimedia Systems"*, Addison Wesley Longman, 1999.
2. Ralf Steinmetz, Klara Nahrstedt, *"Multimedia, computing, communications and applications"*, Prentice Hall, 1995.

Reference Books:-

1. Fred Halsall, *"Multimedia Communications"*, Addison Wesley, 2000.
2. Tay Vaughan, *"Multimedia making It work"*, TMH 5th Edition 2001.
3. Weixel, Fulton, Barksdale.Morse, *"Multimedia Basics"*, Easwar Press 2004.

<div align="center">

BTE85: Artificial Intelligence

</div>

L T P: 3-1-0

Unit-I

Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Text Books:-

1. 1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. 2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill

Reference Books:-

1. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
2. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India,

BTE86-Adhoc & Sensor Networks

L T P: 3-1-0

UNIT I
Ad Hoc Wireless Networks: Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless Internet
MAC protocols for Ad hoc Wireless Networks Issues in Designing a MAC Protocol for Ad hoc Wireless Networks, Design Goals for a MAC Protocol for Ad hoc Wireless Networks, Classifications of the MAC Protocols, Other MAC Protocols.

UNIT II
Routing Protocols for Ad Hoc Wireless Networks Issues in Designing a Routing Protocol for Ad hoc Wireless Networks, Classifications of Routing Protocols
Transport Layer for Ad Hoc Wireless Networks Issues in Designing a Transport layer protocol for Ad hoc Wireless Networks, Design goal s of a Transport layer protocol for Ad hoc Wireless Networks, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks.

UNIT III
Security protocols for Ad hoc Wireless Networks Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks

UNIT IV
Basics of Wireless, Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications
Data Retrieval in Sensor Networks: Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V
Sensor Network Hardware: Components of Sensor Mote, **Operating System in Sensors–** TinyOS, LA-TinyOS, SOS, RETOS
Imperative Language: nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns-2 and its sensor network extension, TOSSIM

Text Books:-

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks : Theory and Applications", Second Edition, World Scientific Publishers, 2011
2. Prasant Mohapatra and Sriramamurtyhy, "Ad Hoc Networks: Technologies and Protocols", Springer International Edition, 2009

Reference Books:-

1. Kazem Sohraby, Daniel Minoli, Taieb Znati, "Wireless Sensor Networks', A John Wiley & Sons Inc. Publication, 2007

BTE87-Storage Area Networks

L T P: 3-1-0

UNIT-1
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, Front end 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 Networked Storage
JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fibre Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (SCSI, FCIP, FCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage solutions overview including technologies like virtualization & appliances.

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

UNIT-V
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 pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools.

Text Books:
1. Information Storage and Management Storing, Managing, and Protecting Digital
2. Information , by EMC, Hopkinton and Massachusetts, Wiley, ISBN: 9788126521470

BTE88-Database Security

L T P: 3-1-0

UNIT I
Introduction
Introduction to Databases Security Problems in Databases Security Controls Conclusions
Security Models -1
Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT II
Security Models -2
Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.
Security Mechanisms
Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT III
Security Software Design
Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design

UNIT IV
Statistical Database Protection & **Intrusion Detection Systems**
Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery.

UNIT V
Models For The Protection Of New Generation Database Systems -1
Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object Oriented Systems SORION Model for the Protection of Object-Oriented Databases
Models For The Protection Of New Generation Database Systems -2
A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

Text Books
1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning, 2009.

Reference Books:
1. Database Security, *Castano,* Second edition, Pearson Education.
2. Database security by alfred basta, melissa zgola, CENGAGE learning.

<p align="center">**BTE89- Embedded Systems**</p>

L T P – 3 1 0

UNIT I
Embedded System Organization
Embedded computing – characteristics of embedded computing applications – embedded system design challenges; Build process of Real time Embedded system – Selection of processor;

Memory; I/O devices-Rs-485, MODEM, Bus Communication system using I^2C, CAN, USB buses, 8 bit –ISA, EISA bus.

UNIT II
Real-Time Operating System
Introduction to RTOS; RTOS- Inter Process communication, Interrupt driven Input and Output Non- maskable interrupt, Software interrupt; Thread – Single, Multithread concept; Multitasking Semaphores.

UNIT III
Interface with Communication Protocol
Design methodologies and tools – design flows – designing hardware and software Interface. system integration; SPI, High speed data acquisition and interface-SPI read/write protocol, RTC interfacing and programming.

UNIT IV
Design of Software for Embedded Control
Software abstraction using Mealy-Moore FSM controller, Layered software development, Basic concepts of developing device driver – SCI – Software - interfacing & porting using standard C & C++ ; Functional and performance Debugging with benchmarking Real-time system software – basics of contemporary RTOS – VXWorks, UC/OS-II

UNIT V
Interfacing with Embedded Controller
Programmable interface with A/D & D/A interface; Digital voltmeter, control- Robot system; - PWM motor speed controller, serial communication interface. Standard single purpose processor's peripherals: timers, counters, watchdog timers, UART, LCD controllers, keypad controllers.
Applications: Digital camera-washing machine-cell phones-home security systems-finger print identifiers-cruise control-printers Automated teller machine.

Text Books:
1. Steven F. Barrett, Daniel J. Pack, "Embedded Systems – Design and Applications with the 68HC 12 and HCS12", Pearson Education, 2008.
2. Raj Kamal, "Embedded Systems- Architecture, Programming and Design" Tata McGraw Hill,2006.

References:
1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, "PIC Microcontroller and Embedded Systems- Using Assembly and C for PIC18", Pearson Education,2008. Steven F.Barrett,Daniel J.Pack, "Embedded Systems-Design & Application with the 68HC12 & HCS12", Pearson Education, 2008.
2. Daniel W. Lewis, "Fundamentals of Embedded Software", Prentice Hall India, 2004.
3. Jack R Smith "Programming the PIC microcontroller with MBasic" Elsevier, 2007.

Course No.	Course Title	Contact periods per week			Credits
		Lecture L	Tutorial T	Practical P	
Semester - IX					
MT111	Network and Computer Security	3	1	0	4
MT112	Advanced Computer Architecture	3	1	0	4
MT113	Neural Networks	3	1	0	4
MT114	Distributed Databases	3	1	0	4
	Elective-I	3	1	0	4
MTL11	Distributed Databases Lab	0	0	4	2
MTL12	Seminar	0	0	4	2
	Total	15	5	8	24
Semester - X					
MT121	Advanced Operating Systems	3	1	0	4
MT122	Data Structure and Algorithm Design	3	1	0	4
MT123	Distributed Systems	3	1	0	4
	Elective-II	3	1	0	4
	Open Elective	3	1	0	4
MTL21	Data Structure and Algorithm Design Lab	0	0	4	2
MTL22	Comprehensive Viva	-	-	-	2
	Total	15	5	4	24
Semester - XI					
MTR31	Dissertation Part - I	-	-	-	12
	Total	-	-	-	12
Semester - XII					
MTR41	Dissertation Part - II	-	-	-	20
	Total	-	-	-	20
	Grand Total				80

List of electives

Course No.	Course Title	Contact periods per week			Credits
		Lecture L	Tutorial T	Practical P	
	Elective-I				
MTE11	Parallel Algorithm	3	1	0	4
MTE12	Pattern Recognition	3	1	0	4
MTE13	Wireless Mobile Network	3	1	0	4
MTE14	Wireless & Mobile Communication	3	1	0	4
MTE15	Machine Learning	3	1	0	4
MTE16	Fuzzy Systems	3	1	0	4
	Elective-II				
MTE21	Real Time System	3	1	0	4
MTE22	Software Metrics	3	1	0	4
MTE23	Software Quality Engineering	3	1	0	4
MTE24	Cluster and Grid Computing	3	1	0	4
MTE25	Natural Language Processing	3	1	0	4
MTE26	Applied Cryptography	3	1	0	4
	Open Elective				
MTO21	Human Computer Interaction	3	1	0	4
MTO22	Bioinformatics	3	1	0	4
MTO23	Information Security and Cyber Laws	3	1	0	4

MT111: NETWORK AND COMPUTER SECURITY   L T P C
                                             3 1 0 4

UNIT 1
Introduction: History and Overview of Cryptography, Historical Ciphers and Their Cryptanalysis, Definition of Perfect Secrecy, Shannon's Theorem, Basic Principles of Modern Cryptography Private Key Cryptography: Private Key Encryption, Computational Approach to Cryptography, Pseudo Randomness, Constructing Secure Encryption Schemes, Chosen Plaintext Attacks, CPA Secure Encryption Schemes, Chosen Cipher Text Attacks, Security Against CCA, Limitations of Private Key Cryptography

UNIT 2
Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

UNIT 3

Reconnaissance: Information Gathering Methodology, Locate the Network Range, Active and Passive reconnaissance. Scanning: Scanning, Elaboration phase, active scanning, DNS Zone transfer. Detecting live systems on the target network, Discovering services running /listening on target systems, Understanding port scanning techniques, Identifying TCP and UDP services running on the target network, Understanding active and passive fingerprinting.

UNIT 4
Trojans and Backdoors: Effect on Business, Trojan, Overt and Covert Channels, Working of Trojans, Different Types of Trojans, Different ways a Trojan can get into a system, Indications of a Trojan Attack. Sniffers: Definition of sniffing, Sniffer working, Passive Sniffing, Active Sniffing, Ethreal tool, Man-in-the-Middle Attacks, Spoofing and Sniffing Attacks, ARP Poisoning and countermeasures.
Denial of Service: Goal of DoS (Denial of Service), Impact and Modes of Attack.

UNIT 5
Understanding Session Hijacking, Spoofing vs Hijacking, Steps in Session Hijacking, Types of Session Hijacking, TCP Concepts 3 Way and shake, Sequence numbers. ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing. Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Securing Wireless Networks.

TEXT BOOKS:

1. Cryptography and Network Security, W. Stallings , Prentice Hall, 5th Edition, 20102.
2. Network Security Essentials, William Stallings ,Prentice Hall, 5th Edition, 2013

REFERNCE BOOKS:-

1. Firewalls and Internet Security, William R. Cheswick and Steven M. Bellovin, Addison-Wesley Professional, 2ndEdition, 2003.
2. Hackers Beware, Eric Core, EC-Council Press, 2003

MT112: ADVANCED COMPUTER ARCHITECTURE   **L T P C**
                                                    3 1 0 4

UNIT 1

Introduction: Overview of IAS computer function and Modern computer function- Instruction sets, Instruction Set Architecture, Instruction formats, Instruction set categories, addressing modes.

UNIT 2

Processor Design: Data path implementation, Register Transfer Notation (RTN), Abstract RTN, Concrete RTN, Control sequence for Simple RISC computer (SRC); Control Module Design, Hardwired control Module Design and Micro programmed control Module Design using control Sequences; Characteristic of CISC and RISC processors, Performance metrics, Execution time, MIPS, MFLOPS.

UNIT 3

Memory Design: Characteristics, Performance parameters, Operations & Timing Diagrams, Main Memory, Byte Storage methods, Six transistor static RAM cell- Timing diagrams, DRAM- Timing diagrams, Conceptual view of memory cell, 1-D,2-D memory design, Typical RAM, ROM chip layouts, Memory address map, Memory connections to CPU, Cache memory- Cache memory management techniques, Types of cache's : Look through, look aside, unified Vs Split, multilevel, performance issues: Mean memory access time, Execution time.

UNIT 4

High Performance Processors: Pipelining: Two stages, Multi stage pipelining, Basic performance issues in pipelining: Hazards, Methods to prevent/ resolve hazards and their drawbacks-Approaches to deal with branches; Flynn's Classification, Shared Memory Multiprocessors: Cache Coherence Protocols, Snoopy, MSI, MESI, and MOESI.

UNIT 5

Multi-Core Architectures: Introduction to multi-core architectures, Moore's Law, hyper threading, multi threading for single core and Multi-core, Issues involved into writing code for multi-core architectures, development of programs for these architectures using OpenMP and Pthreading.

Text Books:-

1. Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" McGraw-Hill international Edition
2. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill

References:

1. V.Rajaraman, L Sivaram Murthy, "Parallel Computers", PHI.
2. William Stallings, "Computer Organization and Architecture, Designing for performance" Prentice Hall, Sixth edition.
3. Kai Hwang, Scalable Parallel Computing.

MT113: NEURAL NETWORK   L T P C
                             3 1 0 4

UNIT 1

Introduction to Neural Networks, Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Basic data structures: mapping of vector spaces, clusters, principal components. Basic Learning Rules, Recent advances in Neural Networks.

UNIT 2

The Perceptron and its learning law. Classification of linearly separable patterns. Adaptive networks, Supervised Learning Neural Networks, Single layer and multi layer perceptrons, Radial basis function networks, Modular neural networks, Adaline and madaline.

UNIT 3

Stochastic Processes and Neural Networks and Stimulated Annealing, Analysis of pattern storage Networks, Analysis of linear auto adaptive feed forward networks, Boltzman machine.

UNIT 4

Analysis of linear auto adaptive feed forward networks, Feedback Neural Networks, Analysis of linear auto adaptive feed forward networks, Stochastic Networks & Stimulated Annealing, Boltzman machine Multilayer Perceptrons, Analysis of pattern storage Networks

UNIT 5

Unsupervised Learning, Adaptive Resonance Theory, Unsupervised Learning Networks Competitive learning, learning vector quantization, Principal component analysis of Hebbian Learning, Adaptive Resonance Theory, Kohonen self-organizing maps.

Text Books:-

1. B. Yegnanarayana, —Artificial Neural Networks‖, PHI
2. Jacek M. Zurada, Introduction to artificial neural systems, Jaico Publ. House, 1994.

Reference Books:-

1. Haykin, —Neural Network a comprehensive Foundation‖, PHI
2. Anderson, —An introduction to Artificial Neural Networks‖, Prentice Hall
3. James A Freeman, David M Skapura, —Neural Networks-Algorithms, Applications and Programming Techniques,‖ Person Education.

MT114: DISTRIBUTED DATABASES

L T P C

3 1 0 4

UNIT 1

Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.

UNIT 2

Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializablity by Locks, Locking system with multiple lock modes, architecture for Locking scheduler.

UNIT 3

Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.

UNIT 4

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

UNIT 5

Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques.

Text Books:-

1. Silberschatz, orth and Sudershan, Database System Concept', Mc Graw Hill
2. Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill

Reference Books:-

1. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education
2. Ceei and Pelagatti,'Distributed Database', TMH
3. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

MT121: ADVANCED OPERATING SYSTEMS　　　　　　　　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 1 0 4

UNIT 1

Introduction: Operating system concept - processes and threads, process model, process creation, process termination, process hierarchies, and process states, Implementation of processes, Threads-Thread model, thread usage, Implementation of threads in user space and kernel, Hybrid implementations.

UNIT 2

Inter Process Communication: Race conditions, critical regions, Mutual Exclusion with busy waiting, sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing; Scheduling- scheduling in batch systems, Interactive systems, Real time systems, Thread scheduling.

UNIT 3

Deadlocks: Introduction, Deadlock Detection and Recovery – Deadlock Detection with one resource of each type, with multiple resource of each type, recovery from deadlock; Deadlock Avoidance, Deadlock Prevention

UNIT 4

Memory and Device Management: Introduction, Swapping, Paging, Virtual memory – Demand paging, page replacement Algorithms; File System Management- Organization of File System, File Permissions, MS DOS and UNIX file system case studies, NTFS; Device Management- I/O Channels, Interrupts and Interrupt Handling, Types of device allocation.

UNIT 5

Distributed Operating Systems: Distributed operating system concept – Architectures of Distributed Systems, Distributed Mutual Exclusion, Distributed Deadlock detection, Agreement protocols, Threads, processor Allocation, Allocation algorithms , Distributed File system design; Real Time Operating Systems: Introduction to Real Time Operating Systems, Concepts of scheduling , Real time Memory Management

Text Books:-

1. Mukesh Singhal and Niranjan, "Advanced Concepts in Operating Systems", TMH, 1st Edition, 2001
2. Andrew S. Tanenbaum, "Modern Operating Systems", Pearson Education, 2nd Edition, 2006

Reference Books:-

3. Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson Education, 2nd Edition, 2001
4. Pradeep K. Sinha, "Distributed Operating Systems and concepts", PHI, First Edition, 2002

MT122: DATA STRUCTURE AND ALGORITHM DESIGN   **L   T   P   C**
                                                    3   1   0   4

UNIT 1

Introduction: Algorithms, analysis of algorithms, Growth of Functions, Master's Theorem, Designing of Algorithms. Sorting and order Statistics: Heap sort, Quick sort, Sorting in Linear time, Medians and Order Statistics.

UNIT 2

Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B-Trees, Binomial Heaps, Fibonacci Heaps, Data Structure for Disjoint Sets.

UNIT 3

Decrease and Conquer: Insertion Sort, Depth First Search and Breadth First Search, Topological Sorting, algorithms for Generating Combinatorial Objects.
Greedy Method: minimum-cost spanning trees: Prim's and Kruskal's algorithms – Single source shortest paths: Dijkstra's algorithm and Bellman Ford algorithms.

UNIT 4

Dynamic Programming: Concepts**,** Dynamic programming v/s. divide and conquer, Applications-Matrix chain multiplication, Optimal binary search trees, All pairs shortest path problem-Warshal's and Floyd's algorithms, Longest Common sequence(LCS).

UNIT 5

Decision Trees, P, NP, NP-complete problems, NP-hard problem. Randomized Algorithms, String Matching, Approximation Algorithms.

Text Books:-

1. **C**ormen, **L**eiserson, **R**ivest and Stein, "Introduction to Algorithms", 2nd Edition, by, McGraw-Hill, 2000.
2. E. Horowitz, and S. Sahni, "Fundamentals of Computer Algorithms", Computer Science Press (1978).

Reference Books:-

1. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.

MT123: DISTRIBUTED SYSTEM　　　　　　　　　　　　　　　　**L T P C**

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 1 0 4

UNIT 1

System Models: Architectural models, Fundamental Models
Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.
Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

UNIT 2

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.
Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem,

UNIT 3

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.
Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

UNIT 4

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.
Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT 5

Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.
Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, Election algorithm.
CORBA Case Study: CORBA RMI, CORBA services.

Books:
1. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, Tata McGraw-Hill Edition.
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

Reference books:
1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, S.Mahajan and S.Shah, Oxford University Press.

MTE11: PARALLEL ALGORITHM   **L T P C**
                                                                 3 1 0 4

Unit 1
Parallel Algorithm Design **:** Boundary Value Problem, Finding the Maximum, Complexity measure for parallel algorithms.

Unit 2
Parallel Combinatorial Algorithms: Permutations with and without repetitions, combinations, derangements.

Unit 3
Parallel Searching Algorithms: Maximum/ minimum, median, k^{th} largest/smallest element, Parallel sorting algorithms.

Unit 4

Parallel Graph Algorithms: Parallel graph search and tree traversal algorithms, parallel algorithms for connectivity problems, parallel algorithms for path problems.

Unit 5

Programming for Parallel Algorithms: Shared-Memory Programming with OpenMP, Message-Passing Programming, Performance Analysis.

Text Books:
1. Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, John Wiley.
2. Pattern Recognition principles: Julus T. Tou and Rafel C. Gonzalez, Addision –Wesley.

Reference Books:
1. A probabilistic theory of pattern recognition, Luc Devroye, László Györfi, Gábor Lugosi, Springer, 1996.
2. Pattern classification, Richard O. Duda, Peter E. Hart and David G. Stork, Wiley, 2001.
3. Pattern recognition and machine learning, Christopher M. Bishop, Springer 2006.

MTE12: PATTERN RECOGNITION   **L T P C**
                                                                 3 1 0 4

Unit 1
Pattern recognition fundamentals: Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model.

Unit 2
Bayesian decision theory: Minimum-error-rate classification, Classifiers, Discriminant functions, Decision surfaces, Normal density and discriminant functions, Discrete features, Missing and noisy features, Bayesian networks (Graphical models) and inferencing.

Unit 3
Maximum-likelihood and Bayesian parameter estimation: Maximum-Likelihood estimation: Gaussian case, Maximum a Posteriori estimation, Bayesian estimation: Gaussian case, Problems of dimensionality, Dimensionality reduction: Fisher discriminant analysis, PCA Expectation-Maximization method: Missing features

Unit 4

Sequential Models: State Space, Hidden Markov models, Dynamic Bayesian, Non-parametric techniques for density estimation: Parzen-window method, K-Nearest Neighbour method
Linear discriminant functions: Gradient descent procedures, Perceptron criterion function, Minimum-squared-error procedures, Ho-Kashyap procedures, Support vector machines

Unit 5

Unsupervised learning and clustering: Unsupervised maximum-likelihood estimates, Unsupervised Bayesian learning, Criterion functions for clustering, Algorithms for clustering: K-means, Hierarchical and other methods, Cluster validation, Low-dimensional representation and multidimensional scaling (MDS).

Text Books:
1. Pattern Recognition principles: Julus T. Tou and Rafel C. Gonzalez, Addision –Wesley.
2. Pattern recognition and machine learning, Christopher M. Bishop, Springer 2006.

Reference Books:
1. A probabilistic theory of pattern recognition, Luc Devroye, László Györfi, Gábor Lugosi, Springer, 1996.
2. Pattern classification, Richard O. Duda, Peter E. Hart and David G. Stork, Wiley, 2001.
3. Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, John Wiley.

MTE13: WIRELESS MOBILE NETWORKS   **L T P C**

                                                                       3 1 0 4

UNIT 1

Fundamental of Wireless Communication Technology, Wireless Network, Wireless Characteristics, Channels, Propagation. Types of wireless systems and their parameters, Satellite System, Cellular System, GSM, Wireless LAN, PAN, MAN and WANs, IEEE 802.11 Standards.

UNIT 2

Infrastructure and Infrastructure less Network, Mobile Ad hoc Network (MANET), Wireless Sensor Network, Properties of MANET, MANET Applications, MAC (Hidden and Exposed terminal problems), MAC Protocol for MANET.

UNIT 3

Security Definition, Services, Mechanisms, Spread spectrum, Frequency hopping, Encryption, Integrity check-sums, Assessment issues specifically related to wireless, Jamming, Interception, Spoofing, Fraud, Satellite Jamming, Theft of service – entertainment services on downlink, Hidden signals

UNIT 4

Routing Protocols for Ad Hoc Wireless Networks Issues in Designing a Routing Protocol for Ad hoc Wireless Networks, Classifications of Routing Protocols. Transport Layer for Ad Hoc Wireless Networks Issues in Designing a Transport layer protocol for Ad hoc Wireless Networks, Design goal s of a Transport layer protocol for Ad hoc Wireless Networks, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks.

UNIT 5

Basics of Wireless, Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications
Data Retrieval in Sensor Networks: Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

Text Books:-
   1. Ad Hoc Wireless Networks, Architecture and Protocols by C. Siva Ram Murthy
   2. Wireless security handbook by Aron E. Earle.

Reference Books:-

   1. Handbook of research on wireless security by Yan zhang jun zheng miao ma.

MTE14: WIRELESS & MOBILE COMMUNICATION　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　1　0　4

Unit 1

Introduction: Network Technologies and Cellular Communications, Discussion on Bluetooth &GSM. Introduction to Mobile Computing: novel applications, limitations, and architecture.
(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Unit 2

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

Unit 3

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time out freezing, Selective retransmission, Transaction oriented TCP.

Unit 4

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Unit 5

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

Text Books:
1. Mobile and Personal communication System and Services- Raj Pandya
2. Wireless Communication and Networks- William Stallings.

Reference Books:
1. Fundamentals of Wireless Communication, David Tse and Pramod Viswanath, Cambridge University Press, 2005
2. Wireless and Personal Communications Systems, Vijay Garg, Joseph Wilkes, Prentice-Hall, Englewood Cliffs, NJ, 1996.

MTE15: MACHINE LEARNING L T P C
3 1 0 4

UNIT 1
INTRODUCTION - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning
Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT 2
Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.
Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT 3
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Naïve Bayes classifier.
Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT 4
Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution
Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

UNIT 5
Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,
Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

MTE16: FUZZY SYSTEMS   **L T P C**

                                                                         3 1 0 4

UNIT I

Introduction, Basic Types, Basic Concepts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets, Types of Operations. Fuzzy Complements, Fuzzy Intersections: t- Norms., Fuzzy Unions: t-Conorms, Combinations of Operations. Aggregation Operations. Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Fuzzy Equations

UNIT 2

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set. Fuzzy Equivalence Relations, Fuzzy Compatibility Relations. Fuzzy Ordering Relations, Fuzzy Morphisms, Sup-i Compositions of Fuzzy Relations., InfCompositions of Fuzzy Relations.

UNIT 3

Fuzzy Measures, Fuzzy Sets and Possibility Theory, Classical Logic: An Overview. Multivalued Logics. Fuzzy Propositions. Fuzzy Quantifiers. Linguistic Hedges. Inference from Conditional Fuzzy Propositions. Inference from Conditional and Qualified Propositions. Inference from Quantified Propositions, Information and Uncertainty, Nonspecificity of Fuzzy Sets. Fuzziness of Fuzzy Sets. Principles of Uncertainty

UNIT 4

Fuzzy Expert Systems: An Overview. Fuzzy Implications. Selection of Fuzzy Implications. Multiconditional Approximate Reasoning. The Role of Fuzzy Relation Equations, Fuzzy Controllers: Overview, Fuzzy Neural Networks. Fuzzy Automata. Fuzzy Dynamic Systems.

UNIT 5

Fuzzy Databases. Fuzzy Information Retrieval, Individual Decision Making, Multiperson Decision Making, Multicriteria Decision Making, Multistage Decision Making, Fuzzy Systems and Genetic Algorithms.

Text Books:-

1. George J. Klir, Bo Yuan, "Fuzzy Sets and Fuzzy Logic", PHI
2. Witold Pedrvcz and Femando Gomide. "An Introduction to Fuzzy Sets", PHI

MTE21: REAL TIME SYSTEMS   L T P C
                                                                         3 1 0 4
Unit 1
Real-time systems: Real-time systems models, Types of real-time systems, internal structure of real-time systems, Performance measures, Examples of real-time systems and real-world applications, Modeling & Designing real-time systems
Unit 2
Real-Time Process Management: Task scheduling for Uniprocessor systems, handling priorities with critical section, interrupts, task allocation & scheduling for multiprocessor systems, adaptive scheduling.
Unit 3
Programming Environment: In depth Knowledge of RTOS programming languages, tools & techniques.
Unit 4
Real-Time System Design: Design techniques for Reliability, Fault Tolerance & other application specific quality considerations.
Unit 5
Trends in Real-Time System Design & Development in fields such as Robotics. Introduction to research topics.

Text Books:
      1. A.C. Shaw, Real-Time Systems and Software, Wiley.
      2. J.E. Cooling, Real-Time Software Systems, International Thompson Computer Press.

Reference Books:

1. Real-Time Systems Design and Analysis, P.H. Laplante, IEEE Press.
2. Real-Time Systems, J. Liu, Prentice-Hall, 2000.
3. Real-Time Computer Control, R. Bennett, Prentice-Hall.
4. Real-Time Systems, C.M. Krishna and K.G. Shin, McGraw-Hill.

MTE22: SOFTWARE METRICS
                                                          L T P C
                                                          3 1 0 4

Unit 1
Software Quality Assurance Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance, Software Quality Assurance Plan. Steps to develop and implement a Software Quality Assurance Plan

Unit 2
Quality Standards: ISO 9000 and Comparison ISO Standards, CMM, CMMI, PCMM, 3 Sigma, 6 Sigma, Software Quality Models.

Unit 3
Measurement basics: What is Software Metrics?, Application Areas of Metrics, Categories of Metrics, Measurement Scale, Axiomatic Evaluation of Metrics on Weyuker's Properties. Analyzing the Metric Data: Summary statistics for preexamining data, Metric Data Distribution, Outlier Analysis, Correlation Analysis, Exploring Analysis.

Unit 4:
Measuring Structure and Size: Size Estimation, Halstead Software Science Metrics, Information flow Metrics, Measuring Quality, Software Quality metrics based on Defects, Usability Metrics, Testing Metrics, Reliability Models.

Unit 5

Object Oriented Metrics: Coupling Metrics, Cohesion Metrics, Inheritance Metrics, Size Metrics, Reuse Metrics,
Empirical software engineering, research in software quality.

Text Books:
1. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education (Singapore) Pvt. Ltd., 2002.
2. Norman E. Fenton and Shari Lawrence, "Software Metrics", PfleegerThomson, 2003.

Reference Books:
1. D. Galin, "Software Quality Assurance: From Theory to Implementation", Addison Wesley.
2. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, 2003
3. Mike Konrad and Sandy Shrum, CMMI, Mary Beth Chrissis, Pearson Education (Singapore) Pvt Ltd, 2003.
4. Mordechai Ben Menachem/Garry S. Marliss, "Software Quality", Thomson Learning.

MTE23: SOFTWARE QUALITY ENGINEERING　　　　　　　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 1 0 4

UNIT 1:

Introduction
Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

UNIT 2:

Software Quality Metrics
Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

UNIT 3:

Software Quality Management and Models
Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT 4:

Software Quality Assurance
Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

UNIT 5:

Software Verification, Validation & Testing:
Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

Text Books:

1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.
2. Metrics and Models in Software Quality Engineering, Stephen H. Kan, Addison- Wesley (2002), ISBN: 0201729156

MTE24: CLUSTER AND GRID COMPUTING　　　　　　　　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 1 0 4

Unit 1

Cluster Computing: Introduction to concepts in Cluster based distributed computing Hardware technologies for cluster computing and software for cluster computing, and different Software Architecture for Cluster Computing.

Unit 2

Resource management and scheduling: Managing, cluster resources: single system images, system level middleware, distributed task scheduling, monitoring and administering system resources Parallel I/O and Parallel Virtual File System. Scheduling: Condor, Maui Scheduler, Portable Batch System (PBS)

Unit 3

Grid Computing: Grids and Grid Technologies, Programming models and Parallelization Techniques, Grid Security Infrastructure, Setting up Grid, deployment of Grid software and tools, and application execution.

Unit 4

Standard application development tools and paradigms: Performance evaluation tools, HINT, netperf, netpipe, ttcp, Iperf**.**message

Unit 5

Data Management: Application Case Study: Molecular Modeling for Drug Design and Brain Activity Analysis, Resource management and scheduling.

Text Books:
1. William Gropp, Ewing Lusk, Thomas Sterling, Beowulf Cluster Computing with Linux, 2nd edition, MIT Press.
2. Bart Jacob, Michael Brown, Introduction to grid computing

Reference Books:
1. MPI The Complete Reference - 2nd Ed by Marc Snir, et. al., The MIT Press, 1998.
2. Parallel Programming with MPI by Peter Pacheco, Morgan Kaufmann, 1998.
3. Gregory F. Pfister, In Search of Clusters: The ongoing battle in lowly parallel computing, Second Edition, Prentice Hall Publishing Company, 1998.

MTE25: NATURAL LANGUAGE PROCESSING　　　　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　1　0　4

Unit 1

Introduction: Introduction to the Morphology, Syntax, Semantics by linking the "linguistics view" (computational linguistics) with the "artificial intelligence view" (natural language processing).

Unit 2

Morphology: Analysis and generation of language on word level: e.g. problems with compounding and idiomatic phrases, homophonous strings as well as loan words and their processing using e.g. finite state automata as well as semantic networks. Ambiguities in words like "pen" and "pipe", but will also discuss some complex strings.

Unit 3

Syntax: Analysis and generation of language on phrasal and sentence level: e.g. applications such as machine translation and grammar checking and the processing using phase structure grammars as well as unification based formalisms and relating those formalisms to recursive transition networks (RTNs) as well as augmented transition networks (ATNs).

Unit 4

Semantics: Language ambiguities on the level of "meaning": represented by case structures and conceptual dependency structures. We will look at famous utterances such as: Colourless green ideas sleep furiously. And will discuss why the machine runs into problems during analysis, and how these problems can be overcome.

Unit 5

Applications of NLP: Machine Translation, Grammar Checkers Dictation, Automatic Document Generation, NL Interfaces.

Text Books:
1. Daniel Jurafsky, James H. Martin "Speech and Language Processing" Second Edition, Prentice Hall, 2008.
2. Chris Manning and Hinrich Schütze, "*Foundations of Statistical Natural Language Processing*", MIT Press. Cambridge, MA: May 1999.

Reference Books:

1. Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
2. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

MTE26: APPLIED CRYPTOGRAPHY   L T P C
                                           3 1 0 4

UNIT 1

Basic Encryption and Decryption: introduction to Ciphers, Monoalphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Monoalphabetic Ciphers, Polyalphabetic Ciphers such as Vigenere Tableaux, Cryptanalysis of Polyalphabetic Ciphers, Perfect Substitution Cipher such as the Vernam Cipher, Stream and Block Ciphers.

UNIT 2

Encryption; authentication; symmetric cryptography, asymmetric cryptography: public-key cryptosystems; digital signatures, message authentication codes. Steganography, One-way functions; pseudo-randomness and random number generators.

UNIT 3

Remote user authentication, notions of security; zero knowledge/ interactive proofs, multi-party cryptographic protocols, key exchange and applications.

UNIT 4

Cryptanalysis of cryptographic primitives and protocols, such as by side-channel attacks, differential cryptanalysis, or replay attacks; and cryptanalytic techniques on deployed systems.

UNIT 5

Advanced Topics - ECC, DNA cryptography, quantum cryptography, Digital Watermarking.
Digital signatures: Definitions and applications, Lamport and Merkle schemes. overview of signatures based on discrete-log. certificates and trust management. , SSL/TLS and IPsec, Privacy mechanisms.

Text Books:
       1. Handbook of Applied Cryptography by A. Menezes, P. Van Oorschot, S. Vanstone.
       2. Cryptography by Behrouz A. Forouzan,TMH

Reference Books:
       1. Cryptography and Network Security by Stalling, PHI
       2. Cryptography & security services , Mechanism & application By Mogollon , Manuel , Cyber tech. Pub.
       3. Cryptography and hardware security By Stalling, W PHI
       4. Introduction to Modern Cryptography by J. Katz and Y. Lindell.
       5. Kahate, Atul, "Cryptography and Network Security." Tata McGraw Hill, 2007.
       6. Delfs, Hans, "Introduction to cryptography." Springer, 2004.

MTO21: HUMAN COMPUTER INTERACTION   **L T P C**
                                                                          3 1 0 4

UNIT 1

Introduction: Importance of user Interface –Characteristics of graphical and web user interfaces, importance of good design. Benefits of good design, Principles of good Screen design.

UNIT 2

System menus and navigation schemes, kinds of windows, device based controls, screen based controls, test and messages.

UNIT 3

Feedback, guidance and assistance, Internationalization and Accessibility, graphics, icons and images, colors, layout windows and pages

UNIT 4

Interaction design - introduction, goals, usability. Conceptualizing interaction problem space, conceptual models, interface metaphors, interaction paradigms, cognition, conceptual framework for cognition, collaboration, communication, social mechanisms conceptual frame work

UNIT 5

Affective aspects, Expressive interface, user frustration agents process of interaction design, activities, characteristics, practical issues, life cycle models, design , prototyping and conceptual design, physical design, evaluation, framework, testing modeling users-kinds of tests, doing user testing, experiments, predictive model.

Text Books:-

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
   Designing the user interface. 3rd Edition Ben Sheidermann, Pearson Education Asia.
2. Preece, Rogers, Sharp, "interaction design", John Wiley 2002

Reference Books:-
1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Sheiderman B Desiging the user interface, "Strategies for Effective Human Computer Interaction" , 2nd ed. Addison Wesley , 1992
3. Sudifte AG , "Human Computer Interface Design" , 2nd ed, Macmillan ,1995

MTO22: BIOINFORMATICS　　　　　　　　　　　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　1　0　4

Unit 1
Introduction: biology, physics: Biological hierarchy, Information stages, Physical processes,
Methods of gene sequencing: Detailed discussion on Sequences searching methods.

Unit 2
Gene expression: Current and prospective methods of gene profiling. Data acquisition. Data standardization. Linear approximations of data; DNA chips, Protein targeting, Data normalization, Linear view.

Unit 3
Statistics approaches: Probabilistic notions, Multivariate issues, Clustering, Information handling, Experimental and computational methods of structure determination for proteins and nucleic acids.

Unit 4
Ontology: Annotation of genes, their products and functions. System biology, evolution, hierarchy, Medical informatics, Software support: Software availability, Software targets, Text parsing, BioPerl. Statistics, R-system

Unit 5
Recent Advances & Applications of Bio-Informatics: Recent trends in Computing with bio-systems.

Suggested Readings:
Text Books:
　　1. David W. Mount, "Bioinformatics, Sequence and Genome Analysis", Cold Spring Harbor Laboratory Press
　　2. Andreas D. Baxevanis, "Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins", Second Edition.

Reference Books:
　　1. D.E. Krane and M.L. Raymer, "Fundamental Concepts of Bioinformatics", Pearson Education, 2003.
　　2. B. Bergeron, "Bioinformatics Computing", Prentice –Hall, 2003.
　　3. Richard Durbin, Sean R. Eddy, Anders Krogh, Graeme Mitchison, "Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids", Cambridge University Press.

MTO23: INFORMATION SECURITY AND CYBER LAWS　　　　　L　T　P　C
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　1　0　4

UNIT 1

Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages 18 Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Principles of Information Security: Confidentiality, Integrity Availability and other terms in Information Security.

UNIT 2

Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems.

UNIT 3

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls: Design and Implementation Issues, Policies.

UNIT 4

IT Act; The rights the various parties have with respect to creating, modifying, using distribution. Computer Software and Intellectual Property-Objective, Copyright Protection, Reproducing, Defenses, Patent Protection. Database and Data Protection-Objective.

UNIT 5

Introduction to Trade mark – Trade mark Registration Process – Post registration Procedures – Trade mark maintenance. Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership. Introduction to Trade Secret – Maintaining Trade Secret.

Text Books:-

  1. Godbole," Information Systems Security", Willey.
  2. Merkov, Breithaupt," Information Security", Pearson Education.

Reference Books:-

  1. Sood,"Cyber Laws Simplified", Mc Graw Hill
  2. Furnell, "Computer Insecurity", Springer
  3. 4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill
  4. IT Act 2000