P.S.R. ENGINEERING COLLEGE

(An Autonomous Institution & Affiliated to Anna University, Chennai)

SIVAKASI - 626140

M.E. COMPUTER SCIENCE AND ENGINEERING

PG REGULATION-2012

CURRICULUM AND SYLLABI

[1st To 4th Semester]

THIS IS THE FINAL VERSION OF THE SYLLABUS AS RATIFIED AND APPROVED BY THE ACADEMIC COUNCIL OF THE COLLEGE IN THE MEETINGS HELD ON 7/7/2012, 1/6/2013

DEAN(ACAD

REGULATIONS FOR PG PROGRAMME (M.E/M.C.A/M.B.A) CANDIDATE ADMITTED DURING THE ACADEMIC YEAR 2012 - 2013 AND ONWARDS [PG Regulation-2012]

PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i. "**Programme**" means Post graduate Degree Programme (M.E., M.C.A. and M.B.A)

ii. **"Branch**" means specialization or discipline of M.E. Degree Programme like "Applied Electronics", "Computer Science and Engineering", etc.

iii. "**Course**" means Theory or Practical subject that is normally studied in a semester, like Applied Mathematics, Embedded System Design, etc.

iv. "**Head of the Institution**" means the Principal of a College / Institution who is responsible for all academic activities of that College / Institution and for implementation of relevant Rules and Regulations.

v. **"Head of the Department"** means Head of the Department concerned.

vi. "**Controller of Examinations"** means the Authority of the College who is responsible for all activities of the Examinations.

vii. "**University**" means ANNA UNIVERSITY.

viii. **"College"** or **"Institution"** means P.S.R. Engineering College.

1. ADMISSION REQUIREMENTS

1.1 Candidates for admission to the first semester of the Master's Degree Programme shall be required to have passed an appropriate Degree Examination of Anna University or any other examination of any University or authority accepted as equivalent thereto.

1.2 Eligibility conditions for admission such as class obtained, number of attempts in qualifying examination and physical fitness will be as prescribed from time to time. &

1.3 Any other conditions as notified by the Government of Tamil Nadu.

2. PROGRAMMES OFFERED AND MODE OF STUDY

2.1. P.G. PROGRAMMES OFFERED

- M.E. Computer Science and Engineering
- M.E. Structural Engineering
- M.E. Applied Electronics
- M.E. Engineering Design
- M.E. Power Electronics and Drives
- M.C.A
- M.B.A

2.2. MODE OF STUDY

Full Time / Part Time (Daytime)

Candidates admitted should be available in the College/ Institution/ University during the complete working hours for curricular, co-curricular and extra-curricular activities assigned to them.

3. DURATION AND STRUCTURE OF THE P.G.PROGRAMMES

3.1 The minimum and maximum periods for completion of the PG Programmes are given below:

Programme	Min. No. of Semesters	Max. No. of Semesters
M.E	4	8
M.B.A	4	8
M.C.A	6	12

The Curriculum and Syllabi of all the P.G. Programmes shall be approved by the Academic Council of the College. The number of Credits to be earned for the successful completion of the programme shall be as specified in the Curriculum of the respective specialization of the P.G. Programme.

3.2 Credits will be assigned to the courses for different modes of study as given below:

3.2.1 The following will apply to all modes of P.G. Programmes.

- One credit for each lecture period allotted per week
- One credit for each tutorial period allotted per week
- One credit for each seminar/practical session of two periods designed per week.

3.2.2 The minimum prescribed credits required for the award of the degree shall be within the limits specified below:

PROGRAMME	PRESCRIBED CREDIT RANGE
M.E. (Full Time)	65 to 75
M.C.A	118
M.B.A	90

3.3 The P.G. Programmes will consist of:

- core subjects
- elective subjects
- project work / thesis / Dissertation
- The Programme will also include design projects / planning projects / seminars / practicals / practical training, if they are specified in the Curriculum.

3.4 The Curriculum and Syllabi of all the P.G. Programmes shall be approved by the Academic Council of the College.

3.5 A student shall pass all the subjects specified in the curriculum of the programme for the successful completion of the programme.

3.6. Each semester shall normally consist of 90 working days or 450 hours or 540 periods of 50 minutes duration. The Head of the Institution shall ensure that every teacher imparts instruction as per the number of periods specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course (subject) being taught. End-Semester Examination will ordinarily follow immediately after the last working day of the semester.

3.7 The maximum marks assigned to different courses shall be as given below:

3.7.1. i. Each of the theory subjects (excluding project work) shall carry maximum of 100 marks out of which the internal assessment will carry 25 marks, while the end semester Examination will carry 75 marks. The practical classes for all the Practical/Lab component subjects will be assessed continuously and marks will be entered in the prescribed proforma. The progress of Practical classes will be monitored by a committee formed by the concerned Head of the Departments / Professor in-charge of the course to ensure that the concerned staff conducts the laboratory experiments as specified in the syllabus. The maximum marks for the Practical/Lab component courses shall be 100, out of which the continuous internal assessment will carry 25 marks, while the end semester practical examination will carry 75 marks. The award of the end semester practical examination marks shall be conducted by both the Internal and External examiners.

ii. The project report / Thesis / Dissertation of M.E. programme, during Phase I, will be evaluated based on the report and a viva-voce examination by an Internal Examiner and an External Examiner.

iii. The project work / Thesis / Dissertation of M.E. programme, during Phase II, will be evaluated based on the Project Report and a viva-voce examination by a team consisting of the supervisor / Internal Examiner and External Examiner for each specialization.

The project report / Thesis / Dissertation of M.B.A. programme (no phases), will be evaluated based on the report and a viva-voce examination by an Internal Examiner and an External Examiner.

iv. Practical Training / Summer Project if specified in the Curriculum shall not exceed the maximum duration of 4 weeks and should be organized by the Head of the Department for every student.

Practical Training / Summer Project of M.B.A. programme if specified in the Curriculum shall not exceed the maximum duration of 6 weeks and should be organized by the Head of the Department for every student.

v. At the end of Practical Training / Summer Project the candidate shall submit a certificate from the organization where he/she has undergone training and also a brief report. The evaluation will be made based on this report and a Viva-Voce Examination, conducted internally by a Departmental Committee constituted by the Head of the Institution. Certificates submitted by the students shall be attached to the mark list sent by the Head of the Institution.

3.7.2 The electives from the curriculum are to be chosen with the approval of the Head of the Department.

3.7.3 A candidate may be permitted by the Head of the Department to choose one or two subjects from P.G. Programmes offered from other departments in the college / institution during the period of his / her study, provided the Head of the Department offering such course also agrees and there is no clash in the time-table for the lecture classes.

3.8. PROJECT WORK/THESIS *I* DISSERTATION

3.8.1 Project work / Thesis / Dissertation shall be carried out under the supervision of a qualified teacher in the Department concerned.

3.8.2 A candidate may, however, in certain cases, be permitted to work on the project in an Industrial/Research Organization, on the recommendations of Head of the Department, with the approval of the Head of the Institution. In such cases, the Project work shall be jointly supervised by a supervisor of the department and an Engineer / Scientist from the Organization and the student shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.

3.8.3 The Project work / Thesis / Dissertation (Phase-II) shall be used for a minimum of 16 weeks during the final semester from the next day of viva voce examination of Phase-1 Project.

The Project work / Thesis / Dissertation of M.B.A programme shall be used for a minimum of 16 weeks during the final semester.

3.8.4 The Project Report / Thesis / Dissertation report / Drawings prepared according to approved guidelines and duly signed by the supervisor(s) and the Head of the Department shall be submitted at the end of the IV semester. The last date for the submission of Thesis (Phase-II) will be six months from the last date of the submission of Phase-I Project Report or Third Semester examination or 24 months from the date of commencement of First Semester class work, whichever is later. However, in exceptional cases, based on the recommendation of the Professor-in-charge of the course the Chairman, Academic Council can permit an extension of time not exceeding 31 days. If a candidate submits the project report/ thesis report/ dissertation after the specified deadline, he / she is deemed to have failed in the Project Work / Thesis ⁄ Dissertation and shall re-enroll for the same in a subsequent semester.

For M.B.A programme, the Project Report / Thesis / Dissertation report / Drawings prepared according to approved guidelines and duly signed by the supervisor(s) and the Head of the Department shall be submitted at the end of the IV semester. The last date for the submission of Thesis will be six months from the commencement of fourth semester. However, in exceptional cases, based on the recommendation of the Professor-in-charge of the course the Chairman, Academic Council can permit an extension of time not exceeding 31 days. If a candidate submits the project report ⁄ thesis report/ dissertation after the specified deadline, he *I* she is deemed to have failed in the Project Work / Thesis / Dissertation and shall re-enroll for the same in a subsequent semester.

3.8.5 Every candidate doing M.E. shall, based on his / her project work thesis dissertation, send a paper for publication in a journal or a conference in which full papers are published after usual review. An acknowledgement for having communicated to the journal or conference shall be attached to the report of the project work /thesis / dissertation. Such acknowledgements shall be sent to the Office of the Controller of

Examinations along with the evaluation marks by the team of examiners without which the marks shall not be accepted.

3.8.6 A student who has passed in all the courses prescribed in the curriculum for the award of the degree shall not be permitted to re-enroll to improve his/her marks in a course or the aggregate marks.

3.8.7 The medium of instruction, examination, seminar and project / thesis / dissertation reports shall be English.

4. FACULTY ADVISER

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a teacher of the Department who shall function as Faculty Adviser for those students throughout their period of study. Such Faculty Adviser shall advise the students and monitor the subjects taken by the students, check the attendance and progress of the students attached to him / her and counsel them periodically. If necessary, the faculty adviser may also discuss with or inform the parents about the progress of the students.

5. CLASS COMMITTEE

5.1 A Class Committee consists of teachers of the concerned class, student representatives and a chairperson who is not teaching the class. It is like the 'Quality Circle' (more commonly used in industries) with the overall goal of improving the teaching-learning process. The functions of the class committee include Solving problems experienced by students in the class room and in the laboratories.

- Clarifying the regulations of the degree programme and the details of rules therein.
- Informing the student representatives the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
- Informing the student representatives the details of regulations regarding the weightage used for each assessment. In the case of practical courses (Iaboratory/ drawing/ project work/ seminar etc.) the breakup of marks for each experiment/ exercise/ module of work, should be clearly discussed in the class committee meeting and informed to the students.
- Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.
- Identifying the weak students, if any, and requesting the teachers concerned to provide additional help or guidance or coaching to such weak students.

5.2 The class committee for a class under a particular specialization is normally constituted by the Head of the Department. However, if the students of different specializations are mixed in a class, the class committee is to be constituted by the Head of the Institution.

5.3 The class committee shall be constituted on the first working day of any semester or earlier.

5.4 At least 2 student representatives (usually 1 boy and 1 girl) shall be included in the class committee.

5.5 The chairperson of the class committee may invite the Faculty Adviser(s) and the Head of the Department to the meeting of the class committee.

5.6 The Head of the Institution may participate in any class committee of the institution.

5.7 The chairperson is required to prepare the minutes of every meeting, submit the same to the Head of the Institution within two days of the meeting and arrange to circulate among the concerned students and teachers. If there are some points in the minutes requiring action by the management, the same shall be brought to the notice of the management by the Head of the Institution.

5.8 The first meeting of the class committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weight age of assessments within the framework of the Regulations. Two or three subsequent meetings may be held at suitable intervals. During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

6. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one group of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Head of the Department /Head the Institution depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The "Course committee" shall meet as often as possible and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the course committee may also prepare a common question paper for the test(s).

7. PROCEDURES FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

7.1 Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' which consists of attendance marked in each lecture or practical or project work class, the test marks and the record of class work (topic covered), separately for each course. This should be submitted to the Head of the Department periodically (at least three times in a semester) for checking the syllabus coverage and the records of test marks and attendance. The Head of the Department will put his signature and date after due verification. At the end of the semester, the record should be verified by the Head of the Institution who will keep this document in safe custody (for five years).

7.2 Theory Subjects [25 marks)

(a). Unit Tests [60% weightage]:

Three tests each carrying sixty (60) marks shall be conducted by the Department / Institution. The total marks obtained in all the tests put together out of 180, shall be reduced to 60 marks and rounded to nearest integer (this implies equal weightage to all the three tests). However a retest at the discretion of the Head of the Department may be conducted for the deserving candidates.

(b). Assignment/Seminar/Miniproject [30% weightage]:

A student has an option to choose any one of the following:

i) Assignment:

Two assignments each carrying 15 marks and requiring work of average 5 to 6 hours of study and written work of average 5 to 6 hours shall be given to be carried out by each student in a separate assignment folder, duly indexed with headings, date of submission, marks, remarks and signature of faculty with date etc.

ii) Assignment and Seminar:

A student has to carry out one assignment and one seminar each carrying 15 marks each. An assignment normally requires work of average 5 to 6 hours of study and written work of average 5 to 6 hours which has to be submitted in a separate assignment folder, duly indexed with headings, date of submission, marks, remarks and signature of faculty with date etc. The student has to make one technical seminar on current topics related to the specialization. The students are expected to submit a report his/her presentation. The seminar will be assessed by the course tutor with common parameters as described by the department.

iii) Mini project

A student can carry out mini project carrying 30 marks either in hardware or software with the approval of the head of the department. The student has to submit a report before the end of the semester. Mini project will be assessed based on the model, presentation and report as decided by the department.

(c). Attendance [10% weightage]:

A maximum of 10 marks for attendance out of 100 marks shall be given to each student depending on his / her attendance percentage as per the distribution given below:

Percentage of Attendance	Marks
75	2
76 – 80	4
81 – 84	6
85 – 90	8
91 and above	10

7.3 Practical Subjects [25 marks]

Every practical exercise / experiment shall be evaluated based on conduct of exercise / experiment and records maintained. There shall be at least one test.

The criteria for determining the internal assessment marks are:

Experiment / Record / Average Practical classes' performance: 50 % Weightage

Practical Test : 40 % Weightage

Attendance : 10 % Weightage

Total 100 marks shall be reduced to 25 Marks.

7.4 Theory Subjects with Laboratory Component

(a). Unit Tests [60% weightage]:

If there is a theory subject with Laboratory component, there shall be three tests; the first two tests (each 60 Marks) will be from theory portions and third test (maximum mark 60) will be for laboratory component. The total 180 marks should be reduced to 60 marks. However a retest at the discretion of the Head of the Department may be conducted for the deserving candidates.

(b). Assignment [30% weightage]:

Two assignments each carrying 15 marks and requiring work of average 5 to 6 hours of study and written work of average 5 to 6 hours shall be given to be carried out by each student in a separate assignment folder, duly indexed with headings, date of submission, marks, remarks and signature of faculty with date etc.

(c). Attendance [10% weightage]:

A maximum of 10 marks for attendance out of 100 marks shall be given to each student depending on his / her attendance 'percentage as per the distribution given below:

Percentage of Attendance	Marks
75	2
76 – 80	4
81 – 84	6
85 – 90	8
91 and above	10

7.5 M.E. Project Work

There shall be a minimum of two reviews for both Phase-I and Phase-II to be conducted separately. The internal and external marks distribution for each phase is given in the table below. The student shall make presentation on the progress made before the review committee. The Head of the Institution/Department shall constitute a review committee for each branch of study.

Project (M.E)	Internal (25 %)		External (75%)	
	Review-I	Review-II	Thesis by External	Viva-voce
Phase-I	25	25	60	90
Phase-II	50	50	120	180

M.B.A/M.C.A. Project Work

There shall be a minimum of two reviews and a model viva-voce for Project Work to be conducted with internal 100 marks and external 300 marks. The student shall make presentation on the progress made before the review committee. The Head of the Institution / Department shall constitute a review committee.

Project work (M.B.A/M.C.A)	Internal (25 %)			External (75%)	
	Review-I	Review-II	Viva-voce	Project Report	Viva-voce
	25	25	50	120	180

8. REQUIREMENTS FOR COMPLETION OF A SEMESTER

A candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester.

8.1 A candidate will be permitted to appear for the Examination for any semester, only if

i) he / she secures not less than 75% of attendance in the number of working days during that semester, provided that it shall be open to Chairman of the Academic Council and any authority delegated with such powers (by the governing body) to grant exemption (based on the recommendation of the Head of the Department) to a candidate who has failed to secure 75% of the attendance for valid reasons and has secured not less than 65% of the attendance. Such exemptions can be allowed only ONCE during his/ her entire course of study.

ii) Candidates representing University in State / National/International/Inter University Sports events, Co & Extra - Curricular activities, paper or project presentation with prior permission from the Head of Institution are given exemption up to 10% of the required attendance and such candidates shall be permitted to appear for the current semester examination.

iii) his / her conduct has been certified to be satisfactory by the concerned Head of Department.

iv) Condonation can be allowed only ONCE during his/ her entire course of study.

8.2 Candidates who do not complete the semester (as per clause 8.1), will not be permitted to write the end-semester examination and are not permitted to go to next semester. They are required to repeat the incomplete semester in a subsequent academic year after getting the necessary permission from the authorities.

9. REQUIREMENTS FOR APPEARING FOR SEMESTER EXAMINATION

A candidate shall normally be permitted to appear for the semester examination of the current semester if he/she has satisfied the semester completion requirements (Subject to Clause 8.1) and has registered for examination in all courses of that semester. Registration is mandatory for all arrear subjects along with current semester subjects, failing which the candidate will not be permitted to move to the higher semester.

10. END SEMESTER EXAMINATION

10.1 There shall be one end-semester examination of 3 hours duration for each lecture based course.

10.2 The project report / Thesis / Dissertation of M.E. programme, during Phase I, will be evaluated based on the report and a viva-voce examination by an Internal Examiner and an External Examiner.

10.3 The project work / Thesis / Dissertation of M.E. programme, during Phase II, will be evaluated based on the Project Report and a viva-voce examination by a team consisting of the supervisor / Internal Examiner and an External Examiner for each specialization.

The following will be the weightages for different courses.

Lecture or Lecture cum Tutorial

Internal Assessments	25%
Semester Examination	75%

Laboratory based subjects

Internal Assessments	25%
Semester Examination	75%

Project work

Internal Assessment	25%
Evaluation of Project Report	

by external examiner	30%
Viva- Voce Examination	45%
(by both Internal & External Examiners)	

M.E.Project

(i). For PHASE- I [Maximum Marks: 100]

Internal Assessment:	50 Marks [Guide: 50 %, Committee: 50%]/
Semester Examination:	150 Marks [Evaluation: 60 Marks, Viva-Voce: 90Marks]

(ii). For Phase- II [Maximum Marks: 400]

Internal Assessment:	100 Marks [Guide: 50%, Committee: 50%)
Semester Examination:	300 Marks [Evaluation: 120 Marks, Viva-Voce: 180 Marks)

MBA Project [MaximumMarks:400]

Internal Assessment:	100 Marks
Semester Examination:	300 Marks [Evaluation: 120 Marks, Viva-Voce: 180 Marks)

11. PASSING REQUIREMENTS

11.1. For each subject the examination will be conducted for 100 marks. A candidate who secures not less than 50% at the total marks in the End Semester examination and Internal Assessment put together in both theory and Practical subjects, including Project work, subject to securing a minimum of 50% in the End - Semester examination, wherever applicable, shall be declared to have passed the examination in that subject. When the mark secured for 100 is converted to 75, for a pass minimum 37 marks must be secured.

11.2 If a candidates fails to secure a pass in a particular course it is mandatory that he/she shall register and reappear for the examination in that course during the next semester when

examination is conducted in that course; he/she should continue to register and reappear for the examination till he / she secures a pass.

12. MALPRACTICE

If a student indulges in malpractice in any of the end semester examinations, he / she shall be liable for punitive action as and when prescribed by the Anna University.

13. ELIGIBILITY FOR THE AWARD OF THE MASTER'S DEGREE

13.1 A student shall be declared eligible *for* the award *of* the degree if he/she has successfully passed all the subjects as specified by the curriculum corresponding to his / her programme within the stipulated time.
No disciplinary action is pending against him/her.

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

14. ISSUE OF MARK SHEETS

Individual mark sheet / grade sheet for each semester will be issued, containing the following information through the Head of the Department concerned, after the publication of the results.

i) The grades obtained in each course.
ii) Whether the candidate has passed / failed in the courses concerned.

15. CLASSIFICATION OF THE DEGREE AWARDED

15.1 A candidate who qualifies for the Degree (vide clause 13) by passing the examination in all subjects of the entire course in first attempt within the specified minimum number of semesters securing a CGPA of not less than 8.5 shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose the withdrawal from examination (vide clause 16) will not be construed as an appearance. Further, the authorized break of study (vide clause 17(iii)) will not be counted for the purpose of classification.

15.2 A candidate who qualifies for the award of the Degree (vide clause 13) having passed the examinations in all the subjects of the course within the specified minimum number of semesters reckoned from his/her commencement of study plus one year securing a CGPA of not less than 6.5 shall be declared to have passed the examination for the degree in FIRST CLASS. For this purpose, the authorized break of study (vide clause 17(iii)} will not be counted for the purpose of classification.

15.3 All other candidates (not covered in clauses 15.1 and 15.2) who qualify for the award of the degree (vide Clause 13) shall be declared to have passed the examination in Second Class.

15.4 A candidate who is absent in semester examination in a subject / project work after having enrolled for the same shall be considered to have appeared in that examination for the purpose of classification.

16. PROVISION FOR WITHDRAWAL FROM EXAMINATION

A candidate may, for valid reasons (medically unfit / unexpected family situations), be granted permission to withdraw from appearing for any subject or subjects of only one semester examination during the entire duration of the degree programme. Also only one application for withdrawal is permitted for that semester examination in which withdrawal is sought. Withdrawal application shall be valid only if the candidate is, otherwise, eligible to write the examination and if it is made prior to the commencement of the last examination in that semester and duly recommended by the Head of Department and approved by the Head of the Institution.

Withdrawal shall not be construed as an appearance for the eligibility of a candidate for the purpose of classification vide clause 15.1 and 15.2.

(i) "Withdrawal application is to be made within TEN days prior to the commencement of the examination".
(ii) "Withdrawal is NOT permitted for arrears examinations of the previous semesters".
(iii) Notwithstanding the requirement of mandatory TEN days notice, applications for withdrawal for special cases under extraordinary conditions will be considered on the merit of the case.

17. AUTHORIZED BREAK OF STUDY FROM A PROGRAMME

i) Break of study shall be granted only once for valid reasons (on medical grounds only) for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the programme In the middle of the semester for valid reasons and rejoin the programme in a later semester, permission may be granted based on the merits of the case provided he / she applies to the Head of the Institution with recommendation from the concerned HOD in advance, but not later than the last date for registering for the end semester examination of the semester in question, through the Head of Department stating the reasons therefore and the probable date of rejoining the programme .

ii) However, if the candidate. has not completed the first semester of the programme, break of study will be considered only on valid medical reasons. The candidate permitted to rejoin the programme after the break shall be governed by the rules and regulations in force at the time of rejoining. Such candidates may have to do additional courses prescribed by the Academic Council, if the regulation is changed.

iii) The authorized break of study will not be counted for the duration specified for passing all the courses for the purpose of classification vide Clause 15.1 and 15.2.

iv) The total period for completion of the programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 3 irrespective of the period of break of study in order that he / she may be eligible for the award of the degree (vide clause 13).

v) If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study' and Clause 17(iii)is not applicable for this case.

18. REVALUATION

Copies of answer script for theory subject(s) can be obtained from the Office of the Controller of Examinations on payment of a prescribed fee specified for this purpose through proper application.

A candidate can apply for revaluation of his / her semester examination answer paper in a theory course, within a week from the declaration of results, on payment of a prescribed fee through proper application to the Office of the Controller of Examinations, as per the norms given by the Chairman, Academic Council. Revaluation is not permitted for Practical Courses and Project work.

19. RANK OF A STUDENT

A candidate who qualifies for the Degree by passing the examination in all subjects of the entire course in first attempt within a period of two consecutive academic years from the date of admission to the course can be given his position in the class as rank. The Rank is determined from I Semester to IV Semester examination mark percentages.

20. PROCEDURE FOR USING SCRIBER

If a candidate is physically handicapped (in case of accidents / ill health) at the time of examination, then he / she may be permitted to use a scriber to write the examination. In such case 30 minutes extra time will be permitted. The Scriber should be a non-engineering student / graduate.

21. INDUSTRIAL VISIT

Every student is required to undergo one Industrial visit, starting f*rom* the first semester of the Programme. Every teacher shall take the students at least for one industrial visit in a year.

22. DISCIPLINE

Every student is required to observe disciplined and decorous behavior both inside and outside the college and not to indulge in any activity which will tend to bring down the prestige of the College. In the event an act of indiscipline being reported, the Principal shall constitute a disciplinary committee consisting of three Heads of Departments of which one should be from the faculty of the student, to inquire into acts of discipline. The disciplinary action is subject to review by the University in case the student represents to the University. Any expulsion of the student from the college shall be with prior concurrence from Directorate of Technical Education / University.

23. CREDIT SYSTEM

The letter grade and the grade point are awarded based on percentage of marks secured by a candidate in individual subjects as detailed below:

Range of Total Marks	Letter Grade	Grade Points (GP)
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	U	0
Incomplete	I	0
Withdrawal	W	0
Absent	AB	0

"U" - denotes failure in the course.

"I" - denotes incomplete as per clause 8.1 and hence prevention from writing End Semester Examination.

"W" - denotes withdrawal from the subject.

"RA" - Reappearance denotes failure in the course.

"AB" - Absent

After results are declared, Consolidated Mark sheets will be issued to each student which will contain the following details:

The list of subjects enrolled during the semester and the grades scored.
The Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards.

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

$$GPA = \frac{\text{Sum of } [\ C \times GP\ ]}{\text{Sum of } C}$$

Where, C - credit of a particular subject &

GP - grade point obtained by the student in the respective subjects.

CGPA will be calculated in a similar manner, considering all the subjects enrolled from first semester. 'U", "I", "W' and "AB" grades will be excluded for calculating GPA and CGPA. Each subject is normally assigned certain number of credits with 1 credit per lecture period per week, 1 credit per tutorial period per week, 1 credit for 2 periods of laboratory or practical or seminar or project work per week (2 credits for 3 or 4 periods of practical). However, the performance of a student is evaluated only based on the mark system.

24. REVISION OF REGULATIONS AND CURRICULAM

The college may from time to time revise, amend or change the regulations, scheme of examinations and syllabi, if found necessary.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATIONS – 2012

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	12CS11	Operations Research	3	1	0	4
2	12CS12	Computer Architecture	3	0	0	3
3	12CS13	Data Structures and Algorithms	3	0	0	3
4	12CS14	Object Oriented Software Engineering	3	0	0	3
5	12CS15	Computer Networks and Management	3	0	0	3
PRACTICAL						
6	12CS16	Data Structures Lab	0	0	3	2
7	12CS17	Networking Lab	0	0	3	2
TOTAL			15	1	6	20

CURRICULUM I TO IV SEMESTERS (FULL TIME)

SEMESTER I

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	12CS21	Data Base Technology	3	0	0	3
2	12CS22	Advanced Operating Systems	3	0	0	3
3	12CS23	Advanced System Software	3	0	0	3
4	12CS24	Information Security	3	0	0	3
5	12CS25	Web Technology	3	0	0	3
6	12CS2*	Elective 1*	3	0	0	3
PRACTICAL						
7	12CS26	Operating System Lab	0	0	3	2
8	12CS27	Internet Programming Lab	1	0	3	3
TOTAL			19	0	6	23

SEMESTER II

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	12CSP*	Elective 2*	3	0	0	3
2	12CSP*	Elective 3*	3	0	0	3
3	12CSP*	Elective 4*	3	0	0	3
PRACTICAL						
4	12CSP1	Project Work (Phase I)	0	0	12	6
TOTAL			9	0	12	15

SEMESTER III

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	12CSP2	Project Work (Phase II)	0	0	24	12
TOTAL			0	0	24	12

SEMESTER IV

TOTAL No. OF CREDITS TO BE EARNED FOR THE AWARD OF DEGREE20+23+15+12 = 70

LIST OF

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
		SEMESTER II				
1	**12CS2A**	Mobile computing	**3**	**0**	**0**	**3**
2	**12CS2B**	Theory of Computation	**3**	**0**	**0**	**3**
3	**12CS2C**	Multimedia Systems	**3**	**0**	**0**	**3**
4	**12CS2D**	Software Quality Assurance	**3**	**0**	**0**	**3**
5	**12CS2E**	Software Project Management	**3**	**0**	**0**	**3**
		SEMESTER III				
6	**12CSPA**	Grid Computing	**3**	**0**	**0**	**3**
7	**12CSPB**	Soft Computing	**3**	**0**	**0**	**3**
8	**12CSPC**	Distributed Computing	**3**	**0**	**0**	**3**
9	**12CSPD**	XML and Web Services	**3**	**0**	**0**	**3**
10	**12CSPE**	Bio Informatics	**3**	**0**	**0**	**3**
11	**12CSPF**	Network Security	**3**	**0**	**0**	**3**
12	**12CSPG**	Embedded Systems	**3**	**0**	**0**	**3**
13	**12CSPH**	Digital Imaging	**3**	**0**	**0**	**3**
14	**12CSPI**	Adhoc Networks	**3**	**0**	**0**	**3**
15	**12CSPJ**	Data Warehousing and Data Mining	**3**	**0**	**0**	**3**
16	**12CSPK**	Performance Evaluation of Computer Systems and Networks	**3**	**0**	**0**	**3**
17	**12CSPL**	Agent Based Intelligent Systems	**3**	**0**	**0**	**3**
18	**12CSPM**	Visualization Techniques	**3**	**0**	**0**	**3**
19	**12CSPN**	Advanced Databases	**3**	**0**	**0**	**3**
20	**12CSPO**	Component Based Technology	**3**	**0**	**0**	**3**
21	**12CSPP**	Cloud Computing	**3**	**0**	**0**	**3**
22	**12CSPQ**	Firewalls and Intrusion Detection System	**3**	**0**	**0**	**3**

ELECTIVES FOR M.E COMPUTER SCIENCE AND ENGINEERING*

2

12CS11 OPERATIONS RESEARCH

L T P C
3 1 0 4

UNIT I QUEUEING MODELS 9

Poisson Process – Markovian Queues – Single and Multi-server Models – Little's formula – Machine Interference Model – Steady State analysis – Self Service Queue.

UNIT II ADVANCED QUEUEING MODELS 9

Non- Markovian Queues – Pollaczek Khintchine Formula – Queues in Series – Open Queueing Networks –Closed Queueing networks.

UNIT III SIMULATION 9

Discrete Even Simulation – Monte – Carlo Simulation – Stochastic Simulation – Applications to Queueing systems.

UNIT IV LINEAR PROGRAMMING 9

Formulation – Graphical solution – Simplex method – Two phase method - Transportation and Assignment Problems.

UNIT V NON-LINEAR PROGRAMMING 9

Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn - Tucker conditions – Quadratic Programming.

TEXT BOOKS: L + T: 45+15 =60

1. Winston.W.L. "Operations Research", Fourth Edition, Thomson – Brooks/Cole, 2003.
2. Taha, H.A. "Operations Research: An Introduction", Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002.

REFERENCES:

1. Robertazzi. T.G. "Computer Networks and Systems – Queuing Theory and Performance Evaluation", Third Edition, Springer, 2002 Reprint.
2. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.

12CS12 COMPUTER ARCHITECTURE

L T P C
3 0 0 3

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING 9

Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.

UNIT II INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES 9

Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware based speculation – Limitations of ILP – Case studies.

UNIT III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES 9

Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms – Case studies.

UNIT IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES 9

Symmetric and distributed shared memory architectures – Performance issues – Synchronisation issues – Models of memory consistency – Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies.

UNIT V MEMORY AND I/O 9

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

REFERENCES:

1. John L. Hennessey and David A. Patterson, " Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A hardware / software approach" , Morgan Kaufmann / Elsevier, 1997.

3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

12CS13 DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

UNIT I COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES 9

Asymptotic notations – Properties of big oh notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – NP-completeness – NP- hard – recurrence equations – solving recurrence equations – arrays – linked lists – trees.

UNIT II HEAP STRUCTURES 9

Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy-binomial heaps.

UNIT III SEARCH STRUCTURES 9

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

UNIT IV GREEDY & DIVIDE AND CONQUER 9

Quicksort – Strassen's matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes

UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING 9

Multistage graphs – 0/1 knapsack using dynamic programming – Flow shop scheduling – 8- queens problem – graph coloring – knapsack using backtracking

TOTAL = 45

REFERENCES:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.
3. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.
4. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
5. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

12CS14 OBJECT ORIENTED SOFTWARE ENGINEERING L T P C
3 0 0 3

UNIT I INTRODUCTION 9

System Concepts – Software Engineering Concepts – Development Activities – Managing Software Development – Unified Modeling Language – Project Organization – Communication

UNIT II ANALYSIS 9

Requirements Elicitation – Concepts – Activities – Management – Analysis Object Model – Analysis Dynamic Models

UNIT III SYSTEM DESIGN 9

Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design

UNIT IV OBJECT DESIGN AND IMPLEMENTATION ISSUES 9

Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing

UNIT V MANAGING CHANGE 9

Rationale Management – Configuration Management – Project Management – Software Life Cycle

TOTAL = 45

REFERENCES:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2004.

2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.

12CS15 COMPUTER NETWORKS AND MANAGEMENT **L T P C**
3 0 0 3

UNIT I HIGH SPEED NETWORKS **9**

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT **9**

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL **10**

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES **9**

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

UNIT V PROTOCOLS FOR QoS SUPPORT **8**

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TOTAL = 45

TEXT BOOKS:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES:

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

12CS16 DATA STRUCTURES LAB **L T P C**
0 0 3 2

1. Min Heap
2. Deaps
3. Leftist Heap
4. AVL Tree
5. B-Tree
6. Tries
7. Quick Sort
8. Convex hull
9. 0/1 Knapsack using Dynamic Programming
10. Graph coloring using backtracking

12CS17 NETWORKING LAB **L T P C**
0 0 3 2

1. Socket Programming
    a. TCP Sockets
    b. UDP Sockets
    c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat
5. Simulation of Network Management Protocols
6. Study of Network Simulator Packages – such as opnet, ns2, etc.

12CS21 DATABASE TECHNOLOGY **L T P C**
3 0 0 3

UNIT I DISTRIBUTED DATABASES **5**

Distributed Databases Vs Conventional Databases – Architecture – Fragmentation – Query Processing – Transaction Processing – Concurrency Control – Recovery.

UNIT II OBJECT ORIENTED DATABASES **10**

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks - Recovery.

UNIT III EMERGING SYSTEMS **10**

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

UNIT IV DATABASE DESIGN ISSUES **10**

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

UNIT V CURRENT ISSUES **10**

Rules - Knowledge Bases - Active And Deductive Databases - Parallel Databases – Multimedia Databases – Image Databases – Text Database

TOTAL= 45

REFERENCES:

1. Elisa Bertino, Barbara Catania, Gian Piero Zarri, “Intelligent Database Systems”, Addison-Wesley, 2001.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, “Advanced Database Systems”, Morgan Kaufman, 1997.
3. N.Tamer Ozsu, Patrick Valduriez, “Principles Of Distributed Database Systems”, Prentice Hall International Inc., 1999.
4. C.S.R Prabhu, “Object-Oriented Database Systems”, Prentice Hall Of India, 1998.
5. Abdullah Uz Tansel Et Al, “Temporal Databases: Theory, Design And Principles”, Benjamin Cummings Publishers, 1993.
6. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, Mcgraw Hill, Third Edition 2004.
7. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fourth Ediion, Mcgraw Hill, 2002.
8. R. Elmasri, S.B. Navathe, “Fundamentals Of Database Systems”, Pearson Education, 2004.

12CS22 ADVANCED OPERATING SYSTEMS **L T P C**
3 0 0 3

UNIT I INTRODUCTION **9**

Overview - Functions of an Operating System – Design Approaches – Types of Advanced Operating System - Synchronization Mechanisms – Concept of a Process, Concurrent Processes – The Critical Section Problem, Other Synchronization Problems – Language

Mechanisms for Synchronization – Axiomatic Verification of Parallel Programs - Process Deadlocks - Preliminaries – Models of Deadlocks, Resources, System State – Necessary and Sufficient conditions for a Deadlock – Systems with Single-Unit Requests, Consumable Resources, Reusable Resources.

UNIT II DISTRIBUTED OPERATING SYSTEMS 9

Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport's Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm - Token-Based Algorithms – Suzuki-Kasami's Broadcast Algorithm – Distributed Deadlock Detection – Issues – Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms.
Agreement Protocols – Classification - Solutions –Applications.

UNIT III DISTRIBUTED RESOURCE MANAGEMENT 9

Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues – Components – Algorithms.

UNIT IV FAILURE RECOVERY AND FAULT TOLERANCE 9

Basic Concepts-Classification of Failures – Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Checkpointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Non-blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols;

UNIT V MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS 9

Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory Management – Reliability / Fault Tolerance; Database Operating Systems – Introduction – Concurrency Control – Distributed Database Systems – Concurrency Control Algorithms.

TOTAL = 45

TEXT BOOKS:

1. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill, 2000

REFERENCES: .

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth Edition, Addison Wesley Publishing Co., 2003.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.

12CS23 ADVANCED SYSTEM SOFTWARE L T P C

3 0 0 3

UNIT I 8

Basic Compiler Functions – Grammars – Lexical Analysis – Syntactic Analysis – Code Generation – Heap Management – Parameter Passing Methods – Semantics of Calls and Returns – Implementing Subprograms – Stack Dynamic Local Variables – Dynamic binding of method calls to methods – Overview of Memory Management, Virtual Memory, Process Creation – Overview of I/O Systems, Device Drivers, System Boot

UNIT II 10

Introduction and Overview – Symbol table structure – Local and Global Symbol table management Intermediate representation – Issues – High level, medium level, low level intermediate languages – MIR, HIR, LIR – ICAN for Intermediate code – Optimization – Early optimization – loop optimization

UNIT III 9

Procedure optimization – in-line expansion – leaf routine optimization and shrink wrapping – register allocation and assignment – graph coloring – data flow analysis – constant propagation – alias analysis – register allocation – global references – Optimization for memory hierarchy - Code Scheduling – Instruction scheduling – Speculative scheduling – Software pipelining – trace scheduling – Run-time support – Register usage – local stack frame – run-time stack – Code sharing – position–independent code

UNIT IV **9**

Introduction to Virtual Machines (VM) – Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading – Security – Garbage Collection – Optimization

UNIT V **8**

Emulation – Interpretation and Binary Translation – Instruction Set Issues – Process Virtual Machines – Profiling – Migration – Grids – Examples of real world implementations of system software

TOTAL= 45

TEXT BOOKS:

1. Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Koffman – Elsevier Science, India, First Edition 2004
2. James E Smith and Ravi Nair, "Virtual Machines", Elsevier, 2005. (Units 4, 5) (Sections 1.0-1.6, 2.0-2.5, 2.8, 3.0-3.6, 4.2, 5.0-5.3, 5.5-5.6, 6.0-6.3, 6.5-6.6, 10.2, 10.3)
3. Robert W. Sebesta, "Concepts of Programming Languages", 7th ed., Pearson Education, 2006. (Unit 3) (Sections 6.9, 9.3, 9.5, 10.1-10.3, 12.10.2)

REFERENCES:

1. Alfred V Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers", Pearson Education, 1986.
2. Terrance W Pratt, Marvin V Zelkowitz, T V Gopal, "Programming Languages", 4th ed., Pearson Education, 2006.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th ed., McGraw Hill, 2002.
4. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th ed., Wiley, 2003.

12CS24 INFORMATION SECURITY **L T P C**
3 0 0 3

UNIT I **9**

An Overview of Computer Security, Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT II **9**

Cryptography- Key management – Session and Interchange keys, Key exchange and generation, Cryptographic Key Infrastructure, Storing and Revoking Keys, Digital Signatures, Cipher Techniques

UNIT III **9**

Systems: Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem.

UNIT IV **9**

Malicious Logic, Vulnerability Analysis, Auditing and Intrusion Detection

UNIT V **9**

Network Security, System Security, User Security and Program Security

TOTAL = 45

TEXT BOOK:

1. Matt Bishop ,"Computer Security art and science ", Second Edition, Pearson Education

REFERENCES:

1. Mark Merkow, James Breithaupt " Information Security : Principles and Practices" First Edition, Pearson Education,
2. Whitman, "Principles of Information Security", Second Edition, Pearson Education
3. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education.
4. "Security in Computing ", Charles P.Pfleeger and Shari Lawrence Pfleeger, 3rd Edition.

12CS25 WEB TECHNOLOGY **L T P C**
3 0 0 3

UNIT I **9**

Web essentials – clients – servers - communication – markup languages – XHTML – simple XHTML pages style sheets – CSS

UNIT II **9**

Client side programming – Java script language – java script objects – host objects : Browsers and the DOM

UNIT III **9**

Server side programming – java servlets – basics – simple program – separating programming and presentation – ASP/JSP - JSP basics ASP/JSP objects – simple ASP/JSP pages.

UNIT IV **9**

Representing Web data – data base connectivity – JDBC – Dynamic Web pages – XML – DTD – XML schema – DOM – SAX – Xquery.

UNIT V **9**

Building Web applications - cookies – sessions – open source environment – PHP – MYSQL – case studies.

TOTAL: 45

TEXT BOOKS:

1. Jeffrey C Jackson, "Web Technology – A computer Science perspective", Pearson Education, 2007.
2. Chris Bates, "Web Programming – Building Internet Applications, "Wiley India, 2006.

12CS26 OPERATING SYSTEM LAB **L T P C**
0 0 3 2

MULTIPROCESSOR OPERATING SYSTEMS

PROGRAM 1 – Semaphores - Multiprocessor operating systems

Assume there are three processes: Pa, Pb, and Pc. Only Pa can output the letter A, Pb B, and Pc C. Utilizing only semaphores (and no other variables) the processes are synchronized so that the output satisfies the following conditions:

a) A B must be output before any C's can be output.

b) B's and C's must alternate in the output string, that is, after the first B is output, another B cannot be output until a C is output. Similarly, once a C is output, another C cannot be output until a B is output.

c) The total number of B's and C's which have been output at any given point in the output string cannot exceed the number of A's which have been output up to that point. Examples

AACB -- invalid, violates a)
ABACAC -- invalid, violates b)
AABCABC -- invalid, violates c)
AABCAAABC -- valid
AAAABCBC -- valid
AB -- valid

PROGRAM 2 – Multithreading - Multiprocessor operating systems

The Cigarette Smokers Problem

Consider a simulation with three *smoker* threads and one *agent* thread. Each smoker continuously makes a cigarette and smokes it. But to make a cigarette, a smoker needs three ingredients: tobacco, paper, and matches. One of the smoker threads has only paper, another has only tobacco, and the third has only matches. The agent thread has an infinite supply of all three materials. The three smoker threads are initially blocked. The agent places two randomly chosen (different) ingredients on the table and unblocks the one smoker who has the remaining ingredient. The agent then blocks. The unblocked smoker removes the two ingredients from the table, makes a cigarette, and smokes it for a random amount of time, unblocking the agent on completion of smoking the cigarette. The agent then puts out another random two of the three ingredients, and the cycle repeats.

Write a multi-class multithreaded Java program that uses a monitor to synchronize the agent thread and the three smoker threads. **Do not mechanically translate semaphore code into monitor code!** The agent thread executes in an agent object created from an agent class. Each smoker thread executes in a smoker object. All smoker objects are created from one smoker class whose constructor is used to specify the ingredient possessed by the smoker object. A driver class with a main method constructs the objects and starts the threads.
Use a single monitor object instantiated from a class Control for synchronization. Each of the four threads invokes a synchronized monitor method for its synchronization. No semaphores are allowed. No synchronized blocks are allowed, only synchronized methods. No busy waiting is allowed. No calls to nap inside a synchronized method are allowed (do not nap while holding the monitor object's lock, that is, while inside a synchronized method or while inside a method called by a synchronized method).

PROGRAM 3 – Multiple sleeping barbers - Multiprocessor operating systems
Write a multi-class multithreaded Java program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single Customer class, each barber is instantiated from a single Barber class.

Network operating systems

PROGRAM 4 – Network operating systems
Establish a Lab setup for the following network operating systems based programs based on the skills in networking on your own. E.g. for identifying networking hardware, identifying different kinds of network cabling and network interface cards can be done.
Exercises

1. Identifying Local Area Network Hardware
2. Exploring Local Area Network Configuration Options
3. Verifying TCP/IP Settings
4. Sharing Resources
5. Testing LAN Connections

Real time operating systems

PROGRAM 5 – Real time operating systems
A real-time program implementing an alarm clock shall be developed.
[Alarm clock, using C and Simple_OS]
The program shall fulfill the following requirements:
Clock with alarm functionality shall be implemented, It shall be possible to set the time, It shall be possible to set the alarm time, the alarm shall be *enabled* when the alarm time is set, the alarm shall be *activated* when the alarm is enabled, and when the current time is equal to the alarm time, an activated alarm must be acknowledged. Acknowledgement of an alarm shall lead to the alarm being *disabled, the* alarm is enabled again when a new alarm time is set, an alarm which is not acknowledged shall be repeated every 10 seconds. The program shall communicate with a graphical user interface, where the current time shall be displayed, and where the alarm time shall be displayed when the alarm is enabled. It shall be possible to terminate the program, using a command which is sent from the graphical user interface.

Database operating systems

PROGRAM 6 – Transactions and Concurrency -Database operating systems
Exercises
Assume any application (e.g.banking) on your own and do the following exercises.

1. Investigate and implement the ObjectStore's concurrency options.
2. Implement the concurrency conflict that occurs between multiple client applications.
3. Observe and implement the implication of nested transactions.

Distributed operating systems

PROGRAM 7 – Distributed operating systems

1. Design a RMI Lottery application. Each time you run the client program -- "**java LotteryClient n**", the server program "**LotteryServer**" will generate **n** set of Lottery numbers. Here **n** is a positive integer, representing the money you will spend on Lottery in sterling pounds. Write this program in a proper engineering manner, i.e. there should be specifications, design

(flow chart, FD, or pseudo code), coding, test/debug, and documentation.

2. Consider a distributed system that consists of two processes which communicate with each other. Let P be a state predicate on the local state of one process and Q be a state predicate on the local state of the other process. Assume that neither P nor Q are stable (i.e. closed).

   Design a superimposed computation which detects that there exists an interleaving of underlying events in this system where at some state P^Q holds. (A superposed computation is one that does not affect the underlying system; it may read" but not write" the state of the underlying system. Events in a superposed computation may occur in at the same instant as the underlying events and/or at different instants.) State any assumptions you make. [Hint: Use vector clocks.]

12CS27 INTERNET PROGRAMMING LAB **L T P C**
1 0 3 3

1. Designing Web Pages using Client Side Scripting and DHTML.
2. Client Server Scripting Programs.
3. Simulation of Email and File Transfer Protocols.
4. Development of Web Services.
5. XML and Databases.
6. Server Side Application Using JSP.
7. Web Customisation.
8. Development of E-Business Application.

12CS2A MOBILE COMPUTING **L T P C**
3 0 0 3

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS **9**

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas - Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNIT II TELECOMMUNICATION SYSTEMS **11**

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security – GPRS.

UNIT III WIRELESS NETWORKS **9**

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPERLAN – Adhoc Network – Blue Tooth.

UNIT IV NETWORK LAYER **9**

Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

UNIT V TRANSPORT AND APPLICATION LAYERS **7**

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML –WML Script – WAE – WTA.

TOTAL = 45

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
3. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.
4. Burkhardt, “Pervasive Computing”, First Edition, Pearson Education, 2003

12CS2B THEORY OF COMPUTATION L T P C
3 0 0 3

UNIT I AUTOMATA 9

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – No deterministic Finite Automata – Finite Automata with Epsilon Transitions.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular Expression – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES 9

CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES 9

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V INDECIDABILITY 9

A Language That Is Not Recursive Enumerable – An Undecidable Problem that Is RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P And NP.

TOTAL = 45

TEXT BOOKS:

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

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", Second Edition, PHI, 2003.

2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition,TMH, 2003.

3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole,1997.

12CS2C MULTIMEDIA SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION AND QOS 9

Introduction-QOS Requirements and Constraints-Concepts-Resources- Establishment Phase- Run-Time Phase-Management Architectures.

UNIT II OPERATING SYSTEMS 9

Real-Time Processing-Scheduling-Interprocess Communication-Memory and Management-Server Architecture-Disk Management.

UNIT III FILE SYSTEMS AND NETWORKS 9

Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing-Ethernet-Gigabit Ethernet-Token Ring-100VG Any LAN-Fiber Distributed Data Interface (FDDI)- ATM Networks-MAN-WAN.

UNIT IV COMMUNICATION 9

Transport Subsystem-Protocol Support for QOS-Transport of Multimedia-Computer Supported Cooperative Work-Architecture-Session Management-MBone Applications.

UNIT V SYNCHRONIZATION 9

Synchronization in Multimedia Systems-Presentation-Synchronization Types-Multimedia Synchronization Methods-Case Studies-MHEG-MODE-ACME.

TOTAL: 45

TEXT BOOKS:

1. Ralf Steinmetz and Klara Nahrstedt, "Multimedia Systems", Springer, I Edition 2004.

REFERENCES:

1. Ralf Steinmetz and Klara Nahrstedt , Media Coding and Content Processing, PHI, 2002.
2. Vaughan T, Multimedia, Tata McGraw Hill, 1999.

3. Mark J.B., Sandra K.M., Multimedia Applications Development using DVI technology, McGraw Hill, 1992.
4. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovacovic, D. A. Milovacovic , Multimedia Communication Systems: Techniques, Standards, and Networks, Prentice Hall, 1st Edition, 2002
5. Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia, Pearson, 2004.

12CS2D SOFTWARE QUALITY ASSURANCE L T P C

3 0 0 3

UNIT I **9**

Introduction to software quality - challenges – objectives – quality factors – components of SQA – Contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

UNIT II **9**

Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

UNIT III **9**

Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad- hoc testing – website testing – usability testing – accessibility testing. Test plan – management – execution and reporting – software test automation – automated testing tools

UNIT IV **9**

Hierarchical models of software quality – software quality metrics –function points -Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

UNIT V **9**

Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

TOTAL = 45

REFERENCES

1. Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.
2. Aditya Mathur, Foundations of software testing, Pearson Education, 2008
3. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – principles and practices , Pearson education, 2006
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Alan C Gillies, “Software Quality Theory and Management”, Cengage Learning, Second edition, 2003

12CS2E SOFTWARE PROJECT MANAGEMENT L T P C

3 0 0 3

UNIT I BASIC CONCEPTS **9**

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

UNIT II FORMAT PROCESS MODELS AND THEIR USE **9**

Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

UNIT III UMBRELLA ACTIVITIES IN PROJECTS **9**

Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

UNIT IV IN STREAM ACTIVITIES IN PROJECTS 9

Project Initiation – Project Planning – Execution and Tracking – Project Wind up – Concept of Process/Project Database.

UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT 9

Phases (Requirements, Design, Development, Testing , Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

TOTAL=45

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Humphrey,Watts,"Managing the Software Process ",Addison Wesley,1986.
3. Pressman,Roger,"Software Engineering",A Practitioner's approach.McGrawHill,1997.
4. Bob Hughes and Mike Cotterell,"Software Project Management".
5. Wheelwright and Clark,"Revolutionising product development",The Free Press,1993.

12CSPA GRID COMPUTING L T P C

3 0 0 3

UNIT I INTRODUCTION 9

Grid activities, Grid Business Areas, Applications, Infrastructure. Grid Computing Organizations and their Roles: Organizations developing Grid standards & best practice Guidelines, Organizations developing Grid Computing Toolkits & the framework Organizations building and using Grid base solutions to solve computing, data, & network requirements. GRID COMPUTING ANATOMY: Grid problem-Grid Architecture.

UNIT II THE GRID COMPUTING ROAD MAP 9

Autonomic computing, Business on demand & infrastructure virtualization, service oriented architecture, semantic grids THE NEW GENERATION OF GRID COMPUTING APPLICATION: Merging the Grid service Architecture with Web service Architecture, Service Oriented Architecture- Web Service Architecture- XML messages and Enveloping- SOAP- Service message description mechanism- Relationship between Web services & Grid services.

UNIT III GRID COMPUTING TECHNOLOGICAL VIEWPOINTS 9

Open Grid Service Architecture (OGSA), Introduction-Architecture-Goals: SOME SAMPLE US CASES THAT DRIVE THE OGSA: Commercial Data center (CDC) - National Fusion Collaborations (NFS)- Online Media & entertainment.OGSA PLATFORM COMPONENTS: Native platform services, mechanisms, OGSA hosting Environment, Core Networking services, Security, Infrastructure, basic services.

OPEN GRID SERVICES INFRASTRUCTURE (OGSI): Introduction-Grid services- High-level introduction to OGSI- Technical details- Introduction to service data components- Grid service: Naming & change management recommendations.

OGSA BASIC SERVICES: Common Management model (CMM)-service domains- policy architecture- security architecture- Mastering & Accounting- common distributed Logging.

UNIT IV GLOBUS GT3 TOOLKIT 9

Architecture, GT3 software architecture model- default server side - framework - security - system level services. GLOBUS GT3 TOOLKIT PROGRAMMING MODEL: Introduction- service programming model- Grid service behavior implementation- operation providers- factory call back mechanisms- Grid service life cycle- Management- service activation & deactivation- custom query engines & evaluators- GT3 tools- configuration- security.

UNIT V GLOBUS GT3 TOOLKIT 9

A sample implementation, Acme search service Implementation in a top-down approach- basic service implementation- Grid service configuration- simple client implementation- advanced Grid services- advanced service data concepts-operation providers.

TOTAL = 45

TEXT BOOKS:

1. Joshy Joseph & Craig Fellenstein , Grid Computing, Pearson/PHI PTR-2003

REFERENCES:

1. Daniel Minoli, A networking approach to Grid Computing
2. Ian Foster & Carl Kesselman - The Grid Blueprint for a New Computing Infrastructure- Morgan Kaufmann
3. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a reality ", John Wiley and sons, 2003.
4. Ahmar Abbas, "Grid Computing: A Practical Guide to Technology and Applications", Charles River media, 2003.

12CSPB SOFT COMPUTING **L T P C**
3 0 0 3

UNIT I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS **9**

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS **9**

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

UNIT III NEURAL NETWORKS **9**

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT IV FUZZY LOGIC **9**

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

UNIT V NEURO-FUZZY MODELING **9**

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

TOTAL = 45

TEXT BOOKS:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.

REFERENCES:

1. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
2. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer, 2007.
4. S.N.Sivanandam · S.N.Deepa, " Introduction to Genetic Algorithms", Springer, 2007.
5. Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishers, 1992.

12CSPC DISTRIBUTED COMPUTING **L T P C**
3 0 0 3

UNIT – I **9**

Distributed Systems: Goal, Advantages, Organization of Multiprocessor Systems and related Hardware and Software Concepts, Design Issues.

UNIT – II **9**

Communication - Layered protocols, RPC, RMI, Message oriented communication, Stream oriented communication, Process - Threads, Clients, Servers, Code Migration, Software agents, Naming - entities, locating mobile entities, removing unreferenced entities.

UNIT – III **9**

Security, Distributed database systems - CORBA, Distributed COM, Distributed GLOBE, Comparision of CORBA, DCOM, and GLOBE, Distributed File Systems - SUN network file system, CODA file system, other distributed file systems and their comparison.

UNIT – IV **9**

Distributed document based systems- Word Wide Web, Lotus notes, Distributed Coordination based systems – Introduction, TIB / RENDEZVOUS, JINI and their comparison.

UNIT – V **9**

Case Studies: From the Internet - OPEN SOURCE Security, Distributed database systems - CORBA, Distributed database systems, CORBA, Distributed COM, GLOBE, Comparison of CORBA, DCOM, and GLOBE

TOTAL = 45

TEXT BOOK:

1. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed System Principles and Paradigms", Pearson education, 2002.

REFERENCES:

1. G Coulouris, J. Dollimore, T. Kindberg, "Distributed System Concepts and Design, 4th Edition, Addison Wesley, 2005.
2. M. Reynal, "Distributed Algorithms and Protocols", John Wiley, 1988.
3. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Wiley, 2004.
4. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGrawHill Series in Computer Science, 1994.
5. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
6. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.

12CSPD XML AND WEB SERVICES **L T P C**
3 0 0 3

UNIT I **7**

Distributed Databases Vs Conventional Databases – Architecture – Fragmentation – Query Processing – Transaction Processing – Concurrency Control – Recovery.

UNIT II OBJECT ORIENTED DATABASES **10**

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks – Recovery

UNIT III EMERGING SYSTEMS **10**

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases.

UNIT IV DATABASE DESIGN ISSUES **9**

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning - Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

UNIT V CURRENT ISSUES **9**

Semantic Web – Role of Meta data in web content - Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG – WSFL – BPEL4WS

TOTAL = 45

REFERENCES:

1. Ron Schmelzer et al. " XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
3. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
4. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
5. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services",First Edition, Apress, 2004.
6. Russ Basiura and Mike Batongbacal, "Professional ASP .NET Web Services", Apress, 2003.

12CSPE BIO INFORMATICS **L T P C**
3 0 0 3

UNIT I INTRODUCTORY CONCEPTS **9**

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology – Hardware – Contents – Security – Ownership – Implementation – Management.

UNIT II SEARCH ENGINES AND DATA VISUALIZATION **9**

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface – Animation Versus simulation – General Purpose Technologies.

UNIT III STATISTICS AND DATA MINING **9**

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods – Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

UNIT IV PATTERN MATCHING **9**

Pairwise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices – Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies – Tools – Nucleotide Pattern Matching – Polypeptide pattern matching – Utilities – Sequence Databases.

UNIT V MODELING AND SIMULATION **9**

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – AbInitio Methods – Heuristic methods – Systems Biology – Tools – Collaboration and Communications – standards – Issues – Security – Intellectual property.

Total = 45

REFERENCES

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2. T.K.Attwood and D.J. Perry Smith, "Introduction to Bio Informatics, Longman Essen,1999.

12CSPF NETWORK SECURITY **L T P C**
3 0 0 3

UNIT I INTRODUCTION **9**

Attacks - Services - Mechanisms - Conventional Encryption - Classical And Modern Techniques – Encryption Algorithms - Confidentiality.

UNIT II PUBLIC KEY ENCRYPTION **9**

RSA - Elliptic Curve Cryptography - Number Theory Concepts

UNIT III MESSAGE AUTHENTICATION **9**

Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

UNIT IV NETWORK SECURITY PRACTICE **9**

Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

UNIT V SYSTEM SECURITY **9**

Intruders – Viruses – Worms – Firewalls Design Principles – Trusted Systems.

TOTAL: 45

TEXT BOOK:

1. Stallings, Cryptography & Network Security - Principles & Practice, Prentice Hall, 3rd Edition 2002.

REFERENCES:

1. Bruce, Schneier, Applied Cryptography, 2nd Edition, Toha Wiley & Sons, 1996.
2. Man Young Rhee, "Internet Security", Wiley, 2003.
3. Pfleeger & Pfleeger, "Security in Computing", Pearson Education, 3rd Edition, 2003.

12CSPG EMBEDDED SYSTEMS **L T P C**
3 0 0 3

UNIT I EMBEDDED COMPUTING **9**

Challenges of Embedded Systems – Embedded system design process. Embedded processors – ARM processor – Architecture, ARM and Thumb Instruction sets

UNIT II EMBEDDED C PROGRAMMING **9**

C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions an inline assembly – portability issues.

UNIT III OPTIMIZING ASSEMBLY CODE **9**

Profiling and cycle counting – instruction scheduling – Register allocation – conditional execution – looping constructs – bit manipulation – efficient switches –optimized primitives.

UNIT IV PROCESSES AND OPERATING SYSTEMS **9**

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling - Performance issues.

UNIT V EMBEDDED SYSTEM DEVELOPMENT **9**

Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Design methodologies – Case studies – Complete design of example embedded systems.

TOTAL = 45

REFERENCES

1. Andrew N Sloss, D. Symes, C. Wright, "ARM System Developers Guide", Morgan Kaufmann / Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education , 2007.
3. Wayne Wolf, "Computers as Components : Principles of Embedded Computer System Design", Morgan Kaufmann / Elsevier, 2nd. edition, 2008.
4. Steve Heath, "Embedded System Design" , Elsevier, 2nd. edition, 2003.

12CSPH DIGITAL IMAGING **L T P C**
3 0 0 3

UNIT I FUNDAMENTALS OF IMAGE PROCESSING **9**

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

UNIT II IMAGE ENHANCEMENT **9**

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening.Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS **9**

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS **9**

Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

UNIT V APPLICATIONS OF IMAGE PROCESSING **9**

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing..

TOTAL = 45

REFERENCES:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing" Second Edition, Pearson Education, 2003.

2. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Second Edition, Thomson Learning, 2001

3. Anil K.Jain, "Fundamentals of Digital Image Processing", Person Educaiton, 2003.

12CSPI AD-HOC NETWORKS **L T P C**
3 0 0 3

UNIT I AD-HOC MAC **9**

Introduction – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

UNIT II AD-HOC NETWORK ROUTING & TCP **9**

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

UNIT III WSN -MAC **9**

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IV WSN ROUTING, LOCALIZATION & QOS **9**

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

UNIT V MESH NETWORKS **9**

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

TOTAL = 45

REFERENCES:

1. C.Siva Ram Murthy and B.Smanoj, " Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman

Publishers, 2004.
3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

12CSPJ DATA WAREHOUSING AND DATA MINING **L T P C**
3 0 0 3

UNIT I **9**

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II **9**

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III **9**

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

UNIT IV **9**

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

UNIT V **9**

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.

Total = 45

REFERENCES

1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2008.
2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

12CSPK PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND NETWORKS
L T P C
3 0 0 3

UNIT I **9**

Performance Characteristics – Requirement Analysis: Concepts –User, Device, Network Requirements – Process –Developing RMA ,Delay, Capacity Requirements – Flow Analysis – Identifying and Developing Flows –Flow Models –Flow Prioritization –Specification.

UNIT II **9**

Random variables - Stochastic process –Link Delay components – Queuing Models – Little's Theorem – Birth & Death process – Queuing Disciplines.

UNIT III **9**

Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ - M/G/1 – M/M/m/m and other Markov-Non-Markovian and self-similar models – Network of Queues –Burke's Theorem – Jackson's Theorem.

UNIT IV **9**

Multi-User Uplinks/Downlinks - Capacity Regions - Opportunistic Scheduling for Stability and Max Throughput - Multi-Hop Routing - Mobile Networks - Throughput Optimality and Backpressure

UNIT V **9**

Performance of Optimal Lyapunov Networking - Energy Optimality- Energy-Delay Tradeoffs - Virtual Cost Queues - Average Power Constraints - Flow Control with Infinite Demand - Auxiliary Variables - Flow Control with Finite Demand - General Utility Optimization.

TOTAL = 45

TEXT BOOKS

1. James D.McCabe , Network Analysis , Architecture and Design, 2nd Edition, Elsevier,2003
2. Bertsekas & Gallager , Data Networks , second edition ,Pearson Education,2003
3. Introduction to Probability Models by Sheldon Ross (8th edition) Academic Press, New York ,2003

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1. D. Bertsekas, A. Nedic and A. Ozdaglar, Convex Analysis and Optimization, Athena Scientific, Cambridge , Massachusetts , 2003
2. Nader F.Mir Computer and Communication Networks,Pearson Education.2007
3. Paul J.Fortier, Howard E.Michel, Computer Systems Performance Evaluation and Prediction, Elsevier,2003

12CSPL AGENT BASED INTELLIGENT SYSTEMS **L T P C**
3 0 0 3

UNIT I INTRODUCTION **9**

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics - Constraint Satisfaction Problems - Game playing.

UNIT II KNOWLEDGE REPRESENTATION AND REASONING **9**

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events

UNIT III PLANNING AGENTS **9**

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

UNIT IV AGENTS AND UNCERTAINITY **9**

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions.

UNIT V HIGHER LEVEL AGENTS **9**

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars- Future of AI.

TOTAL = 45

TEXT BOOK:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Prentice Hall, 2002

REFERENCES:

1. Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, III Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

12CSPM VISUALIZATION TECHNIQUES **L T P C**
3 0 0 3

UNIT I VISUALIZATION **9**

Introduction – Issues – Data Representation – Data Presentation - Interaction

UNIT II FOUNDATIONS FOR DATA VISUALIZATION **9**

Visualization stages – Experimental Semiotics based on Perception Gibson's Affordance theory – A Model of Perceptual Processing – Types of Data.

UNIT III COMPUTER VISUALIZATION **9**

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnificaiton – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

UNIT IV MULTIDIMENSIONAL VISUALIZATION **9**

One Dimension – Two Dimensions – Three Dimensions – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT V CASE STUDIES **9**

Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

TOTAL = 45

TEXT BOOKS:

1. Colin Ware, "Information Visualization Perception for Design" Margon Kaufmann Publishers, 2004, 2nd edition.
2. Robert Spence "Information visualization – Design for interaction", Pearson Education, 2nd Edition, 2007

REFERENCES:

1. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers.

12CSPN ADVANCED DATABASES **L T P C**
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UNIT I PARALLEL AND DISTRIBUTED DATABASES **5**

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies.

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES **10**

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational feature sin SQL/Oracle – Case Studies.

UNIT III XML DATABASES **10**

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

UNIT IV MOBILE DATABASES **10**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes

UNIT V MULTIMEDIA DATABASES **10**

Multidimensional Data Structures – Image Databases – Text/Document Databases – Video Databases – Audio Databases – Multimedia Database Design.

TOTAL = 45

REFERENCES

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.

2. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, " Mobile Database Systems", John Wiley & Sons, 2006.

12CSPO COMPONENT BASED TECHNOLOGY **L T P C**
3 0 0 3

UNIT I INTRODUCTION **9**

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware.

UNIT II JAVA COMPONENT TECHNOLOGIES **9**

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

UNIT III CORBA TECHNOLOGIES **9**

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture.

UNIT IV COM AND .NET TECHNOLOGIES **9**

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

UNIT V COMPONENT FRAMEWORKS AND DEVELOPMENT **9**

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

TOTAL = 45

TEXT BOOKS:

1. "Component Software: Beyond Object-Oriented Programming", Pearson Education publishers, 2003.

REFERENCES:

2. Ed Roman, "Enterprise Java Beans", Third Edition , Wiley , 2004.

12CSPP CLOUD COMPUTING **L T P C**
3 0 0 3

UNIT I UNDERSTANDING CLOUD COMPUTING **6**

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

UNIT II DEVELOPING CLOUD SERVICES **10**

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT III CLOUD COMPUTING FOR EVERYONE **10**

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

UNIT IV USING CLOUD SERVICES **10**

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

UNIT V OTHER WAYS TO COLLABORATE ONLINE 9

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

Total=45

REFERENCES

1. Michael Miller, Cloud Computing: "Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

12CSPQ FIREWALLS AND INTRUSION DETECTION SYSTEM L T P C

3 0 0 3

UNIT I 5

Introduction – overview of TCP/IP – The Different Layers - Routers and Routing Protocols – The Domain Name System – Standard Services – R PC-based Protocols – File Transfer Protocols – The "*r*" Commands – Information Services – The X11 System - Patterns of Trust

UNIT II 10

Firewall Gateways – How to Build an Application-Level Gateway – Authentication – Gateway Tools – Traps, Lures, and Honey pots – The Hacker's Workbench

UNIT III 10

Building Firewalls – Packets and protocols – Firewall Technologies – Firewall architecture – Firewall Design – Packet Filtering – Proxy systems

UNIT IV 10

Traditional Network Security Approaches – Layers of Network Security – I&A for network security entities – network access control – Internet protocol – Supporting protocols for IP – ARP – DNS – RIP – UDP – TCP – TCP/IP Application Security – Role of Firewall in Traditional Security – Role of Intrusion Detection – Intrusion Detection: Concepts and Definitions – Classes of Attacks – Layers of Information Sources – System Data Sources

UNIT V 10

Vulnerability Scanners – UNIX System level IDSs – Sniffing for Intruders – Intrusion Detection for NT – Anamoly based Intrusion Detection Systems – Setting up an ABS – PAYL – POSEIDON – SOM – Threat Response System – System Architecture – ACE – PIE – PDP – PEP – Case Study: e–mail server.

TOTAL = 45

REFERENCES:

1. William R. Cheswick, Steven M. Bellovin, Aviel D. Rubin "Firewalls and Internet Security: Repelling the Wily Hacker" Addison-Wesley, First Edition, 2003
2. Elizabeth D. Zwicky, Simon Cooper, D. Brent Chapman, "Building Internet Firewalls", Second Edition, O'Reily Publishers, 2000
3. Terry Escamilla "Intrusion Detection Network Security beyond the firewall", John Wiley & Sons Inc, 1998
4. Roberto Di Pietro, Luigi V. Mancini, "Intrusion Detection Systems", Springer International, 2010