HINDUSTAN UNIVERSITY

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE

Department of Computer Science & Engineering

B.Tech. Computer Science & Engineering with Specialization in Information Security

Curriculum & Syllabus

2014 Regulations

ACADEMIC REGULATIONS (B.Tech)
(Full /Part Time) (Effective 2014-15)

1. Vision, Mission and Objectives

1.1 The Vision of the Institute is "To make every man a success and no man a failure".

In order to progress towards the vision, the Institute has identified itself with a mission to provide every individual with a conducive environment suitable to achieve his / her career goals, with a strong emphasis on personality development, and to offer quality education in all spheres of engineering, technology, applied sciences and management, without compromising on the quality and code of ethics.

1.2 Further, the Institute always strives

- To train our students with the latest and the best in the rapidly changing fields of Engineering, Technology, Management, Science & Humanities.
- To develop the students with a global outlook possessing, state of the art skills, capable of taking up challenging responsibilities in the respective fields.
- To mould our students as citizens with moral, ethical and social values so as to fulfill their obligations to the nation and the society.
- To promote research in the field of Science, Humanities, Engineering, Technology and allied branches.

1.3 Aims and Objectives of the Institute are focused on

- Providing world class education in engineering, technology, applied sciences and management.
- Keeping pace with the ever changing technological scenario to help the students to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and nation.
- To inculcate a flair for research, development and entrepreneurship.

2. Admission

2.1. The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, following guidelines issued by Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each branch of the B.Tech programme will be decided by BOM as per the directives from MHRD, Government of India and taking into account the market demands. Some seats for Non Resident Indians and a few seats for foreign nationals shall be made available.

2.2. (i) Full-Time :

At the time of applying for admission, the candidates should have passed / appeared and be awaiting results of the final examination of the 10+2 system or its equivalent with Mathematics, Physics and Chemistry as subjects of study.

(ii) Part -Time:

At the time of applying for admission, the candidates should have a Diploma in Engineering/Technology in the relevant branch of specialization awarded by the State Board of Technical Education, Tamil Nadu or any other authority accepted by the Board of Management of the University as equivalent thereto and a minimum of one year practical experience.

2.3. The selected candidates will be admitted to the B.Tech. programme after he/she fulfills all the admission requirements set by the Institute and after the payment of the prescribed fees.

2.4. In all matters relating to admission to the B.E. / B.Tech. programme, the

decision of the Institute and its interpretation given by the Chancellor of the Institute shall be final.

2.5. If at any time after admission, it is found that a candidate has not fulfilled any of the requirements stipulated by the Institute, the Institute may revoke the admission of the candidate with information to the Academic Council.

3. Structure of the programme

3.1. The programme of instruction will have the following structure:

i) A general (common) core programme comprising basic sciences, engineering sciences, humanities, technical arts and mathematics.

ii) An engineering core programme introducing the student to the foundations of engineering in the respective branch.

iii) An elective programme enabling the student to opt and undergo a set of courses of interest to him/ her.

iv) Professional practice including project, seminar and industrial training.

v) General elective courses, such as, Environmental Studies, Physical Education, Professional ethics, and National Service Scheme.

The distribution of total credits required for the degree programme into the above five categories will nominally be 20%, 50%, 15%, 5%, and 10% respectively.

3.2.(i) Full-Time:

The duration of the programme will be a minimum of 8 semesters. Every branch of the B.E. / B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council.

ii) Part – Time:

The duration of the programme will be a minimum of 7 semesters. Every branch of the B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council

3.3 The academic programmes of the Institute follow the credit system. The general pattern is:

- One credit for each lecture hour per week per semester;
- One credit for each tutorial hour per week per semester;
- Two credit for each laboratory practical/ drawing of three hours per week per semester.
- One credit for 4 weeks of industrial training and
- One credit for 4 hours of project per week per semester

3.4. (i) Full-Time:

For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 190-200.

(ii) Part-Time:

For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 110-120.

3.5. The medium of instruction, examination and the language of the project reports will be English.

4. Faculty Advisor

4.1. To help the students in planning their courses of study and for getting general advice on the academic programme, the concerned Department will assign a certain number of students to a Faculty member who will be called their Faculty Advisor.

5. Class Committee

5.1 A Class Committee consisting of the following will be constituted by the Head of the Department for each class:

(i) A Chairman, who is not teaching the class.

(ii) All subject teachers of the class.

(iii) Two students nominated by the department in consultation with the class.

The Class Committee will meet as often as necessary, but not less than three times during a semester.

The functions of the Class Committee will include:

(i) Addressing problems experienced by students in the classroom and the laboratories.

(ii) Analyzing the performance of the students of the class after each test and finding ways and means of addressing problems, if any.

(iv) During the meetings, the student members shall express the opinions and suggestions of the class students to improve the teaching / learning process.

6. Grading

6.1 A grading system as below will be adhered to.

6.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits C_i of course "i " and the grade points P_i earned for that course taken over all courses "i" registered by the student to the sum of C_i for all "i ". That is,

$$GPA = \frac{\sum_i C_i P_i}{\sum_i C_i}$$

CGPA will be calculated in a similar manner, at any semester, considering all the courses enrolled from the first semester onwards.

6.3. For the students with letter grade I in certain subjects, the same will not be included in the computation of GPA and CGPA until after those grades are converted to the regular grades.

Range of Marks	Letter Grade	Grade points
95-100	S	10
85 - 94	A	09
75- 84	B	08
65-74	C	07
55-64	D	06
50-54	E	05
< 50	U	00
	I (Incomplete)	--

6.4 Raw marks will be moderated by a moderation board appointed by the Vice Chancellor of the University. The final marks will be graded using an absolute grading system. The Constitution and composition of the moderation board will be dealt with separately.

7. Registration and Enrolment

7.1 Except for the first semester, registration and enrollment will be done in the beginning of the semester as per the schedule announced by the University.

7.2 A student will be eligible for enrollment only if he/she satisfies regulation 10 (maximum duration of the programme) and will be permitted to enroll if (i) he/she has cleared all dues in the Institute, Hostel and Library up to the end of the previous semester and (ii) he/she is not debarred from enrollment by a disciplinary action of the University.

7.3. Students are required to submit registration form duly filled in.

8. Registration requirement

8.1.(i). Full -Time:
A full time student shall not register for less than 16 credits or more than 30 credits in any given semester.

(ii). Part -Time:
A part time student shall not register for less than 10 credits or more than 20 credits in any given semester

8.2 If a student finds his/her load heavy in any semester, or for any other valid reason, he/she may withdraw from the courses within three weeks of the commencement of the semester with the written approval of his/her Faculty Advisor and HOD. However the student should ensure that the total number of credits registered for in any semester should enable him/her to earn the minimum number of credits per semester for the completed semesters.

9. Continuation of the programme

9.1 For those students who have not earned the minimum required credit prescribed for that particular semester examination, a warning letter to the concerned student and also to his/her parents regarding the shortage of his/her credit will be sent by the HOD after the announcement of the results of the university examinations.

10. Maximum duration of the programme

10.1.(i) Full - Time
The normal duration of the programme is eight semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 14 semesters excluding the semesters withdrawn on medical grounds or other valid reasons.

(ii) Part - Time
The normal duration of the programme is seven semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 12 semesters excluding the semesters withdrawn on medical grounds or other valid reasons

11. Temporary discontinuation

11.1. A student may be permitted by the Director (Academic) to discontinue temporarily from the programme for a semester or a longer period for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum duration of two semesters.

12. Discipline

12.1. Every student is required to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

12.2. Any act of indiscipline of a student reported to the Director (Academic) will be referred to a Discipline Committee so constituted. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Director (Academic) to recommend to the Vice Chancellor the implementation of the decision. The student concerned may appeal to the Vice Chancellor whose decision will be final. The Director (Academic) will report the action taken at the next meeting of the Council.

12.3. Ragging and harassment of women are strictly prohibited in the University campus and hostels.

13. Attendance

13.1. A student whose attendance is less than 75% in a semester is not eligible to appear for the end – semester examination for that semester. The details of all students who have less than 75% attendance in a

course will be announced by the teacher in the class. These details will be sent to the concerned HODs and Director (Academic).

13.2. Those who have less than 75% attendance will be considered for condonation of shortage of attendance. However, a condonation of 10% in attendance will be given on medical reasons. Application for condonation recommended by the Faculty Advisor, concerned faculty member and the HOD is to be submitted to the Director (Academic) who, depending on the merits of the case, may permit the student to appear for the end semester examination. A student will be eligible for this concession at most in two semesters during the entire degree programme. Application for medical leave, supported by medical certificate with endorsement by a Registered Medical Officer, should reach the HOD within seven days after returning from leave or, on or before the last instructional day of the semester, whichever is earlier.

13.3 As an incentive to those students who are involved in extra curricular activities such as representing the University in Sports and Games, Cultural Festivals, and Technical Festivals, NCC/ NSS events, a relaxation of up to 10% attendance will be given subject to the condition that these students take prior approval from the officer – in-charge. All such applications should be recommended by the concerned HOD and forwarded to Director (Academic) within seven instructional days after the programme / activity.

14. Assessment Procedure

14.1. The Academic Council will decide from time to time the system of tests and examinations in each subject in each semester.

14.2 For each theory course, the assessment will be done on a continuous basis as follows:

Test / Exam	Weigh - tage	Duration of Test / Exam
First Periodical Test *	10%	2 Periods
Second Periodical Test *	10%	2 Periods
Model Exam	20%	3 hours
Seminar/ Assignments/Quiz	10%	-
Attendance	10%	
End – semester examination	50%	3 Hours

*Best out of the two test will be considered.

14.3 For practical courses, the assessment will be done by the subject teachers as below:

(i) Weekly assignment/Observation note book / lab records – weightage 60%.
(ii) End semester examination of 3 hours duration including viva – weightage 40%.

14.4 For courses on Physical Education, NSS, etc the assessment will be as satisfactory/not satisfactory only.

15. Make up Examination/Model Exam

15.1. Students who miss the end-semester examinations / model examination for valid reasons are eligible for make-up examination /model examination. Those who miss the end-semester examination / model examination should apply to the Head of the Department concerned within five days after he / she missed examination, giving reasons for absence.

15.2. Permission to appear for make-up examination / model examination will be given under exceptional circumstances such as admission to a hospital due to illness. Students should produce a medical certificate issued by a Registered Medical Practitioner certifying that he/she was admitted to hospital during the period of

examination / model exam and the same should be duly endorsed by parent / guardian and also by a medical officer of the University within 5 days.

16. Project evaluation

16.1 For Project work, the assessment will be done on a continuous basis as follows:

Review / Examination	Weightage
First Review	10%
Second Review	20%
Third Review	20%
End-semester Examination	50%

For end – semester examination, the student will submit a Project Report in a format specified by the Director (Academic). The first three reviews will be conducted by a Committee constituted by the Head of the Department. The end – semester examination will be conducted by a Committee constituted by the Registrar / Controller of examination. This will include an external expert.

17. Declaration of results

17.1.(i) A candidate who secures not less than 50% of total marks prescribed for a course with a minimum of 50% of the marks prescribed for the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

(ii) To be Eligible to appear for the end semester examinations for a particular course, a candidate will have to secure a minimum of 40% marks in the sessional for that course.

(iii) Candidates are required to obtain all credits assigned to the first two semesters of the programme within the first four semesters of the programme. Candidates failing to satisfy this requirement will not be allowed to proceed to the fifth semester until the condition is satisfied. Further, candidates will not be allowed to proceed to seventh semester if they have not cleared all the courses assigned during third & fourth semesters.

17.2 After the valuation of the answer scripts, the tabulated results are to be scrutinized by the Result Passing Boards of UG programmes constituted by the Vice-Chancellor. The recommendations of the Result Passing Boards will be placed before the Standing Sub Committee of the Academic Council constituted by the Chancellor for scrutiny. The minutes of the Standing Sub Committee along with the results are to be placed before the Vice-Chancellor for approval. After getting the approval of the Vice-Chancellor, the results will be published by the Controller of Examination/Registrar.

17.3 If a candidate fails to secure a pass in a course due to not satisfying the minimum requirement in the end semester examination, he/she shall register and re-appear for the end semester examination during the following semester. However, the sessional marks secured by the candidate will be retained for all such attempts.

17.4 If a candidate fails to secure a pass in a course due to insufficient sessional marks though meeting the minimum requirements of the end semester examination, and wishes to improve on his/her sessional marks, he/she will have to register for the particular course and attend the course with permission of the HOD concerned and Director(Academic) with a copy marked to the Registrar. The sessional and external marks obtained by the candidate in this case will replace the earlier result.

17.5 A candidate can apply for the revaluation of his/her end semester

examination answer paper in a theory course within 2 weeks from the declaration of the results, on payment of a prescribed fee through proper application to the Registrar/Controller of Examinations through the Head of the Department. The Registrar/ Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

17.6 After ten semesters, the sessional marks of the candidate will not be considered for a pass in a course. A candidate who secures 50% in the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

18. Grade Card

18.1 After results are declared, grade sheet will be issued to each student which will contain the following details:

(i) Program and branch for which the student has enrolled.
(ii) Semester of registration.
(iii) List of courses registered during the semester and the grade scored.
(iv) Semester Grade Point Average (GPA)
(v) Cumulative Grade Point Average (CGPA).

19. Class/Division

19.1 Classification is based on CGPA and is as follows:

CGPA ≥ 8.0 : **First Class with distinction**
6.5 ≤ CGPA < 8.0 : **First Class**
5.0 ≤ CGPA < 6.5 : **Second Class.**

19.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance within the minimum duration of the programme.

(ii) The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses **within 10 semesters.**

(iii) The period of authorized discontinuation of the programme (vide clause 11.1) will not be counted for the purpose of the above classification.

20. Transfer of credits

20.1. Within the broad framework of these regulations, the Academic Council, based on the recommendation of the transfer of credits committee so consulted by the Chancellor may permit students to earn part of the credit requirement in other approved institutions of repute and status in the country or abroad.

20.2 The Academic Council may also approve admission of lateral entry (who hold a diploma in Engineering/ technology) candidates with advance credit based on the recommendation of the transfer of credits committee on a case to case basis.

21. Eligibility for the award of B.Tech. Degree

21.1. A student will be declared to be eligible for the award of the B.Tech. Degree if he/she has

i) registered and successfully acquired the credits for the core courses;
ii) successfully acquired the credits in the different categories as specified in the curriculum corresponding to the discipline (branch) of his/her study within the stipulated time;
iii) has no dues to all sections of the Institute including Hostels, and
iv) has no disciplinary action pending against him/her.

The award of the degree must be recommended by the Academic Council and

approved by the Board of Management of the University.

22. Change of Branch

22.1 If the number of students in any branch of B.Tech. class as on the last instructional day of the First Semester is less than the sanctioned strength, then the vacancies in the said branches can be filled by transferring students from other branches. All such transfers will be allowed on the basis of merit of the students. The decision of the Chancellor shall be final while considering such requests.

22.2 All students who have successfully completed the first semester of the course will be eligible for consideration for change of branch subject to the availability of vacancies.

23. Power to modify

23.1. Notwithstanding all that has been stated above, the Academic Council shall modify any of the above regulations from time to time subject to approval by the Board of Management.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Programme Educational Objectives (PEOs) are defined and developed for each program with the consultation and involvement of various stakeholders such as management, students, industry, regulating authorities, alumni, faculty and parents. Their interests, social relevance and contributions are taken in to account in defining and developing the PEOs.

The Program Educational Objectives (**PEOs**) of the **Computer Science and Engineering** are listed below:

I. To provide students with a strong foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to prepare them for graduate studies, R&D, consultancy and higher learning.

II. To provide exposure to emerging cutting edge technologies, adequate training & opportunities to work as teams on multidisciplinary projects with effective communication skills and leadership qualities.

III. To prepare the students for a successful career and work with values & social concern, bridging the digital divide and meeting the requirements of Indian and multinational companies.

IV. To promote student awareness on life-long learning and to introduce them to professional ethics and codes of professional practice.

PROGRAMME OUTCOMES:

The Students will be able to

I. Analyze a problem, identify and define the Computing requirements appropriate to its solution.

II. Design, Implement, and Evaluate a Computer-Based System, process, component, or program to meet desired needs.

III. Function effectively on teams to accomplish a common goal.

IV. Understand the professional, ethical, legal, security and Social Issues and responsibilities.

V. Communicate effectively with a range of audiences.

VI. Analyze the local and global Impact of Computing on individuals, organizations, and society.

VII. Recognize the need for and an ability to engage in continuing professional development.

VIII. Use current Techniques, Skills, and Tools necessary for computing practice.

IX. Apply Mathematical Foundations, Algorithmic Principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

X. Apply Design and Development Principles in the construction of Hardware and Software systems of varying complexity.

HINDUSTAN INSTITUTE OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech. (COMPUTER SCIENCE AND ENGINEERING)
with specialisation in INFORMATION SECURITY

CURRICULUM 2014-2015

Sl. No	Subject Code	Subject Name	L	T	P	C	TCH
SEMESTER I (Common to all Branches)							
Theory							
1.	EL2101	Technical English	3	0	0	3	3
2.	MA2101	Engineering Mathematics-I	3	1	0	4	4
3.	PH2001/ CY2001	Engineering Physics / Engineering Chemistry	3	0	0	3	3
4.	ME2101	Engineering Graphics	1	0	3	3	4
5.	CS2101	Computer Programming	3	0	0	3	3
Practical							
6.	CS2131	Computer Programming Laboratory	0	0	3	1	3
7	GE2131	Engineering Practices Laboratory – I	0	0	3	1	3
8	EL2131	Communication Skills Laboratory – I	0	0	3	1	3
9	PH2031/ CY2031	Physics Laboratory / Chemistry Laboratory	1	0	3	2	4
Total						**21**	**30**
SEMESTER II							
Theory							
1.	MA2102	Engineering Mathematics-II #	3	1	0	4	4
2.	PH2001/ CY2001	Engineering Physics / Engineering Chemistry *	3	0	0	3	3
3.	EC3211	Electron Devices and Circuits	3	0	0	3	3
4.	CS2201	Object Oriented Programming and C ++	3	0	0	3	3
5.	CY2002	Environmental Science and Engineering	3	0	0	3	3
Practical							
6.	PH2031/ CY2031	Physics Laboratory / Chemistry Laboratory *	1	0	3	2	4
7.	GE2231	Engineering Practices Laboratory – II #	0	0	3	1	3
8.	EL2231	Communication Skills Laboratory – II #	2	0	2	1	4
9.	CS2231	Object Oriented Programming using C ++ Laboratory	0	0	3	1	3
Total						**21**	**30**
*** Depending upon the number of batches, it will be alternated between semesters 1 & 2** **# Common to all Branches.**							

Sl. No	Subject Code	Subject Name	L	T	P	C	TCH
SEMESTER III							
Theory							
1	MA1214	Probability and Statistics	3	1	0	4	4
2	CS2301	Data Structures	4	0	0	4	4
3	CS2302	Java Programming	3	0	0	3	3
4	CS2303	Database Management Systems	3	0	0	3	3
5	EC2302	Digital Systems	4	0	0	4	4
Practical							
6	CS2331	Data Structures Laboratory	0	0	3	1	3
7	CS3331	Java Programming Laboratory	0	0	3	1	3
8	CS2333	Database Management Systems Laboratory	0	0	3	1	3
9	EL2431	Communication Skills & Personality Development	2	0	2	3	4
Total						**24**	**31**
SEMESTER IV							
Theory							
1.	MA1204	Numerical Methods	3	1	0	4	4
2.	CS2401	Operating Systems	3	0	0	3	3
3.	CS3401	Computer Architecture	4	0	0	4	4
4.	CS3402	Computer Networks	3	0	0	3	3
5.	CS3403	Microprocessor and Microcontroller	3	0	0	3	3
6.	CS2502	Software Engineering	3	1	0	4	4
Practical							
7.	CS2531	Networking Laboratory	0	0	3	1	3
8	CS2431	Operating System Laboratory	0	0	3	1	3
9.	CS3431	Microprocessor and Microcontroller Laboratory	0	0	3	1	3
Total						**24**	**30**
SEMESTER V							
Theory							
1.	CS3501	Theory of Computation	4	0	0	4	4
2.	CS3502	Web Technology	3	0	0	3	3
3.	CS2505	System Software	3	0	0	3	3
4.	MA1301	Discrete Mathematics	3	1	0	4	4
5.	CS2701	Artificial Intelligence	3	0	0	3	3
6.		Elective – I	3	0	0	3	3
Practical							
7.	CS2532	Web Technology Laboratory	0	0	3	1	3
8	CS2533	System Software Laboratory	0	0	3	1	3
9.	CS3531	Software Design Project –I	0	0	6	2	6
Total						**24**	**32**

Sl. No	Subject Code	Subject Name	L	T	P	C	TCH
SEMESTER VI							
Theory							
1.	CS3601	Principles of Compiler Design	3	0	0	3	3
2.	CS2602	XML and Web Services	3	0	0	3	3
3.	CS2601	Object Oriented System Design	3	1	0	4	4
4.	MG2001	Principles of Management	3	0	0	3	3
5.		Elective – II	3	0	0	3	3
6.		Elective – III	3	0	0	3	3
Practical							
7.	CS2633	Compiler Design Laboratory	0	0	3	1	3
8.	CS2632	XML and Web Services Laboratory	0	0	3	1	3
9.	CS3631	Software Design Project – II (UML)	0	0	6	2	6
10.		Comprehension	0	0	2	1	2
Total						**24**	**33**
SEMESTER VII							
Theory							
1.	CS2651	Data Mining and Data Warehousing	4	0	0	4	4
2.	CS2702	Graphics and Multimedia	4	0	0	4	4
3.	MG2002	Total Quality Management	3	0	0	3	3
4.		Elective – IV	3	0	0	3	3
5.		Elective – V	3	0	0	3	3
6.		Elective – VI	3	0	0	3	3
Practical							
7.	CS2731	Computer Graphics Laboratory	0	0	3	1	3
8.	CS3731	Data Mining Laboratory	0	0	3	1	3
9.	CS3732	Software Design Project – III	0	0	6	2	6
Total						**24**	**32**
SEMESTER VIII							
Theory							
1.	CS2801	Mobile Computing	3	0	0	3	3
2.	GE2001	Professional Ethics and Human Values	3	0	0	3	3
Practical							
3.	CS3831	Project Work	0	0	24	6	24
Total						**12**	**30**
Total Programme Credit							**174**

ELECTIVES

Sl. No	Semester	Subject Code	Subject Name	L	T	P	C	TCH
1	V	CS3651	Information Architecture	3	0	0	3	3
2	VI	CS3652	Database Security	3	0	0	3	3
3		CS3653	Software and Application Security	3	0	0	3	3
4	VII	CS3654	Network Security	3	0	0	3	3
5		CS3655	Identity and Access Management	3	0	0	3	3
6		CS3656	Security Governance Risk and Compliance	3	0	0	3	3

SEMESTER – I

EL2101	TECHNICAL ENGLISH	L T P C 3 0 0 3
Goal	The goal of the programme is to provide a theoretical input towards nurturing accomplished learners who can function effectively in the English language skills; to cultivate in them the ability to indulge in rational thinking, independent decision-making and lifelong learning; to help them become responsible members or leaders of the society in and around their workplace or living space; to communicate successfully at the individual or group level on engineering activities with the engineering community in particular, and on multi-disciplinary activities in general, with the world at large.	

OBJECTIVES	OUTCOMES
1. To widen the capacity of the learners to listen to English language at the basic level and understand its meaning. 2. To enable learners to communicate in an intelligible English accent and pronunciation. 3. To assist the learners in reading and grasping a passage in English. 4. To learn the art of writing simple English with correct spelling, grammar and punctuation. 5. To **c**ultivate the ability of the learners to think and indulge in divergent and lateral thoughts.	1. The learners will have the self-confidence to improve upon their informative listening skills by an enhanced acquisition of the English language. **2.** The learners will be able to speak English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate. 3. The learners will be able to read, comprehend and answer questions based on literary, scientific and technological texts. 4. The learners will be able to write instructions, recommendations, checklists, process-description, letter-writing and report writing. **5.** The learners will have the confidence to develop thinking skills and participate in brainstorming, mind-mapping, audiovisual activities, creative thinking and also answer tests in the job-selection processes.

UNIT I: LISTENING SKILL **9**

Topics: Listening to the sounds, silent letters & stress in English words & sentences – Listening to conversation & telephonic conversation -- Listening for general meaning & specific information -- Listening for positive & negative comments – Listening to technical topics – Listening to prose & poetry reading -- Listening exercises.

Embedded language learning: Sentence definition -- Spelling & punctuation -- Imperative form – Sequencing of sentences -- Gerunds -- Infinitives -- 'Wh-'questions.

UNIT II: SPEAKING SKILL **9**

Topics: Self-introduction – Expressing personal opinion – Dialogue – Conversation – Simple oral interaction -- Speaking on a topic -- Expressing views for & against -- Speaking on personal topics like hobbies, topics of interest, present & past experiences, future plans – Participating in group discussions, role plays, debates, presentations, power-point presentations & job-interviews.

Embedded language learning: Adverbs –Adjectives – Comparative and Numerical adjectives -- Nouns & compound nouns -- Prefixes and suffixes.

UNIT III: READING SKILL **9**

Topics: Reading anecdotes, short stories, poems, parts of a novel, notices, message, time tables, advertisements, leaflets, itinerary, content page – Reading pie chart & bar chart -- Skimming and scanning -- Reading for contextual meaning – Scanning for specific information -- Reading newspaper & magazine articles – Critical reading -- Reading-comprehension exercises.

Embedded language learning: Tenses – Active and passive voice -- Impersonal passive -- Words and their function -- Different grammatical forms of the same word.

UNIT IV: WRITING SKILL **9**

Topics: Writing emails, notes, messages, memos, notices, agendas, advertisements, leaflets, brochures, instructions, recommendations & checklists -- Writing paragraphs -- Comparisons & contrasts – Process description of Flow charts – Interpretation of Bar charts & Pie charts – Writing the minutes of a meeting -- Report writing -- Industrial accident reports -- Letter-writing -- Letter to the editors – Letter inviting & accepting or declining the invitation – Placing orders – Complaints -- Letter requesting permission for industrial visits or implant training, enclosing an introduction to the educational institution -- Letters of application for a job, enclosing a CV or Resume – Covering letter.

Embedded language learning: Correction of errors – Subject-verb Concord -- Articles – Prepositions -- Direct and indirect speech.

UNIT V: THINKING SKILL **9**

Topics: Eliciting & imparting the knowledge of English using thinking blocks – Developing thinking skills along with critical interpretation side by side with the acquisition of English -- Decoding diagrams & pictorial representations into English words, expressions, idioms and proverbs.

Embedded language learning: General vocabulary -- Using expressions of cause and effect -- Comparison & contrast -- If-conditionals -- Expressions of purpose and means.

TOTAL:45

REFERENCE BOOKS

1. Norman Whitby. Business Benchmark: Pre-Intermediate to Intermediate – BEC Preliminary. New Delhi: Cambridge University Press, 2008 (Latest South Asian edition).
2. Norman Whitby. Business Benchmark: Pre-Intermediate to Intermediate – Preliminary—Personal Study Book. New Delhi: Cambridge University Press, 2008 (Latest South Asian edition).
3. Cambridge BEC Preliminary: Self-study Edition – Practice Tests. New Delhi: Cambridge University Press, 2008 or latest South Asian edition.
4. Devaki Reddy & Shreesh Chaudhary. Technical English**.** New Delhi: Macmillan, 2009.
5. Rutherford, Andrea J. Basic Communication Skills for Technology. 2nd edition. New Delhi: Pearson Education, 2006.

MA2101	ENGINEERING MATHEMATICS – I	L T P C 3 1 0 4
Goal	To create the awareness and comprehensive knowledge in Engineering Mathematics.	

Objectives	Outcome
The course should enable the students to 1. Find the inverse of the matrix by using Cayley Hamilton Theorem and Diagonalisation of matrix using transformation. 2. Understand the Evolutes and Envelope of the curve. 3. Learn the solutions of second order linear differential equations of standard types and Legendre's linear differential equation. 4. Learn partial differentiations involving two and three variables and expansions of functions using Taylor series. 5. Learn the expansions of trigonometric, hyperbolic functions and their relations.	The students should be able to 1. Identify Eigen value problems from practical areas and obtain its solutions and using transformation diagonalising the matrix which would render Eigen values. 2. Find out effectively the geometrical aspects of curvature and appreciates mathematical skills in constructing evolutes and envelopes in mechanics and engineering drawing. 3. Recognize and to model mathematically and solving, the differential equations arising in science and engineering. 4. Understand and model the practical problems and solve it using maxima and minima as elegant applications of partial differentiation. 5. Acquire skills in using trigonometric and hyperbolic and inverse hyperbolic functions.

UNIT I MATRICES **12**

Characteristic equation – Eigen values and Eigen vectors – Properties - Cayley Hamilton theorem (Statement only) – Verification and inverse using Cayley Hamilton theorem- Diagonalisation of matrices using similarity transformation.

UNIT II DIFFERENTIAL CALCULUS **12**

Methods of differentiation of functions – Product and Quotient rules – Inverse trigonometric functions - Implicit function - parametric form. Partial differentiation – Total differentiation- Taylor's series – Maxima and minima of functions of two variables.

UNIT III INTEGRAL CALCULUS **12**

Integration – Methods of integration – Substitution method - Integration by parts – Integration using partial fraction - Bernoulli's formula. Applications of Integral Calculus: Area, Surface area and Volume.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS **12**

Second order differential equations with constant coefficients – Particular integrals – e^{ax}, $Sinax, Cosax, x^m$, e ^{ax} Cos bx, e ^{ax} Sin bx. Solutions of homogeneous differential equations with variable coefficients - Variation of parameters.

UNIT V TRIGONOMETRY **12**

Expansions of sin nθ, cos nθ, tan nθ where n is a positive integer. Expansions of $\sin^m\theta, \cos^n\theta, \sin^m\theta\cos^n\theta$ in terms of sines and cosines of multiples of θ where m and n

are positive integers. Expansions of $\sin\theta$, $\cos\theta$, $\tan\theta$. Hyperbolic functions - Relation between trigonometric and hyperbolic functions - Inverse hyperbolic function.

TOTAL: 60

TEXT BOOK

1. Venkataraman M.K, Engineering Mathematics, Volume I & Volume II, The National Publishing Company, Chennai, 1985.

REFERENCE BOOKS

1. Kandaswamy P, Thilagavathy K and Gunavath K, Engineering Mathematics, Volume I & II, S.Chand and Company, New Delhi, 2005.
2. Bali N.P, Narayana Iyengar. N.Ch., Engineering Mathematics, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
3. Veerarajan T, Engineering Mathematics (for first year), Fourth Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2005.
4. Erwin Kreyzig, A Text book of Engineering Mathematics, John Wiley, 1999.
5. Grewal B.S, Higher Engineering Mathematics, Thirty Eighth Editions, Khanna Publisher, Delhi, 2004.
6. Chandrasekaran A, A Text book of Engineering Mathematics I, Dhanam Publications, Chennai, 2010

PH2001	ENGINEERING PHYSICS	L T P C 3 0 0 3
Goal	To impart fundamental knowledge in various fields of Physics and its applications.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Develop strong fundamentals of properties and behavior of the materials 2. Enhance theoretical and modern technological aspects in acoustics and ultrasonics. 3. Correlate the theoretical principles with application oriented study of optics. 4. Provide a strong foundation in the understanding of solids and materials testing. 5. Enrich the knowledge of students in modern engineering materials.	The student should be able to 1. Understand the properties and behaviour of materials. 2. Have a fundamental knowledge of acoustics which would facilitate in acoustical design of buildings and on ultrasonics and be able to employ it as an engineering tool. 3. Understand the concept, working and application of lasers and fiber optics. 4. Know the fundamentals of crystal physics and non destructive testing methods. 5. Have an understanding of the production, characteristics and application of the new engineering materials. This would aid them in the material selection stage.

UNIT I PROPERTIES OF MATTER **9**

Elasticity – types of moduli of elasticity – Stress-Strain diagram – Young's modulus of elasticity – Rigidity modulus – Bulk modulus – Factors affecting elasticity – twisting couple on a wire – Torsional pendulum – determination of rigidity modulus of a wire – depression of a cantilever – Young's modulus by cantilever – uniform and non-uniform bending - viscosity – Ostwald's viscometer – comparison of viscosities.

UNIT II ACOUSTICS AND ULTRASONICS **9**

Classification of sound – characteristics of musical sound – intensity - loudness – Weber Fechner law – Decibel – Reverberation – Reverberation time, derivation of Sabine's formula for reverberation time(Jaeger's method) – absorption coefficient and its determination – factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies. Ultrasonics - production – Magnetostriction and Piezoelectric methods – properties – applications of ultrasonics with particular reference to detection of flaws in metal (Non – Destructive testing NDT) – SONAR.

UNIT III LASER AND FIBRE OPTICS **9**

Principle of lasers – Stimulated absorption – Spontaneous emission, stimulated emission – population inversion – pumping action – active medium – laser characteristics – Nd-Yag laser – CO2 laser – Semiconductor laser – applications - optical fiber – principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – types of optical fibers – single and multimode, step index and graded index fibers – applications – fiber optic communication system.

UNIT IV CRYSTAL PHYSICS AND NON- DESTRUCTIVE TESTING 9

Crystal Physics: Lattice – Unit cell - Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – coordination number – Packing factor for SC, BCC, FCC and HCP structures.

Non Destructive Testing: Liquid penetrate method – Ultrasonic flaw detection – ultrasonic flaw detector (block diagram) – X-ray Radiography – Merits and Demerits of each method.

UNIT V MODERN ENGINEERING MATERIALS AND SUPERCONDUCTING MATERIALS 9

Modern Engineering Materials: Metallic glasses: Preparation properties and applications. Shape memory alloys (SMA): Characteristics, applications, advantages and disadvantages of SMA. Nano Materials: Synthesis –Properties and applications.

Superconducting Materials: Superconducting phenomena – Properties of superconductors – Meissner effect – Type I and Type II superconductors – High Tc superconductors (qualitative) – uses of superconductors.

TOTAL : 45

TEXT BOOKS

1. Gaur R.K. and Gupta S.L., "Engineering Physics ", 8th edition, Dhanpat Rai publications (P) Ltd., New Delhi 2010.
2. P.Mani, "Engineering Physics ", Vol-I, Dhanam Publications, Chennai 2011.
3. Rajendran V. an Marikani A., "Applied Physics for engineers" , 3rd edition, Tata Mc Graw –Hill publishing company Ltd., New Delhi,2003.

REFERENCE BOOKS

1. Uma Mukherji, "Engineering Physics ", Narosa publishing house, New Delhi, 2003.
2. Arumugam M., "Engineering Physics ", Anuradha agencies, 2007.
3. Palanisamy P.K., "Engineering Physics ", SciTech Publications, Chennai 2007.
4. Arthur Beiser, "Concepts of Modern Physics", Tata Mc Graw –Hill Publications, 2007.
5. P.Charles, Poople and Frank J. Owens, "Introduction to Nanotechnology", Wiley India, 2007.

CY2001	ENGINEERING CHEMISTRY	L T P C 3 0 0 3
Goal	To impart basic principles of chemistry for engineers.	

Objectives	Outcome
The objective of the course is 1. To make the students conversant with the basics of a. Water technology and b. Polymer science. 2. To provide knowledge on the requirements and properties of a few important engineering materials. 3. To educate the students on the fundamentals of corrosion and its control. 4. To give a sound knowledge on the basics of a few significant terminologies and concepts in thermodynamics. 5. To create an awareness among the present generation about the various conventional energy sources.	Upon successful completion of the course, the outcomes are as follows: 1. The students will gain basic knowledge in water analysis and suitable water treatment method. The study of polymer chemistry will give an idea on the type of polymers to be used in engineering applications. 2. Exposure of the students to the common engineering materials will create awareness among the students to search for new materials. 3. Knowledge on the effects of corrosion and protection methods will help the young minds to choose proper metal / alloys and also to create a design that has good corrosion control. 4. Students with good exposure on the important aspects of basic thermodynamics will be able to understand the advanced level thermodynamics in engineering applications. 5. A good background on the various aspects of energy sources will create awareness on the need to utilize the fuel sources effectively and also for exploring new alternate energy resources.

UNIT I WATER TECHNOLOGY AND POLYMER CHEMISTRY 9

Hardness (Definition, Types, Units) – problems - Estimation of Hardness (EDTA Method) – Water softening - Carbonate conditioning and Calgon conditioning - Demineralization (Ion-Exchange Method) - Water Quality Parameters - Municipal Water Treatment- Desalination - Reverse Osmosis.

Classification of Polymers - PVC, Bakelite - preparation, properties and applications - Effect of Polymer Structure on Properties - Compounding of Plastics- Polymer Blends and Polymer Alloys – Definition, Examples.

UNIT II ENGINEERING MATERIALS 9

Properties of Alloys – Heat Treatment of Steel – Polymer Composites – types and applications.- Lubricants – Classification, properties and applications - Mechanism of Lubrication – MoS_2 And Graphite – Adhesives – classification and properties – Epoxy resin (Preparation, properties and applications) – Refractories – Classification, Properties and General Manufacture – Abrasives – Classification , Properties and Uses – Carbon nano tubes – preparation, properties and applications.

UNIT III ELECTROCHEMISTRY AND CORROSION 9

Conductometric Titration – HCl vs NaOH and mixture of acids vs NaOH - Electrochemical Series and its applications - Nernst Equation – problems - Polarization, Decomposition Potential, Over-voltage (definitions only) - Galvanic series - Corrosion (Definition, Examples, effects) – Mechanism of Dry Corrosion and Wet Corrosion – Differential aeration Corrosion , examples – Factors Influencing Corrosion – Metal and Environment – Corrosion Control – Design –Cathodic Protection methods – Protective Coatings – Galvanising - Anodising – Electroplating (Cu and Ni) and Electroless plating (Cu and Ni) – Constituents of Paints and varnish.

UNIT IV CHEMICAL THERMODYNAMICS 9

Thermodynamic terminology- First Law of Thermodynamics-Internal energy- enthalpy - heat capacity – work done in isothermal expansion of an ideal gas –problems - second law of thermodynamics – entropy change – phase transformations and entropy change – problems - Work Function & Free Energy Function- Maxwell's Relations-Gibbs Helmholtz equation-van't Hoff Isotherm- van't Hoff Isochore – Problems.

UNIT V FUELS AND ENERGY SOURCES 9

Fuels – classification - Calorific Value – Dulong's Formula – Problems - Determination of Calorific Value by Bomb Calorimeter – Coal – Proximate Analysis – problems - Octane Number – Cetane Number – Diesel Index (Definitions only) – Bio Gas – Producer Gas – Water Gas – Preparation, Properties and Uses – Batteries – Primary Cells – Leclanche Cell – Secondary Cell – Nickel Cadmium Battery – Fuel Cells – Hydrogen –Oxygen Fuel Cell – Solar Battery – Lead Acid Storage Cell – Nuclear Energy – Light water nuclear power plant.

Total :45

TEXT BOOKS

1. S. S. Dara, Text Book of Engineering Chemistry, S. Chand & Company Ltd., New Delhi, 2003
2. Murthy, Agarwal & Naidu, Text Book of Engineering Chemistry, BSP, 2003.
3. S.Sumathi, Engineering Chemistry, Dhanam Publications, 2008.
4. S.Sumathi and P.S.Raghavan, Engineering Chemistry II, Dhanam Publications, 2008.

REFERENCE BOOKS

1. B. K. Sharma, Engineering chemistry, Krishna Prakasam Media (P) Ltd., 2003
2. Vogel, A text book of Qualitative Inorganic Analysis, ELBS, London, 2004
3. A. Gowarikar, Text Book of Polymer Science, 2002
4. Kuriacose & Rajaram, Vol. 1 & 2, Chemistry in Engineering and Technology, 2004
5. Puri, Sharma and Pathania, Principles of Physical Chemistry, Vishal Publishing Co. Jalandar, 2004.

ME2101	ENGINEERING GRAPHICS	L T P C 1 0 3 3
Goal	To develop graphical skills for communicating concepts, ideas and designs of engineering products and to give exposure to national standards relating to technical drawings.	

Objectives	Outcome
The course should enable the students to 1. Introduce drawing standards and use of drawing instruments. 2. Introduce first angle projection. 3. Practice of engineering hand sketching and introduce to computer aided drafting. 4. Familiarize the students with different type of projections. 5. Introduce the process of design from sketching to parametric 3D CAD and 2D orthographic drawings to BIS.	The students should be able to 1. Develop parametric design and the conventions of formal engineering drawing. 2. Produce and interpret 2D & 3D drawings 3. Communicate a design idea/concept graphically. 4. Examine a design critically and with understanding of CAD – The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software. 5. Get a Detailed study of an engineering artefact.

Note: Only first angle projection is to be followed

BASICS OF ENGINEERING GRAPHICS **2**

Importance of graphics Use of drawing instruments - BIS conventions and specifications – drawing sheet sizes, layout and folding - lettering - Dimensioning - Geometrical constructions - Scales. Construction of curves like ellipse, parabola, cycloids and involutes.

UNIT I PROJECTION OF POINTS, LINES AND SURFACES **15**

General principles of presentation of technical drawings as per BIS - Introduction to Orthographic projection - Naming views as per BIS - First angle projection. Projection of points. Projection of straight lines located in first quadrant (using rotating line method only). Projection of plane surfaces like polygonal lamina and circular lamina. Drawing views when the surface of the lamina is inclined to one reference plane.

UNIT II PROJECTION OF SOLIDS **10**

Projections of simple solids like prism, pyramid, cylinder and cone - Drawing views when the axis of the solid is inclined to one reference plane.

UNIT III DEVELOPMENT OF SURFACES **10**

Introduction to sectioning of solids. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

UNIT IV ORTHOGRAPHIC PROJECTIONS **10**

Orthographic projections - Conversion of orthographic views from given pictorial views of objects, including dimensioning. Free hand sketching of Orthographic views from Pictorial views.

UNIT V PICTORIAL PROJECTIONS **10**

Isometric projection - Isometric scale - Isometric views of simple solids like prisms, pyramids, cylinders and cones. Introduction to perspective Projections.

COMPUTER AIDED DRAFTING (Demonstration Only) **3**

Introduction to computer aided drafting and dimensioning using appropriate software. 2D drawing commands Zoom, Picture editing commands, Dimensioning, Isometric drawing, Iso-Planes and 3D drafting. Plotting of drawing. Practice includes drawing the projection of lines and solids. Prepare isometric view of simple solids like prisms, pyramids, cylinders and cones.

TOTAL: 60

TEXT BOOKS

1. Jeyapoovan T, "Engineering Drawing and Graphics Using AutoCAD", Vikas Publishing House Pvt. Ltd., New Delhi, 2010.
2. Warren J. Luzadder and Jon. M.Duff, "Fundamentals of Engineering Drawing", Prentice Hall of India Pvt. Ltd., Eleventh Edition, 2003.

REFERENCE BOOKS

1. Bhatt N.D and Panchal V.M, "Engineering Drawing: Plane and Solid Geometry", Charotar Publishing House, Anand-3001, 2007.
2. Thomas E. French, Charles J.Vierck and Robert J.Foster, " Engineering Drawing and Graphic Technology, McGraw- Hill Book company 13th Edition.1987.
3. Venugopal K., "Engineering Graphics", New Age International (P) Limited, New Delhi, 2008.

CS2101	COMPUTER PROGRAMMING	L T P C 3 0 0 3
Goal	This course emphasizes the fundamentals of computers and helps the students to develop their programming skills in C language to a level in which the problems of reasonable complexity can be tackled successfully.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Learn the major components and types of Digital Computer. 2. Learn the problem solving techniques. 3. Develop skills in programming using C language.	The student should be able to 1. Understand the interaction between different components of Computer system and number system. 2. Devise computational strategies for solving problems. 3. Develop solutions by writing program in C programming language for simple to complex problems.

UNIT - I COMPUTER FUNDAMENTALS 9

Introduction – Evolution of Computers – Generations of Computer – Classification of Computers – Application of Computers - Components of a Computer System – Hardware - Software - Starting a Computer (Booting) – Number Systems.

UNIT- II COMPUTER PROGRMMING AND LANGUAGES 9

Introduction - Problem-Solving Techniques: Algorithms, Flowchart, Pseudocode - Program Control Structures – Programming Paradigms – Programming languages – Generations of Programming Languages – Language Translators – Features of a Good Programming Languages.

UNIT - III PROGRAMMING WITH C 9

Introduction to C - The C Declaration - Operators and Expressions – Input and Output in C – Decision Statements – Loop Control Statements.

UNIT- IV FUNCTIONS, ARRAYS AND STRINGS 9

Functions – Storage Class – Arrays – Working with strings and standard functions.

UNIT - V POINTERS, Structures and union 9

Pointers – Dynamic Memory allocation – Structure and Union – Files.

TOTAL: 45

TEXT BOOK

1. ITL Education Solution Limited, Ashok Kamthane, “Computer Programming”, Pearson Education Inc 2007 (Unit: I to V).

REFERNCE BOOKS

1. Byron S. Gottfried, “Programming with C”, Second Edition, Tata McGraw Hill 2006.
2. Yashvant Kanetkar, “Let us C”, Eighth edition, BPP publication 2007.
3. Stephen G.Kochan, “Programming in C - A Complete introduction to the C programming language” , Pearson Education, 2008.
4. T.JeyaPoovan, “Computer Programming Theory and Practice”, Vikas Pub, New Delhi.

CS2131	COMPUTER PROGRAMMING LABORATORY	L T P C 0 0 3 1
Goal	To develop the programming skill using C programming languages and to get familiar with Office suite.	

Objectives	Outcome
The course should enable the students to 1. Gain knowledge about Microsoft office, Spread Sheet. 2. Learn programming concept in C.	The students should be able to 1. Use MS Word to create document, table, text formatting and Mail merge options. 2. Use Excel for small calculations using formula editor, creating different types of charts and including pictures etc, 3. Write and execute C programs for solving simple problems.

LIST OF EXPERIMENTS

a) Word Processing

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

b) Spread Sheet

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document

c) Programming in C

8. Write a C program to prepare the electricity bill.
9. Write a C program to demonstrate functions using

   (a) Call by value (b) Call by reference.
10. Write a C program to print the Fibonacci series for the given number.
11. Write a C program to find the factorial of number using recursion.
12. Write a C program to implement the basic arithmetic operations using Switch Case statement.
13. Write a C program to check whether the given number is an Armstrong number.
14. Write a C program to check whether the given string is a Palindrome.
15. Write a C program to create students details using Structures.
16. Write a C program to demonstrate the Command Line Arguments.
17. Write a C program to implement the Random Access in Files.
18. Write C programs to solve some of the Engineering applications

GE2131	ENGINEERING PRACTICES LABORATORY – I	L T P C 0 0 3 1
Goal	To provide the students with hands on experience on various basic engineering practices in Civil and Mechanical Engineering.	

Objectives	Outcomes
The course should enable the students to 1. Relate theory and practice of basic Civil and Mechanical Engineering 2. Learn concepts of welding and machining practice 3. Learn concepts of plumbing and carpentry practice	The students should be able to 1. Indentify and use of tools, Types of joints used in welding, carpentry and plumbing operations. 2. Have hands on experience on basic fabrication techniques such as carpentry and plumbing practices. 3. Have hands on experience on basic fabrication techniques of different types of welding and basic machining practices.

LIST OF EXPERIMENTS

1. Mechanical Engineering

1. Welding: Arc welding - butt joints, lap joints and T joints.

2. Basic Machining: Facing, Turning, Threading and Drilling practice.

3. Machine assembly practice: Study of centrifugal pump

4. Study on

a. Smithy operations- Production of hexagonal headed bolt.

b. Foundry operations – mould preparation for gear and step cone pulley.

2. Civil Engineering

1. Basic pipe connection using valves, couplings, unions, reducers, elbows in household fitting.
2. Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.
3. Wood work: Sawing, Planning and making common joints.
4. Study of joints in door panels, wooden furniture.

Text Book

1. T. Jeyapoovan, M.Saravanapandian and S. Pranitha, "Engineering Practices Lab Manual", 3rd Edition 2006, Vikas Publishing house (P) Ltd., New Delhi.

EL2131	COMMUNICATION SKILLS LABORATORY I	L T P C 0 0 3 1
Goal	The goal of the programme is to provide a practical input towards nurturing accomplished learners who can function effectively in the English language skills.	

Objectives	Outcome
1. To extend the ability of the learners to be able to listen to English and comprehend its message. 2. To enable the learners to have a functional knowledge of spoken English. 3. To assist the learner**s** to read and grasp the meaning of technical and non-technical passages in English. 4. To help the learners develop the art of writing without mistakes. 5. To expand the thinking capability of the learners so that they would learn how to view things from a different angle.	1. The learners will be able to listen to and evaluate English without difficulty and comprehend its message. 2. The learners would have developed a functional knowledge of spoken English so as to use it in the institution and at job interviews. 3. The learners will be able to read and comprehend the meaning of technical and non-technical passages in English. 4. The learners will have developed the art of writing so as to put down their thoughts and feelings in words. 5. At the end of the course, the learners will be able to think independently and contribute creative ideas.

UNIT I LISTENING SKILL

Topics: Listening to conversations and interviews of famous personalities in various fields -- Listening practice related to the TV-- Talk shows – News – Educative programmes -- Watching films for critical comments – Listening for specific information – Listening for summarizing information – Listening to monologues for taking notes – Listening to answer multiple-choice questions.

UNIT II SPEAKING SKILL

Topics: Self-introduction -- Group discussion – Persuading and negotiating strategies – Practice in dialogues -- Presentations based on short stories / poems -- Speaking on personal thoughts and feelings -- academic topics – News reading – Acting as a compere -- Speaking about case studies on problems and solutions – Extempore speeches.

UNIT III READING SKILL

Topics: Reading anecdotes to predict the content – Reading for interpretation -- Suggested reading -- Short stories and poems -- Critical reading – Reading for information transfer – Reading newspaper and magazine articles for critical commentary – Reading brochures, advertisements, pamphlets for improved presentation.

UNIT IV WRITING SKILL

Topics: At the beginning of the semester, the students will be informed of a mini dissertation of 1000 words they need to submit individually on any non-technical topic of their choice.

The parts of the dissertation will be the assignments carried out during the semester and submitted towards the end of the semester on a date specified by the department. This can be judged as part of the internal assessment.

UNIT V THINKING SKILL

Topics: Practice in preparing thinking blocks to decode diagrammatical representations into English words, expressions, idioms and proverbs – Inculcating interest in English using thinking blocks. Making pictures and improvising diagrams to form English words, phrases and proverbs -- Picture reading.

REFERENCES

1. Raman, Meenakshi, and Sangeetha Sharma. Technical Communication: English Skills for Engineers. 2nd edition. New Delhi: Oxford University Press, 2010.
2. Riordian, Daniel. Technical Communication. New Delhi. Cengage Learning, 2009

Websites for learning English

1. British: Learn English – British Council (Listen & Watch) - <http://learnenglish.britishcouncil.org/>
2. American: Randall's ESL Cyber Listening Lab - <http://www.esl-lab.com/>
3. Intercultural: English Listening Lesson Library Online http://www.elllo.org/

PH 2031	PHYSICS LABORATORY	L T P C 1 0 3 2
Goal	The goal of the programme is to provide a practical input towards nurturing accomplished learners who can function effectively in the English language skills.	

Objectives	Outcome
1. To expose the students for practical training through experiments to understand and appreciate the concepts learnt in Physics	1. Performing the experiments related to the subject will help the students to apply the practical knowledge in industrial applications and for developing or modifying methods

List of Experiments

1. Torsional Pendulum - Determination of rigidity modulus of the material of a wire.
2. Non Uniform Bending - Determination of Young's Modulus.
3. Viscosity -Determination of co-efficient of Viscosity of a liquid by Poiseuille's flow.
4. Lee's Disc - Determination of thermal conductivity of a bad conductor.
5. Air Wedge - Determination of thickness of a thin wire.
6. Spectrometer - Refractive index of a prism.
7. Semiconductor laser - Determination of wavelength of Laser using Grating.

REFERENCES

1. P.Mani, Engineering Physics Practicals, Dhanam Publications, Chennai, 2005.

CY2031	CHEMISTRY LABORATORY	L T P C 1 0 3 2
Goal	The goal of the programme is to provide a practical input towards nurturing accomplished learners who can function effectively in the English language skills.	

OBJECTIVES	OUTCOME
1. To expose the students for practical training through experiments to understand and appreciate the concepts learnt in Chemistry	1. Performing the experiments related to the subject will help the students to apply the practical knowledge in industrial applications and for developing or modifying methods

List of Experiments

1. Estimation of Commercial soda by acid-base titration.
2. Determination of Percentage of nickel in an alloy.
3. Determination of Temporary, permanent and total hardness of water by EDTA method.
4. Determination of Chloride content in a water sample.
5. Potentiometric Estimation of iron.
6. Conductometric Titration of a strong acid with a strong base.
7. Conductometric Titration of mixture of acids.
8. Determination of Degree of polymerization of a polymer by Viscometry.

REFERENCES

1. J.Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantative Chemical Analysis, 6th Edition, Pearson Education, 2004.
2. C. W. Garland, J. W. Nibler, D. P. Shoemaker, ;"Experiments in Physical Chemistry, 8th ed.," McGraw-Hill, New York, 2009.
3. S. Sumathi, Engineering Chemistry Practicals, Dhanam Publications, 2011.

MA2102	ENGINEERING MATHEMATICS II	L T P C 3 1 0 4
Goal	To create the awareness and comprehensive knowledge in Engineering Mathematics.	

Objectives	Outcome
The course should enable the students to 1. Understand the evaluation of the double and triple integrals in Cartesian and polar forms. 2. Know the basics of Vector calculus. 3. Know Cauchy - Riemann equations, Milne – Thomson method and Conformal mapping 4. Grasp the concept of Cauchy's integral formula, Cauchy's residue theorem and contour integration. 5. Know Laplace transform and inverse Laplace transform and their properties.	The students should be able to 1. Find area as double integrals and volume as triple integrals in engineering applications. 2. Evaluate the gradient, divergence, curl, line, surface and volume integrals along with the verification of classical theorems involving them. 3. Applies analytic functions and their interesting properties in science and engineering. 4. Evaluate the basics of complex integration and the concept of contour integration which is important for evaluation of certain integrals encountered in practice. 5. Have a sound knowledge of Laplace transform and its properties and their applications in solving initial and boundary value problems.

UNIT I MULTIPLE INTEGRALS **12**

Double integration – Cartesian and polar co-ordinates – Change of order of integration. Area as a double integral – Triple integration in Cartesian co ordinates – Volume as a triple integral - Change of variables between Cartesian and polar coordinates.

UNIT II VECTOR CALCULUS **12**

Gradient, Divergence and Curl – Unit normal vector, Directional derivative – angle between surfaces-Irrotational and solenoidal vector fields.

Green's theorem - Gauss divergence theorem and Stoke's theorem (without proof) – Verification and evaluation of the above the theorems - Simple applications to regions such as square, rectangle, triangle, cuboids and rectangular parallelopipeds.

UNIT III LAPLACE TRANSFORM **12**

Laplace transform – Conditions of existence – Transform of elementary functions – properties - Derivatives and integrals of transforms – Transforms of derivatives and integrals – Initial and final value theorems – Transform of periodic functions. Inverse Laplace transforms using partial fraction and convolution theorem. Solution of linear ODE of second order with constant coefficients.

UNIT IV FOURIER SERIES **12**

Dirichlet's Conditions – General Fourier Series – Odd and even functions – Half range sine and cosine series –Harmonic Analysis.

UNIT V COMPLEX VARIABLES **12**

Functions of a complex variable – Analytic function - Cauchy - Riemann equations (Statement only) – Properties of analytic function (Statement only) – Construction of Analytic functions by Milne – Thomson method.

TOTAL: 60

TEXT BOOK

1. Venkatraman M.K, Mathematics, Volume – II & Volume -III, National Publishing Company, Chennai, 1985.

REFERENCE BOOKS

1. Kandasamy P, Engineering Mathematics Volume II, S.Chand & Co., Delhi, 1987.
2. Grewal B.S, "Engineering Maths – II", Sultan Chand, New Delhi, 1993.
3. Bali N.P, Manish Goyal, Text book of Engineering Mathematics, 3rd Edition, Lakshmi Publications, 2003.
4. Chandrasekaran A, Engineering Mathematics, Volume–II, Dhanam Pub., 2008.

EC3211	ELECTRON DEVICES AND CIRCUITS	L T P C 3 0 0 3
Goal	To understand the application of different electronic devices and simple circuits.	

OBJECTIVES	OUTCOMES
The students will develop an understanding of 1. This course gives an overview of various semiconductor devices. 2. At the end of this course, the students will be 3. able to analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices.	The student will be able to 1. Demonstrate the working of diodes, transistors. 2. Design and conduct experiments, analyze and interpret data. 3. Design a system, component or process as per needs and specifications.

UNIT I DIODES **9**

PN diode : Intrinsic and Extrinsic semiconductors – formation of pn junction – biasing the diode – VI characteristics of diode – static and dynamic resistance – drift and diffusion currents – transition and diffusion capacitance - diode models.

Diode applications : HWR – FWR – power supply filters and regulators – diode clipping and clamping circuits.

Special purpose diodes: Zener diodes – zener diode applications – Varactor diode – LED – photo diode – Schottky diode – PIN diode – step recovery diode – Tunnel diode - Laser diode (discuss only the basic characteristics of various diodes).

UNIT II BIPOLAR JUNCTION TRANSISTORS **9**

Bipolar Junction Transistors : Physical structure – basic operation – the CE connection – Transistor characteristics and parameters – transistor as an amplifier – transistor as a switch – transistor biasing – dc load line operating point – bias stability – analysis of various dc bias circuits.

UNIT III FIELD-EFFECT TRANSISTORS **9**

Field-Effect Transistors : The JFET - basic operation – JFET characteristics and parameters – JFET biasing – The MOSFET – basic operation – MOSFET characteristics and parameters – MOSFET biasing – MOSFET as an analog switch.

UNIT IV FEEDBACK AMPLIFIERS AND OSCILLATORS **9**

Feedback amplifiers: General feedback structure – properties of negative feedback – basic feedback topologies – stability of feedback circuits – gain and phase margins.

Oscillators: Oscillator principles – Hartley, Colpitts, Clapp, Phase shift, Wien bridge and Crystal oscillators and their analysis and design.

UNIT V OPERATIONAL AMPLIFIERS **9**

Introduction to op-amp : op-amp symbol, terminals, packages, specifications, block schematic – op-amp parameters – ideal op-amp – open-loop and closed-loop response Basic op-amp circuits : Inverting & noninverting amplifier – voltage follower, summing and differential amplifiers.

TOTAL: 45

TEXT BOOKS

1. Thomas L. Floyd, Electronic Devices, Pearson Education, 6th Edition, 2002.
2. Albert Malvino, David J.Bates, Electronic Principles, Tata McGraw-Hill, 7th Ed., 2007.
3. Ramakant A. Gayakwad, OP-AMPS and Linear Integrated Circuits, Prentice Hall of India, 4th Edition.

REFERENCE BOOKS

1. David A.Bell, Electronic Devices and Circuits, Prentice Hall of India, 4th Edition, 2003.
2. Robert Boylestad, Louis Nashelsky, Electron Devices and Circuit Theory, Pearson Education, 9th Edition, 2007.
3. Jacob Millman,Christos C.Halkias, Electronic Devices and Circuits, Tata McGraw-Hill, 1991.

CS2201	OBJECT ORIENTED PROGRAMMING AND C++	L T P C 3 0 0 3
Goal	This course advances students knowledge in problem solving and programming principles for scientific and technical applications through the presentation of object-oriented programming in the C++ language. The course emphasizes data abstraction and object oriented programming design through the implementation, in C++, of classes and numerous related concepts. This includes inheritance, polymorphism, and inter-object communication, as well as techniques with which you can generalize classes, such as templates and operator overloading.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Learn Object-oriented programming paradigm. 2. Understand ddvanced object-oriented features through C++ programming language. 3. Learn exception handling. 4. Learn Generic classes and templates.	The student should be able to 1. Explain concepts in object oriented programming. 2. Write simple programs in C++. 3. Demonstrate the concept of functions, operator overloading, inheritance through C++ programs. 4. Demonstrate the concepts of exception handling, generic functions, and templates.

UNIT I INTRODUCTION 9

OOP Paradigm: Comparison of Programming paradigms, Characteristics of Object-Oriented Programming Languages, Object-based programming languages C++: Brief History of C++, Structure of a C++ program, Difference between C and C++ - cin, cout, new, delete operators, ANSI/ISO Standard C++, Comments, Working with Variables and const Qualifiers. Enumeration, Arrays and Pointer.

Implementing oops concepts in C++ Objects, Classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Default Parameter Value, Using Reference variables with Functions.

UNIT II FUNCTIONS AND OVERLOADING 9

Abstract data types, Class Component, Object & Class, Constructors Default and Copy Constructor, Assignment operator deep and shallow coping, Access modifiers – private, public and protected. Implementing Class Functions within Class declaration or outside the Class declaration. instantiation of objects, Scope resolution operator, Working with Friend Functions, Using Static Class members. Understanding Compile Time Polymorphism function overloading Rules of Operator Overloading (Unary and Binary) as member function/friend function, Implementation of operator overloading of Arithmetic Operators, Overloading Output/Input, Prefix/ Postfix Increment and decrement Operators, Overloading comparison operators, Assignment, subscript and function call Operator , concepts of namespaces.

UNIT III INHERITANCE AND POLYMORPHISM 9

Inheritance: Inheritance, Types of Inheritance, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors and Destructor in derived classes. Multiple Inheritance.

Polymorphism: Polymorphism, Type of Polymorphism – compile time and runtime, Understanding Dynamic polymorphism: Pointer to objects, Virtual Functions (concept of VTABLE) , pure virtual functions, Abstract Class.

UNIT IV EXCEPTION HANDLING 9

Advanced Input/Output, Exception Handling and Manipulating strings, Using istream /ostream member functions, Using Manipulators, Creating Manipulator Functions, Understanding Implementation of Files, Writing and Reading Objects. Understanding of working and implementation of Exception Handling.

UNIT V TEMPLATES 9

Generic Programming: and mastering STL Understanding Generic Functions with implementation of searching sorting algorithm. Overloading of Function Templates.

Understanding Class Templates using Implementation of Generic stack, linked lists: singly and doubly linked lists, Binary Search Tree basic operations. Understanding Inheritance with Generic Class.

Standard Template Library:– Understanding Components of Standard Template Library, Working of Containers, Algorithms, Iteraters and Other STL Elements. Implementation of Sequence and Associative containers for different Algorithms using their Iterator.

TOTAL: 45

TEXT BOOKS

1. Ira Pohl, “Object Oriented Programming using C++”, 2nd Edition, Pearson Education, 2009.
2. Nell Dale, Chips Weens, “Programming and Problem Solving with C++”, Jones and Bartlett , 5th Ed., 2010
3. Behrouz A. Forouan, Richrad F. Gilberg, “Computer Science - A Structural Approach Using C++”, Cengage Learning, 2004.
4. Bruce Eckel, “Thinking in C++”, President, Mindview Inc., Prentice Hall, 2nd Ed., 1999.

CY2002	ENVIRONMENTAL SCIENCE AND ENGINEERING	L T P C 3 0 0 3
Goal	To impart basic knowledge on the significance of environmental science for engineers.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. To make the students aware of the existing natural resources such as forest water resources etc. and to educate them to understand the need for preserving the resources. 2. To educate the students about the functions of various ecosystems and biodiversity. 3. To provide knowledge on the various aspects of different types of pollution such as air pollution, water pollution, soil pollution etc. 4. To give a basic knowledge on the social issues such as global warming, acid rain, ozone layer depletion, nuclear hazards etc. and to educate them about the various Environmental Protection Acts. 5. To create an awareness among the present generation about the various aspects of human population and their effect on environment.	The student should be able to 1. The students would have understood the effects of over exploitation of water resources, forest resources etc. and their impact on day to day life on earth. 2. Knowledge on the functions of several of ecosystems will help the students to design the processes that are eco friendly. 3. Knowledge on the different types of pollution will help the young minds to device effective control measures to reduce rate of pollution. 4. Exposure on the issues such as global warming, acid rain, ozone layer depletion, and nuclear hazards will make the students understand the significances of sustainable development and the need to enforce Environmental Acts. 5. Educating on the various aspects of population explosion will create awareness on population control for effective utilization of the resources and the need to explore new alternate energy resources for a healthy environment.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT II ECOSYSTEMS AND BIODIVERSITY 14

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

and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Field study of common plants, insects, birds and Field study of simple ecosystems like pond, river, hill slopes, etc.

UNIT III ENVIRONMENTAL POLLUTION 8

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Soil waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides. Field Study of local polluted site – Urban / Rural / Industrial / Agricultural

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

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

TOTAL: 45

TEXT BOOKS

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co., 1971.
3. Townsend C, Harper J and Michael Begon, Essentials of Ecology, Blackwell Sci., 1999.
4. Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Pub., 1998.

REFERENCE BOOKS

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, India, 2004.
2. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media.

3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.

GE2231	ENGINEERING PRACTICES LABORATORY II	L T P C 0 0 3 1
Goal	To provide knowledge of basic engineering concepts.	

Objectives	Outcome
The course should enable the students 1. To impart knowledge on basic engineering concepts.	The students should be able to 1. To learn how to use Electrical and Electronics tools.

LIST OF EXPERIMENTS

1. Electrical Engineering

1. Wiring for a tube light.

2. Wiring for a lamp and fan.

3. Staircase wiring.

4. Study of (i) Iron box and (ii) Fan with Regulator.

2. Electronics Engineering

1. Study of Electronic components and Equipments.
2. Characteristics of PN junction diode & measurement of Ripple factor or half wave and full wave rectifier.
3. Applications of OP-AMP – Inverter, Adder and Subtractor.
4. Study and verification of Logic Gates.

	EL2231 COMMUNICATION SKILLS LABORATORY II	L T P C 2 0 2 1
Goal	The goal of the programme is to provide an **advanced practical input** towards moulding student-achievers who can use the English language with ease.	

OBJECTIVES	OUTCOMES
1. To extend the power of the learners to listen to English at an advanced level and comment on it. 2. To guide the learners to speak English at the formal and informal levels. 3. To enable learners to read and grasp the in-depth meaning of technical and non-technical passages in English. 4. To help the learners develop the art of writing at the formal and informal levels. 5. 5. To expand the thinking capability of the learners so that they would learn how to be original in their thoughts.	1. The learners will be able to listen to and understand English at an advanced level and interpret its meaning. 2. The learners would have developed English at the formal and informal levels and thus gained the confidence to use it without fear. 3. The learners will be able to read and grasp the in-depth meaning of technical and non-technical passages in English. 4. The learners will have developed the art of formal and informal writing. 5. The learners will be able to think independently and creatively and also verbalize their thoughts fearlessly.

UNIT I: LISTENING SKILL **12**

Topics: Listening to telephonic conversations -- Listening to native British speakers -- Listening to native American speakers -- Listening to intercultural communication -- Listening to answer questions as one-liners and paragraphs -- Listening practice to identify ideas, situations and people -- Listening to group discussions -- Listening to films of short duration.

UNIT II: SPEAKING SKILL **12**

Topics: Interview skills – People skills – Job interview – Body language and communication -- How to develop fluency -- Public speaking -- Speaking exercises involving the use of stress and intonation – Speaking on academic topics – Brain storming & discussion – Speaking about case studies on problems and solutions – Extempore speeches – Debating for and against an issue – Mini presentations – Generating talks and discussions based on audiovisual aids.

UNIT III: READING SKILL **12**

Topics: Reading exercises for grammatical accuracy and correction of errors -- Reading comprehension exercises with critical and analytical questions based on context – Evaluation of contexts – Reading of memos, letters, notices and minutes for reading editing and proof reading -- Extensive reading of parts of relevant novels after giving the gist of the same.

UNIT IV: WRITING SKILL **12**

Topics: At the beginning of the semester, the students will be informed of a mini dissertation of 2000 words they need to submit individually on any non-technical topic of their choice. The parts of the dissertation will be the assignments carried out during the semester and

submitted towards the end of the semester on a date specified by the department. This can be judged as part of the internal assessment.

UNIT V: THINKING SKILL **12**

Topics: Practice in preparing thinking blocks to decode pictorial representations into English words, expressions, idioms and proverbs – Eliciting the knowledge of English using thinking blocks -- Picture rereading -- Finding meaning in the meaningless – Interpreting landscapes, simple modern art and verbal and non-verbal communication.

TOTAL: 60

REFERENCE BOOKS

1. Ibbotson, Mark. *Cambridge English for Engineering*. New Delhi: Cambridge University Press, 2009.
2. Smith-Worthington Jefferson. *Technical Writing for Success.* New Delhi. Cengage Learning, 2007.

Websites for learning English

1. British: Learn English – British Council (Business English) - <http://learnenglish.britishcouncil.org/>
2. BBC Learning English (General and Business English) - <http://www.bbc.co.uk/worldservice/learningenglish/>
3. Intercultural: English Listening Lesson Library Online <http://www.elllo.org/>

CS2231	OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY	L T P C 0 0 3 1
Goal	To practice the concepts learned in the subject "CS2201 Object Oriented Programming and C++".	

Objectives	Outcome
The course should enable the students to 1. Have a practical exposures in Object Oriented Programming (OOP). 2. Gain knowledge in object oriented concepts. 3. Work practically on day to day problems and to solve them using C++	The students will be able to 1. Write programs in C++ and be familiar in the OOP concepts. 2. Write programs with objects, class, inheritance, polymorphism, data abstraction, encapsulation, dynamic binding and message passing concepts. 3. Give solutions to real time problems using C++.

LIST OF EXPERIMENTS

Implementation of OOP Concepts

1. Programs using Constructor and Destructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs using function overloading and operator overloading.
5. Programs using inheritance.
6. Program using friend functions.
7. Program using virtual function.
8. Write a program using exception handling mechanism.
9. Programs using files.
10. Programs using function templates.

Program Development based on Understanding

11. Write a C++ program to create a database of personnel information system containing following information. Name, birth- date, blood group, weight, height, policy number, telephone no., driving license. Design base class with name, Date of Birth, blood group, and another class consist of height and weight. Design another base class consisting of policy number and address. Design a derived class using the base classes to store information such as telephone number and driving license number. Also provide facilities for Insertion, Deletion and modification.
12. Create a message class with a constructor that takes a single string with a default value. Create a private member string and in the constructor assign the argument string to the internal string. Create two overloaded member functions called Print(): one that takes no argument and one that takes string argument.
13. Define two classes to store distance. One of the classes should store distance in centimeters and meters and other should store distance in feet's and inches. Read two

distances, one for each class and compute sum or difference between them as per the user's choice. Display answer in the unit provided by user. Use friend function, function overloading, default values, constructors etc

14. Write C++ program for the following.

    A bag consists of zero or more objects of the same type. Each object can be described by its color and weight. Design C++ program to create a new object. This can be done in two ways. If the user provides information about color and/or weight of the object to be created then this information will be used to create the object otherwise the object will be created using default values for these attribute(s). Provide a facility to keep track of total number of objects and total weight of objects in the bag at a given time. Also provide facility to delete an object from a bag. Use static variable and functions.

15. Write a C++ program to perform String operations

    i.= Equality

    ii.== String Copy

    iii.+ Concatenation

    iv.<< To display a string

    v.>> To reverse a string

    *vi.*Function to determine whether a string is a palindrome

    *vii.*To find occurrence of a sub-string. Use Operator Overloading.

16. Write C++ program using three classes as

b. Student's personal information (name, address, phone, birth date etc)

c. Student's academic information (X^{th}, XII^{th} and Graduation)

d. Student's other information (project done, seminar, hobbies, sports record etc)

Use multiple inheritance and print bio-data of a particular student

17. Create a simple "shape" hierarchy. A base class called shape and derived classes called circle, square and triangle. In the base class write a virtual function "draw" and override this in derived classes.

18. Consider a bookshop that sells both books and tapes. Book is having title and number of pages and cost. Tape has time and cost. Using virtual functions, print the required information about book or tape. Use files to store information.

19. Write a C++ program to perform matrix operation using Templates.

SEMESTER III

MA1214	PROBABILITY AND STATISTICS	L T P C 3 1 0 4
Goal	To create the awareness and comprehensive knowledge in probability and queuing theory	

Objectives	Outcome
The course should enable the students to 1. Learn basics of probability, Baye's theorem. Understands the concept of random variable, moment generating function and their properties. 2. Learn standard distributions in discrete and continuous cases. 3. Learn two dimensional random variable and its characteristics. Understands correlation and regression and the uses of central limit theorem. 4. Learn statistical intervals for a single sample, and tests of hypotheses for a single sample. 5. Learns ANOVA for one way and two way classifications.	The students should be able to 1. Evaluates the probability using addition and multiplication theorem. Applies Baye's for practical problems to find the probability. Verifies whether a given function is a probability mass or density function. 2. Applies the discrete and continuous distributions for solving practical problems. Evaluates the moments of the distributions using moment generating function. 3. Evaluates the probability using marginal and conditional distributions. Analyzes the correlation between two variables. Finds the regression equations for the given set of data and their degree of relationship. Applies central limit theorem for practical problems and evaluates the probability of an event. 4. Construct confidence intervals on parameters for a single sample. 5. Able to identify the appropriate hypothesis testing procedure based on type of outcome variable and number of samples.

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Axioms of Probability – Conditional Probability – Total Probability – Baye's Theorem – Random variable – Probability mass function – Probability Density functions – Properties – Moments – Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 12

Binomial, Poisson , Geometric, Negative binomial, Uniform, Exponential, Gamma, Weibull and normal distributions and their properties – Functions of Random Variables.

UNIT III TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distribution – Marginal and conditional distribution - Co-variance – Correlation and Regression – Transformation of Random Variables – Central Limit Theorem.

UNIT IV TESTING OF HYPOTHESIS 12

Sampling distributions – Testing of Hypothesis for mean, Variance, Proportions and differences using normal, t, Chi-square and F distribution – Tests for Independence of attributes and goodness of fit.

UNIT V DESIGNS OF EXPERIMENTS 12

Analysis of variance - one way classification - CRD – Two way classification - RBD – Latin square.

TOTAL: 60

TEXT BOOKS

1. Kandasamy, "Probability and Statistics", S. Chand & Co, Latest Edition
2. Sivaramakrishna Dass, "Probability and Statistics, Viji Academy, Latest Edition.

REFERENCE BOOKS

1. M.B.K. Murthy, "Probability and Statistics", V.R.B. Publishers, Latest Edition.
2. T. Veerarajan "Probability and Statistics", Tata McGraw Hill, Latest Edition.

CS2301	DATA STRUCTURES	L T P C 4 0 0 4
Goal	To provide an in-depth knowledge in problem solving techniques and data structures.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Acquire knowledge on several data structures like stacks, queues, linked list, trees and graph. 2. Have better insight into linear and nonlinear data structures. 3. Learn various sorting and searching techniques. 4. Exercise the applications of data structures. 5. Have a good understanding of problem solving using data structure tools and techniques.	The student should be able to 1. Demonstrate the knowledge in problem solving techniques. 2. Write programs for different data structures. 3. Implement different applications using tree structures. 4. Implement various sorting techniques. 5. Apply and implement learned algorithm design techniques and data structures to solve problems using Graphs.

UNIT I ARRAYS AND STACKS 12

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off.

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices, and Vectors.

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

UNIT II QUEUES AND LINKED LIST 12

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue.

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

UNIT III TREES AND HASHING 12

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman algorithm.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

UNIT IV SORTING BINARY SEARCH TREES 12

Sorting: Insertion Sort, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

UNIT V GRAPHS AND FILES 12

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

TOTAL: 60

TEXT BOOKS

1. Ellis Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 2006.
2. Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C and C++", Pearson Education, 2nd Edition, 1995.

REFERENCE BOOKS

1. M. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2006, 3rd Eedition.
2. Michael Berman, "Data Structures via C++", Oxford University Press, 2002.
3. S. Lipschutz, "Data Structures", McGraw Hill, 1986.
4. Jean-Paul Tremblay, Paul. G. Soresan, "An Introduction to Data Structures with Applications", Mc-Graw Hill, 2nd edition 1984.
5. ISRD Group, "Data Structures through C++", McGraw Hill, 2011.

CS2302	JAVA PROGRAMMING	L T P C 3 0 0 3
Goal	To provide an in-depth knowledge in JAVA programming.	

Objectives	Outcomes
The course should enable the students 1. To understand the basic and advanced concepts in Java 2. To gain knowledge in the concepts of Methods, Packages and Applets 3. To build a sample applications using Java technologies	The student should be able to 1. implement the various object-oriented features 2. implement various Java concepts 3. create classes, Inheritances and Packages 4. write programs using Applets 5. develop Real world applications

UNIT I INTRODUCTION 9

Object-Oriented Languages, Java's History, Creation of Java, Importance of Java for the Internet, Java's Magic : Byte-code, Its Features, Object-Oriented Programming in Java. Java Program Structure and Java's Class Library, Data Types, Variables and Operators, Operator Precedence. Selection Statements, Scope of Variable, Iterative Statement. Defining Classes & Methods, Constructors, Creating Objects of a Class, Assigning object Reference Variables, Variable this, Defining and Using a Class, Automatic Garbage Collection.

Arrays and Strings : Arrays, Arrays of Characters, String Handling Using String Class, Operations on String Handling Using, String Buffer Class.

UNIT II INHERITANCE AND PACKAGES 9

Extending Classes and Inheritance : Using Existing Classes, Class Inheritance, Choosing Base Class, Access Attributes, Polymorphism, Multiple Levels of inheritance, Abstraction through Abstract Classes, Using Final Modifier, The Universal Super-class Object Class.

Package & Interfaces : Understanding Packages, Defining a package, Packaging up Your Classes, Adding Classes from a package to Your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface.

UNIT III EXCEPTION HANDLING AND MULTITHREADING 9

Exception Handling : The concept of Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining Your Own Exceptions.

Multithreading Programming : The Java Thread Model, Understanding Threads, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Deadlocks Interthread communication, Deadlocks.

UNIT IV FILES AND APPLETS 9

Input/Output in Java : I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

Creating Applets in Java : Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, Requesting Repainting, Using The Status Window, The HTML APPLET Tag Passing Parameters to Applets.

UNIT V WORKING WITH WINDOWS AND GRAPHICS 9

Working with Windows : AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in an Applet, Displaying Information Within a Window.

Working with Graphics and Texts : Working with Graphics, Working with Color, Setting the Paint Mode, Working with Fonts, Managing Text Output Using Font Metrics, Exploring Text and Graphics.

TOTAL: 45

TEXT BOOKS

1. Cay S. Horstman and Gary Cornell, "Core Java Volume I—Fundamentals", 9th Ed (Core Series), Prentice Hall, 2012
2. Herbert Schildt, "Java 2: The Complete Reference", 5th Ed, Tata McGraw Hill, 2002.

REFERENCE BOOKS

1. Cay Horstman, "Big Java", 2nd Ed., Wiley Publications, 2005.
2. Ken Arnold, James Gosling, and David Holmes, "The Java Programming Language", 4th edition, Addison-Wesley, 2005.

CS2303	DATABASE MANAGEMENT SYSTEMS	L T P C 3 0 0 3
Goal	To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.	

Objectives	Outcomes
The course should enable the student 1. To make a study of SQL and relational database design. 2. To understand the internal storage structures using different file and indexing techniques which will help in physical DB design. 3. To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure. 4. To have an introductory knowledge about the emerging trends in the area of distributed DB- OODB- Data mining and Data Warehousing. 5. To learn the basics of query evaluation and optimization techniques.	The Student should be able to 1. Master the basic concepts and appreciate the applications of database systems. 2. Master the basics of SQL and construct queries using SQL. 3. Be familiar with a commercial relational database system (Oracle) by writing SQL using the system. 4. Be familiar with the relational database theory, and be able to write relational algebra expressions for queries. 5. Master in design principles for logical design of databases, including the ER method and normalization approach.

UNIT I INTRODUCTION AND CONCEPTUAL MODELING **9**

Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT II RELATIONAL MODEL **9**

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependencies and Normalization for Relational Databases (up to BCNF).

UNIT III DATA STORAGE AND QUERY PROCESSING **9**

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

UNIT IV TRANSACTION MANAGEMENT **9**

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT V CURRENT TRENDS **9**

Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

TOTAL: 45

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- "Database System Concepts", Sixth Edition, McGraw-Hill, 2010.

REFERENCE BOOKS

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", Fifth Edition, Pearson Education, 2007.
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
3. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000.
4. Peter Rob and Corlos Coronel- "Database System, Design, Implementation and Management", Thompson Learning Course Technology- Fifth edition, 2003.

EC2302	DIGITAL SYSTEMS	L T P C 4 0 0 4
Goal	To learn the fundamental concepts used in the design of digital systems.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Introduce number systems, codes, basic postulates of Boolean algebra and shows the correlation between Boolean expressions. 2. Introduce the methods for simplifying Boolean expressions 3. Outline the formal procedures for the analysis and design of combinational circuits. 4. Introduce several structural and behavioral models for synchronous sequential circuits. 5. Introduce the concept of memories and programmable logic devices.	The student should be able to 1. Reduce complex logical expressions using various postulates of Boolean algebra. 2. Have understood different graphical methods for the simplification of complex logical expressions. 3. Design the methodology for combinational logic circuits. 4. Design sequential circuits. 5. Have understood the structure of various semiconductor storage devices

UNIT I NUMBER SYSTEMS AND BOOLEAN SWITCHING ALGEBRA 12

Introduction to Number Systems – Positional Number Systems, Number System conversion, Binary codes –Binary arithmetic, Binary logic functions – Switching algebra – Functionally complete operation sets, Reduction of switching equations using Boolean algebra, Realization of switching function. DeMorgan's Theorem.

UNIT II COMBINATIONAL LOGIC CIRCUIT DESIGN 12

Logic Gates, Minimal two level networks – Minimization of POS and SOP – Design of two level gate networks – Two level NAND-NAND and NOR-NOR networks – Karnaugh maps – Advantages and Limitations – Quine McClusky's method.

UNIT III ARITHMETIC AND STANDARD COMBINATIONAL MODULE 12

Adders – Subtractors – Binary parallel adders, Parallel subtractors, Parallel adder/subtractors, Binary decoders and encoders – Priority encoders – Multiplexers – MUX as universal combinational modules – Demultiplexers- Introduction to Hardware Description Language (HDL[Arithmetic, Multiplexer. Demultiplexer Module Only])

UNIT IV SEQUENTIAL CIRCUIT 12

Flip flops – SR, JK, D and T flip flops, Master – Slave flip flops, Characteristic and excitation table – Shift registers – Counters – Synchronous and Asynchronous counters – Modulus counters, Up/Down counters – State diagram, State table, State minimization, Implication chart method.

UNIT V MEMORIES AND PROGRAMMABLE LOGIC DEVICES 12

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays (FPGA).

TOTAL:60

TEXT BOOK

1. Morris Mano, "Digital design", 3 rd Edition, Prentice Hall of India, 2008.

REFERENCE BOOKS

1. Milos Ercegovac, Jomas Lang, "Introduction to Digital Systems", Wiley publications, 1998.
2. John M. Yarbrough, "Digital logic: Applications and Design", Thomas – Vikas Publishing House, 2002.
3. R.P.Jain, "Modern digital Electronics",4th Edition, TMH, 2010.
4. William H. Gothmann, "Digital Electronics", Prentice Hall, 2001.

CS2331	DATA STRUCTURES LABORATORY	L T P C 0 0 3 1
Goal	To learn the principles of good programming practice and to have a practical training in writing efficient programs in C++	

Objectives	Outcomes
The course should enable the student to 1. Implement the various data structures as Abstract Data Types (ADT) 2. Write programs to solve problems using the ADTs 3. Efficiently implement the different data structures.	The student should be able to 1. Have gained knowledge in problem solving techniques. 2. Be capable of writing programs using list, stack and queue. 3. Have obtained confidence in storing data in tree and other related data structures. 4. Have grasped knowledge in various sorting techniques. 5. Have learnt the concepts in graph and its traversal algorithms.

LIST OF EXPERIMENTS (Using C++)

1. Code the following list ADT operations using array, single linked list, double linked list.

a. void is_emptyList(List 1)	b. List makeNullList(size n)
c. Position firstPost(List 1)	d. Position endPost(List 1)
e. Position nextPost(List 1, Position p)	f. Position prevPos(List 1, position p)
g. Position find)List 1, Element x)	h. Position findKth(List 1, int k)
i. void insert(List 1, Position p)	j. void delete(List 1, Position p)
k. void append(List 1, Element x)	l. int cmp(List 1, Position p1, Position p2)
m. int cmp2(List11, List12, Position p1, Position p2)	n. void swap(List 1, Position p1, Position p2)
o. Element retrieveElement(List 1, Position p)	p. void print element(List 1, Position p)

2. Using the above List ADT operations, Write a menu driven program to support following higher level list operations:
    a. Create null list
    b. Read a list of elements into the list.
    c. Insert an element in the Kth position of the list
    d. Delete an element in the Kth position of the list
    e. Delete a given element from the list
    f. Find whether given element is present in the list
    g. Display the elements of the list

3. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list.
4. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.
5. Implement stack ADT and write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Extend the program to handle parenthesized expression also.
6. Implement Queue ADT and write a program that performs Radix sort on a given set of elements.
7. Implement the following sorting operations:-

   (a) Shell Sort (b) Heap Sort (c) Merge Sort (d) Quick Sort
8. Implement Binary Tree ADT and write a program that reads postfix Arithmetic expression form, builds the expression tree and performs tree Traversal on it.
9. Implement Binary search Tree ADT and write a program that interactively allows

   (a) Insertion (b) Deletion (c) Find_min (d) Find_max (e) Find operations
10. Implement AVL Tree ADT and Write a program that interactively allows

    (a) Insertion (b) Deletion (c) Find_min (d) Find_max

CS3331	JAVA PROGRAMMING LABORATORY	L T P C 0 0 3 1
Aim	To learn write and execute programs in JAVA	

OBJECTIVES	OUTCOMES
To enable the learners to have a practical exposures in JAVA.	The learners will be able to write programs in JAVA and familiar the JAVA concepts.

LIST OF EXPERIMENTS

1. Write a Program to find the area of a rectangle.
2. Write a program to find the result of following expressions (Let a=10, b=5)
   i) (a << 2) + (b >>2) ii) (a) || (b>0) iii) (a + b * 100) /10 iv) a & b
3. Write a program to print the individual digits of a 3-digit number.
4. Write a program that asks the user to enter two integers, obtains the numbers from the user, and then prints the larger number followed by the words "is larger." If the numbers are equal, print the message “These numbers are equal.”
5. Write a program that reads an integer and determines and prints whether it is odd or even.
6. Write a program to find the biggest number between the given three integer numbers.
7. Write a program to find the sum of the digits of a given number.
8. Write a program to find the first 15 terms of the Fibonacci sequence.
9. Write a program to read N numbers and find the largest and smallest numbers.
10. Write a program for the multiplication of two matrices.
11. Write a program that accepts a shopping list of four items from the command line and stores them in a vector. Write a Menu based Program to perform the following operations using vector
    a) To add an item at a specific location in the list.
    b) To delete an item in the list.
    c) To print the contents of the vector.
    d) To delete all elements
    e) To add an item at the end of the vector.
12. Write a program to create a String object. Initialize this object with your name. Find the length of your name using the appropriate String method. Find whether the character ‘a’ is in your name or not; if yes find the number of times ‘a’ appears in your name. Print locations of occurrences of ‘a’.
13. Write a program to create a StringBuffer object and illustrate how to append characters. Display the capacity and length of the string buffer.
14. Write a program to create a StringBuffer object and illustrate how to insert characters at the beginning.
15. Write a program to create a StringBuffer object and illustrate the operations of the append() and reverse() methods.
16. Write a program to display total marks of 5 students using student class. Given the following attributes: Regno(int), Name(string), Marks in subjects(Integer Array), Total (int).
17. Write a program in Java with class Rectangle with the data fields width, length, area and colour. The length, width and area are of double type and colour is of string type. The methods are get_length(), get_width(), get_colour() and find_area().

Create two objects of Rectangle and compare their area and colour. If the area and colour both are the same for the objects then display " Matching Rectangles", otherwise display " Non-matching Rectangle".

18. Create a class to represent complex numbers. A complex number has the form real part + i * imaginary part. Provide constructor to enable an object of this class to be initialized when it is declared. Provide a no-argument constructor with default value in case no initializes are provided. Provide public methods for the following:
    a) Addition of two complex numbers
    b) Subtraction of two complex numbers
    c) Printing complex numbers in the form (a,b) where a is the real part and b is the imaginary part.

    (Pass objects as arguments)
19. Write a program to create a player class. Inherit the classes Cricket_player, Football_player and Hockey_player form player class.
20. Write a program to show how a class implements two interfaces.
21. Show through a program that fields in an interface are implicitly static and final and methods are automatically public.
22. Write a program to create a package for Book details giving Book Name, Author Name, Price, year of publishing.
23. A color can be created by specifying the red, green, blue values as integer parameters to the constructor of class Color. The values range from 0 to 255. Provide three horizontal scroll bars and ask the user to select the values of the colors by dragging the thumb in the scroll bar. Using the color selected, draw a rectangle.
24. Create an applet for simple calculator to perform Addition, Subtraction,
25. Multiplication and Division using Button, label and Text field classes.
26. Draw a bar chart for the following details using Applets.

Subject	Tamil	English	Maths	Physics
Marks	75	85	98	56

27. Write a Java program to catch more than two exceptions.
28. Write a Java program to create your own exception subclass that throws exception if the sum of two integers is greater than 99.
29. Write a Java program for generating two threads, one for printing even umbers and other for printing odd numbers.
30. Write a Java program for producer and consumer problem using Thread.

CS2333	DATABASE MANAGEMENT SYSTEMS LABORATORY	L T P C 0 0 3 1
Goal	To provide practice in SQL and application development with an RDBMS.	

OBJECTIVES	OUTCOMES
To enable the learners to have a practical exposures database applications.	The learners will be able to write applications using Oracle/SQL Server and SQL.

LIST OF EXPERIMENTS

1. To study Basic SQL commands (create database, create table, use , drop, insert) and execute the following queries using these commands:
    - Create a database named ‘ Employee’.
    - Use the database ‘Employee’ and create a table ‘Emp’ with attributes ‘ename’,’ecity’,’salary’,’enumber’,’eaddress’,’depttname’.
    - Create another table ‘Company’ with attributes ‘cname’, ccity’,’empnumber’ in the database ‘Employee’.
2. To study the viewing commands (select , update) and execute the following queries using these commands:
    - Find the names of all employees who live in Delhi.
    - Increase the salary of all employees by Rs. 5,000.
    - Find the company names where the number of employees is greater than 10,000.
    - Change the Company City to Gurgaon where the Company name is ‘TCS’.
3. To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:
    - Add an attribute named ‘ Designation’ to the table ‘Emp’.
    - Modify the table ‘Emp’, Change the datatype of ‘salary’ attribute to float.
    - Drop the attribute ‘depttname’ from the table ‘emp’.
    - Delete the entries from the table ‘ Company’ where the number of employees are less than 500.
4. To study the commands that involve compound conditions (and, or, in , not in, between , not between , like , not like) and execute the following queries using these commands:
    - Find the names of all employees who live in ‘ Gurgaon’ and whose salary is between Rs. 20,000 and Rs. 30,000.
    - Find the names of all employees whose names begin with either letter ‘A’ or ‘B’.
    - Find the company names where the company city is ‘Delhi’ and the number of employees is not between 5000 and 10,000.
    - Find the names of all companies that do not end with letter ‘A’.
5. To study the aggregate functions (sum, count, max, min, average) and execute the following queries using these commands:
    - Find the sum and average of salaries of all employees in computer science department.

- Find the number of all employees who live in Delhi.
- Find the maximum and the minimum salary in the HR department.

6. To study the grouping commands (group by, order by) and execute the following queries using these commands:
    - List all employee names in descending order.
    - Find number of employees in each department where number of employees is greater than 5.
    - List all the department names where average salary of a department is Rs.10,000.
7. To study the commands involving data constraints and execute the following queries using these commands:
    - Alter table 'Emp' and make 'enumber' as the primary key.
    - Alter table 'Company' and add the foreign key constraint.
    - Add a check constraint in the table 'Emp' such that salary has the value between 0 and Rs.1,00,000.
    - Alter table 'Company' and add unique constraint to column cname.
    - Add a default constraint to column ccity of table company with the value 'Delhi'.
8. To study the commands for aliasing and renaming and execute the following queries using these commands:
    - Rename the name of database to 'Employee1'.
    - Rename the name of table 'Emp' to 'Emp1'.
    - Change the name of the attribute 'ename' to 'empname'.
9. To study the commands for joins (cross join, inner join, outer join) and execute the following queries using these commands:
    - Retrieve the complete record of an employee and its company from both the table using joins.
    - List all the employees working in the company 'TCS'.
10. To study the various set operations and execute the following queries using these commands:
    - List the enumber of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
    - List the enumber of all employees who live in Delhi but whose company is not in Gurgaon.
11. To study the various scalar functions and string functions (power, square, substring, reverse, upper, lower, concatenation) and execute the following queries using these commands:
    - Reverse the names of all employees.
    - Change the names of company cities to uppercase.
    - Concatenate name and city of the employee.
12. To study the commands for views and execute the following queries using these commands:
    - Create a view having ename and ecity.
    - In the above view change the ecity to 'Delhi' where ename is 'John'.
    - Create a view having attributes from both the tables.
    - Update the above view and increase the salary of all employees of IT department by Rs.1000.

13. To study the commands involving indexes and execute the following queries:
    - Create an index with attribute ename on the table employee.
    - Create a composite index with attributes cname and ccity on table company.
    - Drop all indexes created on table company.
14. To study the conditional controls and case statement in PL-SQL and execute the following queries:
    - Calculate the average salary from table 'Emp' and print increase the salary if the average salary is less that 10,000.
    - Print the deptno from the employee table using the case statement if the deptname is 'Technical' then deptno is 1, if the deptname is 'HR' then the deptno is 2 else deptno is 3.
15. To study procedures and triggers in PL-SQL and execute the following queries:
    - Create a procedure on table employee to display the details of employee to display the details of employees by providing them value of salaries during execution.
    - Create a trigger on table company for deletion where the whole table is displayed when delete operation is performed.
16. Consider the insurance database given below. The primary keys are made bold and the data types are specified.

    PERSON(driver_id:string , name:string , address:string)

    CAR(regno:string , model:string , year:int)

    ACCIDENT(report_number:int , accd_date:date , location:string)

    OWNS(driver_id:string , regno:string)

    PARTICIPATED(driver_id:string , regno:string , report_number:int , damage_amount:int)

    a. Create the above tables by properly specifying the primary keys and foreign keys.
    b. Enter at least five tuples for each relation.
    c. Demonstrate how you
        - Update the damage amount for the car with specific regno in the accident with report number 12 to 25000.
        - Add a new accident to the database.
    d. Find the total number of people who owned cars that were involved in accidents in the year 2008.
    e. Find the number of accidents in which cars belonging to a specific model were involved.

17. Consider the following relations for a order processing database application in a company.

    CUSTOMER(custno:int , cname:string , city:string)

    ORDER(orderno:int , odate:date , custno:int , ord_amt:int)

    ORDER_ITEM(orderno:int , itemno:int , quantity:int)

    ITEM(itemno:int , unitprice:int)

    SHIPMENT(orderno:int , warehouseno:int , ship_date:date)

    WAREHOUSE(warehouseno:int , city:string)

    a. Create the above tables by properly specifying the primary keys and foreign keys.
    b. Enter at least five tuples for each relation.

c. Produce a listing: custname , No_of_orders , Avg_order_amount , where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.

d. List the orderno for orders that were shipped from all the warehouses that the company has in a specific city.

e. Demonstrate the deletion of an item from the ITEM table and demonstrate a method of handling the rows in the ORDER_ITEM table that contains this particular item.

18. Consider the following database of student enrollment in courses and books adopted for that course.

STUDENT(regno:string , name:string , major:string , bdate:date)

COURSE(courseno:int , cname:string , dept:string)

ENROLL(regno:string , courseno:int , sem:int , marks:int)

BOOK_ADOPTION(courseno:int , sem:int , book_isbn:int)

TEXT(book_isbn:int , book_title:string , publisher:string , author:string)

a. Create the above tables by properly specifying the primary keys and foreign keys.

b. Enter atleast five tuples for each relation.

c. Demonstrate how you add a new text book to the database and make this book to be adopted by some department.

d. Produce a list of text books (includes courseno , book_isbn , book_title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.

e. List any department that has all its books published by a specific publisher.

19. The following are maintained by a book dealer.

AUTHOR(author_id:int , name:string , city:string , country:string)

PUBLISHER(publisher_id:int , name:string , city:string , country:string)

CATALOG(book_id:int , title:string , author_id:int , publisher_id:int , category_id:int , year:int , price:int)

CATEGORY(category_id:int , description:string)

ORDER_DETAILS(order_no:int , book_id:int , quantity:int)

a. Create the above tables by properly specifying the primary keys and foreign keys.

b. Enter at least five tuples for each relation.

c. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.

d. Find the author of the book that has maximum sales.

e. Demonstrate how you increase the price of books published by a specific publisher by 10%.

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EL2431	COMMUNICATION SKILLS & PERSONALITY DEVELOPMENT	L T P C 2 0 2 3
Goal	The goal of the programme is to provide the learners with the methods and materials required for becoming accomplished personalities through the medium of English.	

OBJECTIVES	OUTCOMES
The course should enable the students to:	The students should be able to:
1. Be aware of self-knowledge by exposure to soft skills, values, behaviour, attitudes, temperamental changes, and a positive attitude to life.	1. Apply the knowledge gained to improve upon their values, behaviour, attitude, and develop the soft skills required for home, workplace and the society.
2. Learn personality traits and undergo personality tests to determine their own personality characteristics and the scope for improvement.	2. Employ the concept of personality traits and build up an accomplished personality that would be pleasing to people around so as to influence them positively.
3. Cultivate the art of speaking fluently making use of proper gestures, tone and voice modulation, adding humour to the speech.	3. Develop a personal style and communicate fearlessly and effectively in a convincing manner so as to impress listeners or the audience.
4. Figure out the need to work in teams, adorn or accept team leadership, and make use of body language to enhance team spirit.	4. Participate in presentations, group discussions, debates and mock interviews making good use of language skills and interpersonal relationships.
5. Be familiar with the art of managing self, people, work and time, keeping in mind problems like time-wasters and stress-builders.	5. Comprehend stress-management tips to overcome stress-prone habits and develop a career plan with personal, familial and societal goals for success.

UNIT I VALUES AND ATTITUDES 12

Values and attitudes – Value-formation – Values & education – Terminal & Instrumental values – Civic responsibilities – The power of Personal/ Cultural/ Social valves -- Behaviour and attitudes -- Features of attitudes – Developing positive attitude – Overcoming negative attitude -- People skills – Soft skills as per the Work Force Profile – The four temperaments – Sanguine – Choleric – Melancholic – Phlegmatic -- Tests for Personal Chemistry.

UNIT II PERSONALITY DEVELOPMENT 12

What is personality development? – Types of personalities as per (i) Heredity (ii) Environment (iii) Situation – the 16 personality factors – MBTI Tests – Personality types – Increasing self awareness: Assessing one's locus of control, Machiavellianism, self-esteem, self-monitoring, risk-taking, Type A, Type B personality elements – Intellectual and physical abilities for jobs -- Personality tests.

UNIT III ART OF SPEAKING 12

Developing the art of speaking – How to get rid of stage fright? – Enhancing fluency – Modulating voice – Enunciation – Positive and negative gestures – Preparation – How to begin? – How to convince the listeners? – How to wind up the speech? – Adding humour and illustration – Developing one's own style – Types of style – How to influence the audience? – How to become an effective speaker? -- Tests for effective speaking.

UNIT IV TEAM 12

Team work – Team building – Team leadership -- How to face an interview? -- How to participate in a group discussion? – How to argue for or against in a debate? – Body language – non-verbal communication – personal appearance – facial expression – posture – gestures – eye contact – Etiquette – Voluntary and involuntary body language –Gender implications -- Tests.

UNIT V TIME AND STRESS MANAGEMENT 12

Managing self, people, work, situations – Time-management – Secrets of time-management – Time-wasters – Stress -- Kinds of stress – Spotting stress – Stress-builders – Stress - management tips – Stress-prone habits -- Goals – Career planning – Interpersonal interaction – Interpersonal relationships -- Tests.

TOTAL: 60

NOTE:

Study material will be prepared by the Department of Languages.

Tests suggested will be prepared by a senior faculty of the department.

Movies will be screened to discuss and debate on the topics introduced in each unit.

MA1204	NUMERICAL METHODS	L T P C 3 1 0 4
Goal	To create the awareness and comprehensive knowledge in numerical solutions.	

OBJECTIVES	OUTCOMES
The course should enable the students to: 1. Learn the techniques of solving the algebraic and transcendental equations. 2. Learn to interpolate using Newton's forward and backward difference formulae for equal and unequal intervals 3. Understand the use of numerical differentiation and understands to find the approximate area using numerical integration. 4. Understand solving numerically the initial value problems for ordinary differential equations using single step and multi step method. 5. Learn the methods of solving second order partial differential equations numerically and use it to solve initial and boundary value problems for partial differential equations.	The students should be able to: 1. Find out the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations by direct and indirect methods. 2. Solve problems where huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values. 3. Use the numerical differentiation and integration when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information. 4. Solve engineering problems which are characterized in the form of nonlinear ordinary differential equations, since many physical laws are couched in terms of rate of change of oneindependent variable 5. Solve the initial and boundary value problems related heat flow, both one and two dimensional and vibration problems. Understands the numerical techniques of solving the partial differential equation in engineering applications.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 12

Linear interpolation methods (method of false position) – Newton's method – Statement of Fixed Point Theorem – Fixed pointer iteration x=g(x) method – Solution of linear system of Gaussian elimination and Gauss-Jordan methods – Iterative methods: Gauss Jacobi and Gauss – Seidel methods- Inverse of a matrix by Gauss-Jordan method. Eigen value of a matrix by power methods.

UNIT II INTERPOLATION AND APPROXIMATION 12

Lagrangian Polynomials – Divided difference – Interpolation with a cubic spline – Newton forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Derivatives from difference table – Divided difference and finite difference – Numerical integration by Trapezoidal and Simpson's 1/3 and 3/1 rules – Romberg's method – Two and three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step Methods : Taylor Series and methods - Euler and Modified Euler methods - Fourth order Runge-Kutta method for solving first and second order equations - Multistep methods – Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS 12

Finite difference solution for the second order ordinary differential equations. Finite difference solution for one dimensional heat equation by implict and explict methods – one dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL: 60

TEXT BOOKS

1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill, 1999.

REFERENCE BOOKS

1. Kandasamy, P.Thilakavthy, K, Gunavathy, K, "Numerical Methods", S.Chand & Co., 1999
2. Burden, R.L and Faries, T.D., "Numerical Analysis", 7th Ed., Thomson Pub., 2002.
3. Venkatraman M.K, "Numerical Methods" National Pub. Company, Chennai, 1991.
4. Sankara Rao K., "Numerical Methods for Scientists and Engineers", 2nd Ed, Prentice Hall, 2004.

CS2401	OPERATING SYSTEMS	L T P C 3 0 0 3
Goal	This course emphasizes on the major functions of operating system such as process management, memory management, I/O management and file systems management	

Objectives	Outcomes
The course should enable the student to 1. Learn the structure of operating systems. 2. Know the components of an operating system. 3. Understand process management part of operating system. 4. Learn how storage management is done by the operating system. 5. Learn the concepts of I/O management and File systems management.	The student should be able to 1. Have understood the basic functions of operating systems. 2. Implement the process scheduling algorithms. 3. Have understood the concepts of deadlocks. 4. Apply the concepts of virtual memory and file system in operating system design. 5. Posses the knowledge of File system implementation and disk I/O techniques.

UNIT I INTRODUCTION **9**

Introduction – Computer System Organization - Computer System Architecture - Computer System Structure - Operating System Operations - Process Management – Memory Management - Storage Management – Protection Security – Distributed Systems - Operating System Services – User Operating System Interface – System Calls – Types of System calls – System Programs - Process Concept – Process Scheduling – Operations on Processes - Inter-process Communication – Examples of IPC Systems.

UNIT II SCHEDULING **9**

Threads – Overview – Multithreading Models - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Thread Scheduling - Multiple-Processor Scheduling - The Critical-Section Problem - Peterson's Solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors.

UNIT III DEADLOCKS **9**

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Structure of Page table - Segmentation.

UNIT IV PAGING AND FILE SYSTEM **9**

Virtual Memory – Demand Paging – Copy-on Write – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory and Disk Structure – File System Mounting – File Sharing – Protection**.**

UNIT V FILE MANAGEMENT **9**

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management - Disk Structure – Disk Attachment - Disk Scheduling – Disk Management – Swap-Space Management – RAID Structure

TOTAL : 45

TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Eighth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2009.

REFERENCE BOOKS

1. Harvey M. Deitel, "Operating Systems", Second Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 2003.
3. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.
4. Pramod Chandra P. Bhatt – "An Introduction to Operating Systems, Concepts and Practice", Prentice Hall of India, 2003.

CS3401	COMPUTER ARCHITECTURE	L T P C 4 0 0 4
Goal	To discuss the basic structure of a digital computer and to study in detail the organization of the Control unit, the Arithmetic and Logical unit, the Memory unit and the I/O unit.	

OBJECTIVES	OUTCOMES
The course should enable the student to	The Student should be able to
1. Understand the basic structure and operation of a digital computer. 2. Learn the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division. 3. Study in detail the different types of control and the concept of pipelining. 4. Study the hierarchical memory system including cache memories and virtual memory. 5. Study the different ways of communicating with I/O devices and standard I/O interfaces.	1. Understand the basic operations and performance of a computer 2. Have obtained the knowledge about the technique of doing the arithmetic operations in the computer. 3. Have gained the knowledge about the different types of control units and pipelining technique. 4. Have learnt the concept of memory and I/O Devices

UNIT I BASIC STRUCTURE OF COMPUTERS **12**

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT II ARITHMETIC UNIT **12**

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

UNITIII BASIC PROCESSING UNIT **12**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Microprogrammed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNITIV MEMORY SYSTEM & I/O ORGANIZATION **12**

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage. Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

UNIT V ADVANCED ARCHITECTURES

Multithreading – Types of multithreading – Blade server architecture –Why server blades? Challenges? Future for blades – New IT infrastructure – Virtual Machine architecture – Definitions, Techniques – List of hardware with virtual machine support – List of virtual machine software – Parallel computing – Types of parallelism – Hardware – Software - Algorithmic methods.

TOTAL: 60

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, 2002.

REFERENCE BOOKS

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003.
2. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 2nd Edition, Morgan Kaufmann, 2002.
3. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998.

CS3402	COMPUTER NETWORKS	L T P C 3 0 0 3
Goal	To introduce the concepts, terminologies and technologies used in modern data communication and computer networks.	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Understand the concepts of data communications. 2. Study the functions of the data link layer and to introduce IEEE standards employed in computer networking. 3. Learn the functions of the network layer and to get familiarized with the different protocols involved. 4. Learn the functions of the transport layer and to get familiarized with the different protocols involved. 5. Understand multiplexing , Domain name space and protocols.	The Student should be able to **1.** Be familiar with various components and categories of data communications, types of connections, topologies, protocols and standards, various transmission media and modems. **2.** Detect and correct the errors using various algorithmic techniques, be aware of the various Ethernet standards and bridges. **3.** Have an understanding about the internetworks, various switching approaches, methods used in IP addressing and implement the various routing and router protocols. **4.** Be aware of multiplexing and demultiplexing, implement the user datagram and transmission control protocols, control the congestion and improve the quality of services. **5.** Have a clear understanding of Domain Name Space, implement the various protocols involved and web security techniques.

UNIT I DATA COMMUNICATIONS **6**

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DATA LINK LAYER **9**

Error – detection and correction – Parity – LRC – CRC – Hamming code – low Control and Error control - stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges.

UNIT III NETWORK LAYER **10**

Internetworks – Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER **10**

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER **10**

Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.

TOTAL: 45

TEXT BOOK

1. Behrouz A. Forouzan, "Data communication and Networking", 4th Ed., Tata McGraw Hill, 2009.

REFERENCE BOOKS

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 3rd Ed., Pearson Education, 2003.
2. L.Peterson and Peter S. Davie, "Computer Networks", 5th Ed., Morgan Kaufmann, 2011.
3. Andrew S. Tanenbaum, "Computer Networks", 5th Ed., Prentice Hall, 2010.
4. William Stallings, "Data and Computer Communication", 8th Ed., Pearson, 2006.

CS3403	MICROPROCESSOR AND MICROCONTROLLER	L T P C 3 0 0 3
Goal	To introduce Microprocessor Intel 8086, Micro Controller 8051 with Applications and Mobile Processors	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Study the Architecture of 8086 & 8051. 2. Study the addressing modes & instruction set of 8086 & 8051. 3. Introduce the need & use of Interrupt structure. 4. Develop skill in simple program writing. 5. Learn commonly used peripheral / interfacing ICs - To study simple applications	The student should be able to 1. Have understood the architecture, instruction sets and programming of 8085 2. Explain the architecture, Interrupts and memory interfacing of 8086 3. Write programs for arithmetic and data manipulation using 8086 4. Have an understanding about interfacing concepts using 8056 5. Understand the architecture, instruction sets and programming of 8081

UNIT I 8086 PROCESSOR **9**

Functional block diagram - Signals - Memory interfacing - I/O ports and data transfer concepts - Timing Diagram - Interrupt structure - Multiprocessor configurations.

UNIT II PROGRAMMING 8086 PROCESSOR **9**

Instruction format and addressing modes - Assembly language format - Data transfer, data manipulation, control and string instructions - Programming: Loop structure with counting & Indexing - Look up table - Subroutine instructions stack.

UNIT III PERIPHERAL INTERFACING **9**

Study of Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8257 DMA 8251 USART, 8279 Key board display controller and 8253 Timer/ Counter - Interfacing with 8085 - A/D and D/A converter interfacing.

UNIT IV MICRO CONTROLLER 8051 **9**

Functional block diagram - Instruction format and addressing modes - Interrupt structure - Timer -I/O ports - Serial communication. Data Transfer, Manipulation, Control & I/O instructions

UNIT V MICRO CONTROLLER PROGRAMMING , APPLICATIONS & MOBILE PROCESSORS **9**

Simple programming exercises, PID control algorithm - wave form generation:- square triangular and sine, key board and display interface - Closed loop control of servo motor-stepper motor control. C programming for embedded Microcontroller systems.

Mobile Processor - Qualcomm Snapdragon 805 processor - architecture- ARM Processor-architecture- Dual Core Intel Microprocessor- architecture.

TOTAL : 45

TEXT BOOKS

1. A K Ray and K M Burchandi "Advanced Microprocessor and Peripherals" Tata McGraw Hill -2004
2. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The 8051 Micro Controller and Embedded Systems', Pearson Education, 5th Indian reprint, 2003.
3. http://www.eng.auburn.edu/~nelson/courses/elec3040_3050/C%20programming%20for%20embedded%20system%20applications.pdf

REFERENCE BOOKS

1. William Kleitz, 'Microprocessor and Micro Controller Fundamental of 8085 and 8051 Hardware and Software', Pearson Education, 1998.
2. Programming and Customizing the 8051 Microcontroller

CS2502	SOFTWARE ENGINEERING	L T P C 3 1 0 4
Goal	To provide the basic knowledge in the software Engineering and learn various techniques/tools required for efficient development of software	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Understand the software life cycle models. 2. Understand the importance of modelling and modelling languages. 3. Learn the design and development of correct and robust software products. 4. Understand business requirements pertaining to software development. 5. Understand testing and managing software projects	The Student should able to 1. Define and develop a software project from requirement gathering to implementation. 2. Focus on the fundamentals of modelling a software project using the Unified Modelling language. 3. Implement software products 4. Do testing process 5. Measure and estimate a software project

UNIT I SOFTWARE PROCESS **12**

Introduction –S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation – life cycle process – development process –system engineering hierarchy.

UNIT II SOFTWARE REQUIREMENTS **12**

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -S/W document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT III DESIGN CONCEPTS AND PRINCIPLES **12**

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design – transform and transaction mapping – user interface design – user interface design principles. Real time systems - Real time software design – system design – real time executives – data acquisition system - monitoring and control system. SCM – Need for SCM – Version control – Introduction to SCM process – Software configuration items.

UNIT IV SOFTWARE TESTING **12**

Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large. S/W testing strategies – strategic approach and issues - unit testing – integration testing – validation testing – system testing and debugging.

UNIT V SOFTWARE PROJECT MANAGEMENT **12**

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes – program evolution dynamics – software maintenance – Architectural evolution. Taxonomy of CASE tools.

TOTAL: 60

TEXT BOOK

1. Roger Pressman, Software engineering- A practitioner's Approach, 7th Ed., McGraw-Hill, 2010.

REFERENCE BOOKS

1. Ian Sommerville, Software engineering, Pearson education Asia, 9th edition, 2011.
2. PankajJalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
4. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.

CS2531	NETWORKING LABORATORY	L T P C 0 0 3 1
Goal	To simulate the various protocols, develop various applications and study the various network simulators.	

Objectives	Outcome
This course should enable the students to understand and simulate the behaviour of network environment.	The students should be able to implement algorithms used in the networking environment.

LIST OF EXPERIMENTS

(All the programs are to be written using C)

1. Simulation of ARP / RARP.
2. Write a program that takes a binary file as input and performs bit stuffing and CRC Computation.
3. Develop an application for transferring files over RS232.
4. Simulation of Sliding-Window protocol.
5. Simulation of BGP / OSPF routing protocol.
6. Develop a Client – Server application for chat.
7. Develop a Client that contacts a given DNS Server to resolve a given host name.
8. Write a Client to download a file from a HTTP Server.
9. Study of Network Simulators like NS2/Glomosim / OPNET

CS2431	OPERATING SYSTEM LABORATORY	L T P C 0 0 3 1
Goal	To implement operating system(OS) concepts in LINUX platform and familiarise with low level system programming.	

OBJECTIVES	OUTCOMES
This course should enable the students to understand OS concepts.	The students should be able to implement algorithms used in OS.

LIST OF EXPERIMENTS

Implement the following on LINUX platform using C programming.

1. Shell programming
    a. command syntax
    b. write simple functions
    c. basic tests
2. Shell programming
    a. loops
    b. patterns
    c. expansions
    d. substitutions
3. Write programs using the following system calls of LINUX operating system (OS):

    fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of LINUX OS (open, read, write, etc.)
5. Write C programs to simulate LINUX commands like ls, grep.
6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Implement the Producer – Consumer problem using semaphores.
9. Implement memory management schemes.

CS3431	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	L T P C 0 0 3 1
Goal	To learn the architecture programming and interfacing of microprocessors and Microcontrollers.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Study 8085 – 8 bit arithmetic 2. Study 8086 – 16 bit arithmetic 3. Study 8086 – serial, parallel 4. Study Interfacing and programming – ADC and DAC, 8279, 8251 and 8253 5. Study 8051- arithmetic and logical	The student should be able to 1. Write the program for arithmetic operations 2. Write the program for arithmetic operations 3. Write program for serial and parallel communications and also the timer program 4. Write program for peripheral devices 5. Write program for arithmetic, logical and interfacing stepper motor

LIST OF EXPERIMENTS

1. Addition and Subtraction of two 8bit numbers using 8085.
2. Multiplication and Division of two 8bit numbers using 8085.
3. Addition and Subtraction of two 8bit numbers using 8086.
4. Multiplication and Division of two 8bit numbers using 8086.
5. Programs for String manipulation operations using 8086.
6. Interfacing ADC and DAC.
7. Parallel Communication between two MP Kits using Mode 1 of 8255.
8. Interfacing and Programming 8279, 8259, and 8253.
9. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.
10. Interfacing and Programming of Stepper Motor and DC Motor Speed control.

Note: Experiment number 1,2,3,4 & 9 should be performed by both software and hardware.

SEMESTER V

CS3501	THEORY OF COMPUTATION	L T P C 4 0 0 4
Goal	To have a understanding of finite state, push down automata and Turing machine.	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Have knowledge of regular knowledge and context free language. 2. Know the relation between regular, context free and corresponding recognizers. 3. Study Turing machine and classes of problems. 4. Study context free grammer and languages 5. Study undecidability	The student should be able to 1. Have gained the knowledge in deterministic and non deterministic automata. 2. Have obtained understanding in regular expressions and languages. 3. Have grasped idea in context free grammar and languages. 4. Have learnt the properties of context free languages. 5. Differentiate recursive and recursively enumerable languages.

UNIT I AUTOMATA **12**

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES **12**

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 **12**

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata- Pumping Lemma for CFL

UNIT IV TURING MACHINES **12**

Turing Machines – Programming Techniques for TM.- A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine

UNIT V UNDECIDABILITY **12**

Post's Correspondence Problem - The classes P and NP. Halting problem, Computability-Enumerability, Decidability-The Church-Turing thesis-Properties of language combinations (concatenation, union, intersection, quotient, etc)-Diagonalization

TOTAL: 60

TEXT BOOKS

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education, 2007.

REFERENCE BOOKS

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/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.

CS3502	WEB TECHNOLOGY	L T P C 3 0 0 3
Goal	The course emphasizes on the basics of web technology and various server side and client side scripting languages.	

Objectives	Outcomes
The course should enable the student to learn and understand 1. Learn Internet applications 2. Learn Server Side Programming 3. Learn Web Databases ,MS Sharepoint 4. Learn Scripting languages	The students should be able to 1. Understand the basic concepts of Internet programming and protocols used. 2. Create applications using HTML, HTML5 ,DHTML, 3. Write scripts using CSS and Java Script. 4. Develop applications using SERVELETS.

UNIT I INTRODUCTION **9**

Introduction – Network concepts – Web concepts – Internet addresses - Retrieving Data with URL – HTML – DHTML: Cascading Style Sheets, Common Gateway Interface: Programming CGI Scripts – HTML Forms – Custom Database Query Scripts – Server Side Includes – Server security issues.

UNIT II RICH INTERNET APPLICATION **9**

XHTML: Introduction, CSS- Scripting languages- Java Script: Control statements, Functions, Arrays, Objects – DOM- Ajax enable rich internet applications.

UNIT III SERVER SIDE PROGRAMMING **9**

Server side Programming – Active server pages – Java server pages – Java Servlets: Servlet container – Exceptions – Sessions and Session Tracking – Using Servlet context – Dynamic Content Generation – Servlet Chaining and Communications.

UNIT IV HTML5 **9**

HTML review, Feature detection , The HTML5 new Elements, Canvas, Video and audio, Web storage, Geolocation, Offline Webpages , Microdata, HTML5 APLS, Migrating from HTML4 to HTML5, CSS3.

UNIT V WEB 2.0, WEB 3.0, MS SHARE POINT **9**

WEB 2.0 – HISTORY, characteristics, technologies, concepts, usage, web2.0 in education, philanthrophy, social work. **Web 3.0** – Theory and history understanding basic web artifacts and applications , implementation

MS share point – Share point 2013 overview ,share (Put social to work ,Share your stuff, Take share point on the go), Discover (find experts, discover answers, find what you are looking for), Manage (cost, risk, time)

TOTAL: 45

TEXT BOOKS

1. Deitel, Deitel and Neito, "Internet and World Wide Web – How to program", Pearson Education Asia, 4th Edition, 2009.
2. Elliotte Rusty Herold, "Java Network Programming", O'Reilly Publications, 3rd Edition, 2004.

REFERENCE BOOKS

1. Jeffy Dwight, Michael Erwin and Robert Nikes "USING CGI", PHI Publications, 1997
2. Jason Hunter, William Crawford "Java Servlet Programming" O'Reilly Publications, 2nd Edition, 2001.
3. Eric Ladd and Jim O'Donnell, et al, "USING HTML 4, XML, and JAVA1.2", Prentice Hall, 2003.
4. Jeremy Keith , "Html5 for web designers"

CS2505	SYSTEM SOFTWARE	L T P C 3 0 0 3
Goal	To provide a basic knowledge in the concepts of System Software. To understand the concepts of machine architecture and text editors.	

Objectives	Outcomes
The course should enable the student to 1. Learn the different kinds of machine architecture. 2. Learn about many types of assemblers and data structures this will help in the design of assembler 3. Understand the concept and design of machine bootstrap loader and various kinds of linker. 4. Understand the concept and design of macro processor. 5. Study about text editors, debugging and User interface.	The Student should be able to 1. Acquire knowledge in the basic architecture and assigning the data values for different machine. 2. Design assemblers and construct the different examples. 3. Be familiar with Loader concept and Linkage by writing different kinds of programs according to the machine architecture. 4. Design Macro processor with expansion and Keyword parameters for defining it. 5. Be familiar in creating text editors and be able to solve different debugging techniques.

UNIT I ASSEMBLERS **9**

System software and machine architecture – The Simplified Instructional Computer (SIC) & SIC/XE - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming- Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT II LOADERS AND LINKERS **9**

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT IV MACRO PROCESSORS **9**

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro

Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

UNIT IV SYSTEM SOFTWARE TOOLS **9**

Text editors - Overview of the Editing Process - User Interface – Editor Structure. - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

UNIT V 4GL AND PYTHON **9**

Fourth Generation Programming Language-Types-General use/versatile -Database Query languages-Report Generators-Data manipulation, analysis, and reporting languages-GUI creators – Database driven GUI application development-Domain Specific Programming Languages-Rapid Application Development-Fifth generation Programming Languages-python interpreter-program execution-executing code from a file-Interpreter and complier-Python compiler internals.

TOTAL: 45

TEXT BOOK

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2008.

REFERENCE BOOKS

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.
2. John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 1972.
3. http://en.wikipedia.org/wiki/Fourth-generation_programming_language
4. http://www.pasteur.fr/formation/infobio/python/ch14.html#sect_module
5. http://tomlee.co/wp-content/uploads/2012/11/108_python-language-internals.pdf

MA1301	DISCRETE MATHEMATICS	L T P C 3 1 0 4
Goal	To mathematical maturity and ability to deal with abstraction and to gain knowledge in expert system in data base and logics of a program.	

Objectives	Outcome
The course should enable the students to 1. Learn logical connectives and equivalences in propositions, DeMorgan's Laws, normal forms, principal normal forms and theory of inference. 2. Learn logical equivalences and implications for quantified statements and the theory of inferences in predicate calculus. 3. Learn basics of set theory, relations and its properties and Hasse diagram. 4. Learn different types of functions and its classifications with examples. Understands recursive and permutation functions with examples. 5. Be exposed to basic concepts and properties of algebraic structures such as groups, semi groups, monoids, abelian group, normal subgroup and group codes.	The students should be able to 1. Verify the equivalence formulae by using truth table method as well as by equivalence rules and find the principal conjunctive and disjunctive normal form and verify the validity of argument using theory of inference. 2. Symbolize the given sentence using predicate logic and verify the given predicate formula and validity of the argument using universal specification and generalization and equivalence rules. 3. Verify the algebraic statements analytically and graphically, analyze the properties of the given relations and represent the relation using matrix and graph. Be able to analyze whether a relation is equivalence or poset or not. 4. Evaluates the composition and inverse of the given function and verifies the results. Gives practical examples for one to one, onto and bijective functions. Defines initial, hashing, recursive, primitive recursive and permutation functions. 5. Be able to analyze between semi group, monoid, group and abelian group with suitable examples. Find the applications of group theory in computer arithmetic, theory of sequential machines and formal languages. Design the fast adders and error correcting codes using group codes.

UNIT I PROPOSITIONAL CALCULUS **12**

Propositions – Logical connectives – Compound propositions – Conditional and bi-conditional propositions – Truth tables – Tautologies and contradictions – Contra positive – Logic equivalences and implications – DeMorgan's Laws – Normal forms – Principal

conjunctive and disjunctive normal forms – Rules of inference – Arguments – Validity of arguments.

UNIT II PREDICATE CALCULUS **12**

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

UNITIII SET THEORY **12**

Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets – Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram.

UNIT IV FUNCTIONS **12**

Definitions of functions – Classification of functions – Type of functions – Examples – Composition of functions – Inverse functions – Binary and n – ary operations – Characteristic function of a set – Hashing functions – Recursive functions – Permutation functions.

UNIT V ALGEBRAIC SYSTEMS **12**

Groups , Cyclic Groups, Subgroups , Cosets, lagrange's theorem, Normal subgroups – Codes and group codes – Basic notions of error correlation – Error recovery in group codes.

TOTAL: 60

TEXT BOOKS

1. Trembly J.P ab Monohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw – Hill Publishing & Co., LTD, New Delhi, 2003.
2. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, 2002.

REFERENCE BOOKS

1. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Fourth Indian Reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications ", Fifth edition, Tata McGraw Hill Publishing & Co, New Delhi, 2003.
3. Richard Johnsonbaugh, "Discrete Mathematics", Fifth Edition, Pearson Education Asia, New Delhi, 2002.

CS2701	ARTIFICIAL INTELLIGENCE	L T P C 3 0 0 3
Goal	To provide the basic exposition to goals and methods of Artificial Intelligence	

Objectives	Outcomes
The course should enable the student to	The students should be able to
1. Understand the representation of agents and agent environments. 2. Understand the searching techniques 3. Know the knowledge representation and learning 4. Enable the students to apply these techniques in application which involve perception, reasoning and learning 5. Know the features of expert systems	1. Develop a basic understanding of the building blocks of AI 2. Understand the main approaches to artificial intelligence such as heuristic search, game and search. 3. Understand machine learning, neural networks and natural language processing. 4. Recognize problems that may be solved using artificial intelligence and implement artificial intelligence algorithms for hands-on experience. 5. Develop expert systems for an application.

UNIT I INTRODUCTION **8**

Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information.

UNIT II SEARCHING TECHNIQUES **10**

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

UNIT III KNOWLEDGE REPRESENTATION AND LEARNING **10**

First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects - Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning –

Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

UNIT IV APPLICATIONS **9**

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

UNIT V EXPERT SYSTEM **8**

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

TOTAL: 45

TEXT BOOKS

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, 2004.
2. Donald A.Waterman, 'A Guide to Expert Systems', Pearson Education.

REFERENCE BOOKS

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, "Artificial Intelligence-Structures And Strategies For Complex Problem Solving", Pearson Education / PHI, 2002.
4. Janakiraman, K. Sarukesi, 'Foundations of Artificial Intelligence and Expert Systems', Macmillan Series in Computer Science.
5. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', Prentice Hall of India, 2003

CS2532	WEB TECHNOLOGY LABORATORY	L T P C 0 0 3 1
Goal	To learn about Web Programming concepts used to develop web application	

Objectives	Outcomes
The course should enable the student to create programs to demonstrate the skills learned in "Web Technology".	The students should be able to 1. Write simple internet applications. 2. Create applications using HTML, DHTML, 3. Write scripts using CSS and Java Script. 4. Develop applications using Servelets. 5. Write applications using XML and JDB.

LIST OF EXPERIMENTS

1. Write programs in Java to demonstrate the use of following components Text fields, buttons, Scrollbar, Choice, List and Check box
2. Write Java programs to demonstrate the use of various Layouts like Flow Layout, Border Layout, Grid layout, Grid bag layout and card layout
3. Write programs in Java to create applets incorporating the following features:
    a. Create a color palette with matrix of buttons
    b. Set background and foreground of the control text area by selecting a color from color palette.
    c. In order to select Foreground or background use check box control as radio buttons
    d. To set background images
4. Write programs in Java to do the following.
    a. Set the URL of another server.
    b. Download the homepage of the server.
    c. Display the contents of home page with date, content type, and Expiration date.
    d. Last modified and length of the home page.
5. Write programs in Java using sockets to implement the following:
    a. HTTP request
    b. FTP
    c. SMTP
    d. POP3
6. Write a program in Java for creating simple chat application with datagram sockets and datagram packets.
7. Write programs in Java using Servlets:
    a. To invoke servlets from HTML forms
    b. To invoke servlets from Applets

8. Write programs in Java to create three-tier applications using servlets
    a. for conducting on-line examination.
    b. for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
9. Create a web page with the following using HTML
    a. To embed a map in a web page
    b. To fix the hot spots in that map
    c. Show all the related information when the hot spots are clicked.
10. Create a web page with the following.

    a. Cascading style sheets.
    b. Embedded style sheets.
    c. Inline style sheets.

    Use our college information for the web pages.

CS2533	SYSTEM SOFTWARE LABORATORY	L T P C 0 0 3 1
Goal	To implement the design of various System Software.	

Objectives	Outcome
This course should enable the students to understand concepts learned in "CS2501 System Software". This course should enable the students to understand OS concepts.	The students should be able to 1. Implement assembler. 2. Implement macro processor 3. Implement loader 4. Implement editor using C language

LIST OF EXPERIMENTS – SYSTEM SOFTWARE

Demonstrate the following using C language.

1. Implement a symbol table with functions to create, insert, modify, search, and display.
2. Implement pass one of a two pass assembler.
3. Implement pass two of a two pass assembler.
4. Implement a single pass assembler.
5. Implement a two pass macro processor
6. Implement a single pass macro processor.
7. Implement an absolute loader.
8. Implement a relocating loader.
9. Implement pass one of a direct-linking loader.
10. Implement pass two of a direct-linking loader.
11. Implement a simple text editor with features like insertion / deletion of a character, word, and sentence.
12. Implement a symbol table with suitable hashing (For loader exercises, output the snap shot of the main memory as it would be, after the loading has taken place)

SEMESTER VI

CS3601	PRINCIPLES OF COMPILER DESIGN	L T P C 3 0 0 3
Goal	To understand, design and implement a lexical analyzer, parser, code generation, code optimization and program verification phases of compiler.	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Understand the basic principles of the compiler, Compiler construction tools and lexical analysis. 2. Learn the Concept of Context Free Grammars, Parsing and various Parsing Techniques. 3. Learn the process of intermediate code generation. 4. Learn the process of Code Generation and various Code optimization techniques. 5. Understand need of Program verification and Lambda calculus in verification.	The students should be able to 1. Differentiate the various phases of a compiler. 2. Have an understanding of parsing techniques and able to write Context Free Grammars for various languages. 3. Have an understanding of the structure of intermediate code for various types of statements and expressions. 4. Design code generator and code optimization techniques. 5. Do program verification and application of Lambda calculus in verification.

UNIT I INTRODUCTION 9

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT II SYNTAX ANALYSIS 9

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

UNIT III INTERMEDIATE CODE GENERATION 9

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

UNIT IV CODE GENERATION AND CODE OPTIMIZATION 12

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization- Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis .

UNIT V PROGRAM VERIFICATION 6

Introduction to Program Verification-Functional programming-Application of Lambda Calculus.

TOTAL: 45

TEXT BOOK

1. Alfred Aho, Lam, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education , New International edition, 2014.

REFERENCE BOOKS

1. Raghavan V, "Principles of Compiler Design", McGraw Hill, 4th Ed., 2012.
2. Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.
3. C.N. Fischer and R.J.LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
4. J.P.Bennet, "Introduction to Compiler Techniques", 2nd Edition, Tata McGraw-Hill, 2003.
5. Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", Prentice Hall, 2001.
6. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning, 2003.
7. Applications of Lambda calculus, http://wwwusers.di.uniroma1.it/~vamd/TSL/typedlambdacalculi.pdf
8. Techniques for Program Verification www.eecs.berkeley.edu/~necula/Papers/nelsonthesis.pdf

CS2602	XML AND WEB SERVICES	L T P C 3 0 0 3
Goal	To impart knowledge and training on XML and web services.	

OBJECTIVES	OUTCOMES
The course should enable the student to	The students should be able to
1. Create a XML application using structure and presentation technologies.	1. Apply XML concepts to develop Web application.
2. Use XML manipulation technologies such as XSLT, XPath, XLink and XQuery.	2. Create SOAP application using XML and Web Services.
3. Perform Program Manipulation and Dynamic access through DOM architecture.	3. Acquire information from the web sites using XML programming.
4. Understand web services and ensure security.	4. Implement XML in e-business
5. Understand role of metadata in web content	5. Develop web services and ensure security

UNIT I XML TECHNOLOGY FAMILY **9**

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX- presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ.

UNIT II ARCHITECTING WEB SERVICES **9**

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

UNIT III WEB SERVICES BUILDING BLOCK **9**

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

UNIT IV IMPLEMENTING XML IN E-BUSINESS **9**

B2B - B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

UNIT V XML AND CONTENT MANAGEMENT **9**

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

TOTAL: 45

TEXT BOOKS

1. Ron schmelzer et al, “XML and Web Services”, Pearson Education, 2008.
2. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall, 2004.

REFERENCE BOOKS

1. Frank P. Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.
2. Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education, 2003.
3. Henry Bequet and Meeraj Kunnumpurath, “Beginning Java Web Services”, Apress, 2004.
4. Russ Basiura and Mike Batongbacal, “Professional ASP.NET Web Services”, Apress,2.

CS2601	OBJECT ORIENTED SYSTEM DESIGN	L T P C 3 1 0 4
Goal	To learn the methodologies of object oriented analysis and design.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Learn the Object oriented life cycle. 2. Know how to identify objects, relationships, Services and attributes through UML. 3. Understand the Use case diagrams. 4. Understand object oriented analysis and design 5. Know object oriented design process, software quality and usability.	The students should be able to 1. Acquire knowledge of OOAD. 2. Demonstrate the design concepts using UML diagrams. 3. Practice through object oriented life cycle. 4. Draw UML diagrams 5. Acquire knowledge on software quality and usability

UNIT I INTRODUCTION **10**

An Overview of Object Oriented Systems Development - Object Basics – Object Oriented Systems Development Life Cycle.

UNIT II OBJECT ORIENTED METHODOLOGIES **14**

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns – Frameworks – Unified Approach – Unified Modeling Language – Use case - class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram.

UNIT III OBJECT ORIENTED ANALYSIS **12**

Identifying use cases - Object Analysis - Classification – Identifying Object relationships - Attributes and Methods.

UNIT IV OBJECT ORIENTED DESIGN **12**

Design axioms - Designing Classes – Access Layer - Object Storage - Object Interoperability.

UNIT V SOFTWARE QUALITY AND USABILITY **12**

Designing Interface Objects – Software Quality Assurance – System Usability - Measuring User Satisfaction.

TOTAL: 60

TEXT BOOKS

1. Ali Bahrami, “Object Oriented Systems Development”, Tata McGraw-Hill, 2008.
2. Martin Fowler, “UML Distilled”, Second Edition, PHI/Pearson Education, 2002.

REFERENCE BOOKS

1. Stephen R. Schach, “Introduction to Object Oriented Analysis and Design”, Tata McGraw-Hill, 2003.
2. James Rumbaugh, Ivar Jacobson, Grady Booch “The Unified Modeling Language Reference Manual”, Addison Wesley, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, “UML Toolkit”, OMG Press Wiley Publishing Inc., 2004.

MG2001	PRINCIPLES OF MANAGEMENT	L T P C 3 0 0 3
Goal	To make the students to understand the different managerial functions like planning, organizing, staffing, leading and controlling .	

Objectives	Outcome
The course should enable the students to	The students should be able to
1. Be familiar with the historical development of organizations. 2. Understand the various steps involved in planning. 3. Understand the Structure and Process involved in formal and informal organization. 4. Impart knowledge on the principles of leadership and human factors. 5. Impart knowledge on System and process of Controlling.	1. Visualize the development of various business organizations. 2. Be acquainted with steps involved in planning. 3. Gain knowledge in departmentation by different strategies. 4. Be acquainted with different motivation techniques. 5. Describe the various issues on process control.

UNIT I HISTORICAL DEVELOPMENT 9

Definition of Management – Science or Art – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organisation.

UNIT II PLANNING 9

Nature & Purpose – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies & Planning Premises- Forecasting – Decision-making.

UNIT III ORGANISING 9

Nature and Purpose – Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness.

UNIT IV DIRECTING 9

Scope – Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication – Process of Communication – Barriers and Breakdown – Effective Communication – Electronic media in Communication.

UNIT V CONTROLLING 9

System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology in Controlling – Use of computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

TOTAL: 45

TEXT BOOKS

1. G.K. Vijaya Raghavan, M.Sivakumar, Principles of Management, Lakshmi Pub., 2010.
2. M. Govindarajan, S. Natarajan, Principles Of Management, Prentice Hall of India, 2005.
3. Harold Kooritz & Heinz Weihrich "Essentials of Management", Tata McGraw-Hill, 1998.
4. Joseph L Massie "Essentials of Management", Prentice Hall of India, 4th Edition, 2003.

REFERENCE BOOKS

1. Tripathy PC and Reddy PN, "Principles of Management", Tata McGraw-Hill, 1999.
2. Decenzo David, Robbin Stephen A, "Personnel and Human Reasons Management", Prentice Hall of India, 1996
3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.
4. Fraidoon Mazda, "Engineering Management", Addison Wesley, 2000.

CS2633	COMPILER DESIGN LABORATORY	L T P C 0 0 3 1
Goal	To design and develop each and every phase of a compiler.	

OBJECTIVES	OUTCOMES
To understand, design and implement lexical analyzer, parser, code generation, and code optimization.	The students should implement various phases of compiler in C language.

LIST OF EXPERIMENTS

1. Implement a lexical analyzer in "C".
2. Use LEX tool to implement a lexical analyzer.
3. Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
4. Use YACC and LEX to implement a parser for the same grammar as given in problem
5. Write semantic rules to the YACC program in problem 5 and implement a calculator that takes an expression with digits, + and * and computes and prints its value.
6. Implement the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
7. Implement the back end of the compiler which takes the three address code generated in problems 7 and 8, and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.

CS2632	XML AND WEB SERVICES LABORATORY	L T P C 0 0 3 1
Goal	To design and implement component services using XML and Web Services technologies.	

OBJECTIVES	OUTCOMES
To understand design of web applications using XML and web services.	The students should develop and deploy web applications using XML and have exposure to web services.

LIST OF EXPERIMENTS

1. Create an XML document to store an address book.
2. Create an XML document to store information about books and create the DTD files.
3. Create an XML schema for the book's XML document from exercise 2.
4. Create an XML document to store resumes for a job web site and create the DTD file
5. Present the book's XML document using cascading style sheets (CSS).
6. Write an XSLT program to extract book titles, authors, publications, book rating from the book's XML document and use formatting.
7. Use Microsoft DOM to navigate and extract information from the book's XML document.
8. Use Microsoft DSO to connect HTML form or VB form to the book's XML document and display the information.
9. Create a web service for temperature conversion with appropriate client program.
10. Create a web service for currency conversion (at five currencies) with appropriate client program.

SEMESTER VII

CS2651	DATA MINING AND DATA WAREHOUSING	L T P C 4 0 0 4
Goal	Understand the fundamentals of data mining functionalities and its application in various business and social domains.	

Objectives	Outcomes
The course should enable the student to 1. Understand the fundamentals of data mining and its functionalities 2. Obtain knowledge in different data mining techniques and algorithms 3. Discuss about various application domains of data mining 4. Understand advanced mining 5. Apply on different case studies	The Student should be able to 1. Have an understanding about the concepts of data mining and data warehousing concepts and techniques. 2. Work with data mining tools. 3. Have an understanding about different data mining techniques and algorithms 4. Explain clustering 5. Implement data ware house

UNIT I INTRODUCTION 12

Data Mining Tasks, Data mining Issues, Decision Support System, Dimensional Modeling, Data warehousing, OLAP & its tools, OLTP.

UNIT II MINING TECHNIQUES: CLASSIFICATION 12

Introduction, statistical Perspective of data mining, Decision tree, Neural networks, Genetic algorithms, Issues in classification, Statistitical based algorithm(regression), Distance based algorithm(simple approach), Decision Tree based algorithm(C4.5), Neural network based (propagation).

UNIT III MINING TECHNIQUES : CLUSTERING AND ASSOCIATION RULES 12

Introduction to clustering, Similarity and distance measures, Hierarchical algorithm(divisive clustering), partitional algorithm (Minimum Spanning tree, nearest neighbour), Clustering large database(CURE), Introduction to association, basic algorithm(Apriori), parallel & distributed(data parallelism), Incremental rules, Association rule techniques(Generalized, multiple level)

UNIT IV ADVANCED MINING 12

Web mining, Web content mining, Introduction to Spatial mining & its primitives, spatial classification algorithm (ID3 extension), Spatial clustering algorithm (SD), Introduction to temporal mining, Time series, Temporal association rule.

UNIT V DATA MINING ENVIRONMENT 12

Case study in building business environment, Application of data mining in Government National data warehouse and case studies.

TOTAL: 60

TEXT BOOKS

1. Margaret H. Dunham, S. Sridhar "Data Mining Introductory & Advance Topics" - 2006(Unit - 1,2,3,4)
2. C.S.R. Prabhu, “Data Warehousing: Concept, Techniques, Products and Applications”, Prentice Hall of India, 2001 (Unit-5).

REFERENCE BOOKS

1. J.Han, M.Kamber, “Data Mining: Concept and Techniques”, Academic Press, Morgan Kanfman Publishers, 3rd Edition, 2008.
2. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill, 2007.
3. Pieter Adrians, Dolf Zantinge, “Data Mining”, Addison Wesley, 2000.

CS2702	GRAPHICS AND MULTIMEDIA	L T P C 4 0 0 4
Goal	To provide the fundamental knowledge to develop interactive graphics and handling multimedia devices.	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Learn the rules and algorithms in generating graphical outputs. 2. Learn 3-dimensional objects using suitable transformations. 3. Understand the architecture for design of multimedia system. 4. Realize the issues related to multimedia file handling. 5. Understand hypermedia standards in developing multimedia applications.	The students should be able to 1. Develop algorithms to draw fundamental drawings 2. Develop real-time rendering graphics 3. Create 2D and 3D images 4. Have an understanding on the basics of creating multimedia applications 5. Design and Develop multimedia applications

UNIT I OUTPUT PRIMITIVES **12**

Introduction - Line - Curve and Ellipse Drawing Algorithms – Attributes – Two-Dimensional Geometric Transformations – Two-Dimensional Clipping and Viewing.

UNIT II THREE-DIMENSIONAL CONCEPTS **12**

Three-Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation.

UNIT III MULTIMEDIA SYSTEMS DESIGN **12**

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases.

UNIT IV MULTIMEDIA FILE HANDLING **12**

Compression & Decompression – Data & File Format standards – Multimedia I/O technologies - Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval Technologies.

UNIT V HYPERMEDIA **12**

Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards – Integrated Document management – Distributed Multimedia Systems.

TOTAL: 60

TEXT BOOKS

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.
2. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003 .

REFERENCE BOOKS

1. Judith Jeffcoate, “Multimedia in practice technology and Applications”, PHI, 1998.
2. Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education, second edition 2003.

MG2002	TOTAL QUALITY MANAGEMENT	L T P C 3 0 0 3
Goal	To learn the principles and tools available to achieve Total Quality Management and also to understand the statistical approach for quality control.	

Objectives	Outcomes
The course should enable the student to 1. Understand the basic concepts of Total Quality Management. 2. Be familiar with the total quality management principles. 3. Know about the various process control tools available to achieve Total Quality Management. 4. Study about quality function deployment and total productive maintenance. 5. Get awareness about the ISO certification process and their need in various industries.	At the end of the course the student should be able to 1. Be aware of the various dimensions of quality, costs, leadership, philosophy and barriers to implement TQM. 2. Have a clear understanding of customer satisfaction, employee involvement, continuous process improvement, supplier partnership and performance measures. 3. Apply the various Quality tools and statistical fundamentals. 4. To carry out the various aspects of benchmarking, deploy the quality functions and to deal with the total productive maintenance. 5. Assure and ensure the various quality standards and to implement the related quality systems.

UNIT I INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II TQM PRINCIPLES **9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV TQM TOOLS 9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

TOTAL: 45

TEXT BOOK

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, 2003.

REFERENCE BOOKS

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.

CS2731	COMPUTER GRAPHICS LABORATORY	L T P C 0 0 3 1
Goal	To understand and demonstrate the basic concepts of computer graphics.	

Objectives	Outcomes
The course should enable the students to 1. Apply the algorithms in generating graphical outputs. 2. Develop 3-dimensional objects using suitable transformations. 3. Write program to convert colour from RGB to CMY 4. Know the compression technique to reduce the file size 5. Foster poster design and animation skills.	The students should 1. Draw using basic built-in function. 2. Develop real-time rendering graphics using 2D and 3D. 3. Select portion of image using clipping algorithm. 4. Compress file and image. 5. Design a poster using image editing software Create an animation video.

LIST OF EXPERIMENTS

1. To implement Bresenham's algorithms for line, circle and ellipse drawing.
2. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. To implement Cohen-Sutherland 2D clipping and window-viewport mapping.
4. To perform 3D Transformations such as translation, rotation and scaling.
5. To visualize projections of 3D images.
6. To convert between color models.
7. To implement text compression algorithm.
8. To implement image compression algorithm.
9. To perform animation using any Animation software.
10. To perform basic operations on image using any image editing software.

CS3731	DATA MINING LABORATORY	L T P C 0 0 3 1
Goal	To understand and demonstrate the basic concepts of data mining using open sourece tools.	

Objectives	Outcomes
The course should enable the students to 1. learn a data mining tool. 2. Apply data mining tools for various phases of data mining.	The students should able to 1. Explain the features of selected tool. 2. Implement various data iming techniques using the selected tool.

LIST OF EXPERIMENTS

1. Evolution of data management technologies, introduction to data warehousing concepts.
2. Develop an application to implement defining subject area, design of fact dimension table, data mart.
3. Develop an application to implement OLAP, roll up, drill down, slice and dice operation
4. Develop an application to construct a multidimensional data.
5. Develop an application to implement data generalization and summarization technique.
6. Develop an application to extract association rule of data mining.
7. Develop an application for classification of data.
8. Develop an application for one clustering technique
9. Develop an application for Naïve Bayes classifier.
10. Develop an application for decision tree.

SEMESTER VIII

CS2801	MOBILE COMPUTING	L T P C 3 0 0 3
Goal	To impart knowledge on various aspects of mobile computing	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Learn mobile computing architecture. 2. Learn various mobile technologies. 3. Learn GPRS and WAP technologies. 4. Learn Wireless LAN technology. 5. Learn platforms for Mobile Application development.	The students should be able to 1. Have an understanding on the various mobile architectures. 2. Have learnt various messaging environment in mobile environments. 3. Acquire knowledge to develop mobile applications under PALM and SYMBIAN OSs. 4. Write mobile applications using J2ME.

UNIT I INTRODUCTION 9

Introduction: Mobility of Bits and Bytes – Wireless-The Beginning – Mobile Computing – Dialogue Control– Networks – Middleware and Gateways – Application and Services (Contents) – Developing Mobile Computing Application s- Security in Mobile Computing – Standards-Why is it Necessary? – Standard Bodies – Players in the Wireless Space.

Mobile Computing Architecture: Internet-The Ubiquitous Network – Architecture for Mobile Computing – Three-Tier Architecture – Design Considerations for Mobile Computing – Mobile Computing through Internet – Making Existing Applications Mobile-Enabled.

UNIT II MOBILE COMPUTING THROUGH TELEPHONY 9

Mobile Computing Through Telephony: Evolution of Telephony – Multiple Access Procedures – Mobile Computing through Telephone – Developing an IVR Application – Voice XML – Telephony Applicatioin Programming Interface (TAPI).

Emerging Technologies: Introduction – Bluetooth – Radio Frequency Identification (RFID), WiMAX –Mobile IP – IPv6 – Java Card.

Global System for Mobile Communications (GSM): GSM Architecture – Entities – Call Routing in GSM –PLMN Interfaces – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation –Authentication and Security.

UNIT III SMS, GPRS AND WAP 9

Short Message Service (SMS): Mobile Computing over SMS – SMS – Value Added Services through SMS –Accessing the SMS Bearer.

GPRS: Packet Data Network – Network Architecture – Network Operations – Data Services in GPRS –Applications for GPRS – Limitations – Billing and Charging.

Wireless Application Protocol (WAP): Introduction – WAP – MMS – GPRS Applications.

UNIT-IV 3G AND OTHER TECHNOLOGIES 9

CDMA and 3G: Introduction – Spread-Spectrum Technology – IS-95 – CDMA Vs GSM – Wireless Data – 3GNetworks & Applications.

Wireless LAN: Introduction – Advantages – IEEE 802.11 Standards – Architecture – Mobility – Deploying –Mobile Ad Hoc Networks and Sensor Networks – Wireless LAN Security – WiFi Vs 3G.

Internet Networks and Interworking: Introduction – Fundamentals of Call Processing – Intelligence in the Networks – SS#7 Signaling – IN Conceptual Model – Softswitch – Programmable Networks –Technologies and Interfaces for IN.

Client Programming: Introduction – Moving Beyond the Desktop – A Peek under the Hood: Hardware Overview – Mobile Phones – PDA – Design Constraints in Applications for Handheld Devices.

UNIT V MOBILE APPLICATION PLATFORMS 9

Wireless Devices with SYMBIAN OS: Introduction – Symbian OS Architecture – Applications for Symbian – Control and Compound Controls – Active Objects – Localization – Security on the Symbian OS.

Programming for the Android OS: Introduction – Android Architecture – Application Development.

J2ME: JAVA in the Handset – Three-Prong Approach to Java Everywhere, Java 2 Micro Edition (J2ME) –Programming for CLDC – GUI in MIDP – UI Design Issues – Multimedia – Record Management System –Communication in MIDP – Security Considerations in MIDP – Optional Packages

TOTAL: 45

TEXT BOOK

1. Asoke K Talukder & Roopa R.Yavagal, “Mobile Computing – Technology Applications and Service Creation”, TMH 2006.

REFERENCE BOOKS

1. Uwe Hansmann, Lother Merk, Martin S.Nicklous, Thomas Staber, “Principles of Computing”, 2/e, Springer International Edition.
2. J.Schiller, “Mobile communications”, Addison-Wesley, 2003

GE2001	PROFESSIONAL ETHICS AND HUMAN VALUES	L T P C 3 0 0 3
Goal	To introduce the students to basic concepts of Engineering Ethics and Human Values.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Create an awareness on Human Values. 2. Be familiar with the various theories on Engineering Ethics. 3. Throw light on moral social values and Loyalty of professional. 4. Create am awareness about the safety aspects responsibilities and various rights of professionals.	The students will be able to 1. Gain knowledge in Human values. 2. Use the senses of Engineering Ethics and ethical theories.. 3. Be acquainted with the Global issues on Environmental Ethics and Computer Ethics. 4. Get awareness on the Ethics and responsibilities of a professional. 5. Get awareness on Engineering Ethics and Human Values.

UNIT I HUMAN VALUES 10

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V GLOBAL ISSUES 8

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

TOTAL: 45

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, “Ethics in engineering”, McGraw-Hill, 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education, 2004.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

ELECTIVES
SEMESTER – V

CS3651	INFORMATION ARCHITECTURE	L	T	P	C
		3	0	0	3
Goal	To learn and apply Information architecture (IA) which is the art and science of organizing and labelling data including websites, intranets, online communities, software, books and other mediums of information, to develop usability and structural aesthetics.				

Objectives	**Outcomes**
The course should enable the students to 1. Understand the basic information architecture concepts with web 2.0. 2. Identify the research issues in information architecture 3. Learn interaction design 4. Know enterprise Information Architecture 5. Understand Global Information Architecture	The student should be able to 1. Describe the information architecture of web 2.0 2. Take up research to resolve existing issues in Information Architecture 3. Design an interactive Information Architecture 4. Describe Information Architecture practice 5. Define the future of Global Information Architecture

UNIT I INFORMATION ARCHITECTURE AND WEB 2.0 9

Information architecture concepts - Definition- The evolution of the web and web design, Information architecture and web 2.0 - Changing the web world wide web -generations of web -web 2.0

UNIT II INFORMATION ARCHITECTURE AND RESEARCH 9

Challenges and opportunities of IA and design community - Information architecture Research - Design and evaluation ,Organisation - Logical organisation - Semantic Organisation

UNIT III INTERACTION DESIGN 9

Navigation systems - User information behavior and design implications - Understanding user needs and information behavior - Theories and principles - Design implications, Design Components - Interaction design principles - Personalisation and customization

UNIT IV ENTERPRISE IA AND IA IN PRACTICE 9

Enterprise information architecture - Online workspace aggregation - Practising information architecture

UNIT V GLOBAL INFORMATION ARCHITECTURE 9

The need for internationalisation and Localisation - Cross culture theories and localisation - Guidelines for global IA and user experience design , The future of information architecture, The IA community- Challenges in IA architects

TOTAL: 45

TEXT BOOKS

1. Ding, W. and X. Lin (2010). Information architecture and Web 2.0. In Information Architecture: The Design and Integration of Information Spaces (pp. 7-21). San Rafae: Morgan & Claypool Publishers.

2. Wei Ding, Xia Lin Information Architecture: The Design and Integration of Information Spaces Synthesis Lectures on Information Concepts, Retrieval, and Services 2009, International Drexel University.

SEMESTER – VI

CS3652	DATABASE SECURITY	L T P C 3 0 0 3
Goal	.To learn Database security that concerns the use of a broad range of information security controls to protect databases, the database applications or stored functions, the database systems, the database servers and the associated network links against compromises of their confidentiality, integrity and availability.	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Realize the issues in database security. 2. Learn database security models. 3. Study Security Mechanisms. 4. Learn the design of secure DBMS. 5. Learn statistical Database Protection system and IDS.	The students should be able to 1. Have understood the database security models. 2. Implement security mechanisms for database. 3. Design a secure DBMS. 4. Design IDS for DBMS. 5. Have learnt the models for new generation DBMS.

UNIT I INTRODUCTION **9**

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

UNIT II SECURITY MODELS AND MECHANISMS **9**

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

UNIT III SECURITY SOFTWARE DESIGN **9**

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

UNIT IV STATISTICAL DATABASE PROTECTION & INTRUSION DETECTION SYSTEMS **9**

Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery.

UNIT V MODELS FOR THE PROTECTION OF NEW GENERATION DATABASE SYSTEMS **9**

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions.

TOTAL: 45

TEXT BOOKS

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning, 2009.
2. Database Security, Castano, Second edition, Pearson Education.

REFERENCE BOOK

1. Database Security, Alfred Basta, melissa zgola, CENGAGE learning.

CS3653	SOFTWARE AND APPLICATION SECURITY	L T P C 3 0 0 3
Goal	To impart knowledge on web application security and to develop a secure application through secure coding	

Objectives	Outcomes
The course should enable the student to 1. Understand the security fundamentals 2. Learn Network Security Programming 3. Learn various security attacks. 4. Understand web application security 5. Learn secure coding in C, C++ and Java	The student should be able to 1. possess the knowledge of the fundamental concepts of security 2. Securely program servers and clients 3. Capture packets and analyze the packets for security attacks 4. Apply web application attacks 5. Develop a secure code.

UNIT I SECURITY FUNDAMENTALS **9**

Security Attacks - Security Services - Security Mechanisms - Need for secure systems- Proactive security development process- Security principles - threat modelling.

UNIT II NETWORK SECURITY PROGRAMMING **9**

Raw Socket basics -Socket Libraries and Functionality - Programming Servers and Clients - Programming Wired and Wireless Sniffers - Programming arbitrary packet injectors - PCAP file parsing and analysis.

UNIT III WEB APPLICATION SECURITY **9**

Web Servers and Client scripting - Web Application Fuzzers - Scraping Web Applications – HTML and XML file analysis - Web Browser Emulation - Attacking Web Services - Application Proxies and Data Mangling - Automation of attacks such as SQL Injection, XSS.

UNIT IV SECURITY CODING IN C **9**

Character strings- String manipulation errors – String Vulnerabilities and exploits – Mitigation strategies for strings- Pointers – Mitigation strategies in pointer based vulnerabilities – Buffer Overflow based vulnerabilities.

UNIT V: SECURITY CODING IN C++ AND JAVA **9**

Dynamic memory management- Common errors in dynamic memory management- Memory managers- Double –free vulnerabilities –Integer security- Mitigation strategies

TOTAL :45

REFERENCE BOOKS

1. William Stallings, " Cryptography and Network Security" , 5th Ed., Pearson, 2010.
2. Michael Howard , David LeBlanc, “Writing Secure Code”, Microsoft Press, 2nd Ed., 2003
3. Robert C.Seacord, “Secure Coding in C and C++”, Pearson Education, 2nd Ed., 2013

SEMESTER – VII

CS3654	NETWORK SECURITY	L T P C 3 0 0 3
Goal	To impart knowledge on Network security and to design IDS and firewall for network security.	

OBJECTIVES	OUTCOMES
The course should enable the student to 1. Understand the network security fundamentals 2. Learn Cryptographic Algorithms 3. Learn the concepts and design of IDS 4. Learn the configuration and design of firewalls 5. Learn SEIM & Logs	The student should be able to 1. Implement Cryptographic algorithm. 2. Design Intrusion Detection System 3. Design and configure a firewall 4. Do log analysis 5. Understand firewalls

UNIT I INTRODUCTION **9**

Security Mechanisms - Security Services - Security Attacks - Model for Network Security - Classical Ciphers.

UNIT II CRYPTOGRAPHIC ALGORITHMS **9**

Number Theory - Modern Block Ciphers: DES, 3DES, AES, Blowfish, IDEA, CAST-128 - Stream Cipher - Public Key Cryptography : RSA, Diffie-Hellman, Elgamal, ECC.

UNIT III INTRUSION DETECTION SYSTEM **9**

Architecture - Types - Soft Computing and data mining techniques for the design of IDS-SNORT.

UNIT IV FIREWALL AND TRUSTED SYSTEMS **9**

Virus - Worms - Firewall Design Principles: Firewall Characteristics -Types of Firewalls Firewall Configurations - Trusted Systems-Data Access Control - Trusted systems -Trojan Horse Defense.

UNIT V SEIM & LOGS **9**

Basic concepts - Types - MIB - Log formats - Mobile transaction Logs - Log tools

TOTAL: 45

REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security" , 5th Ed., Pearson, 2010.
2. Bruce Schneir, "Applied cryptography", 2nd Ed., , John Wiley, 1996.
3. Jacob Babin et.al., "Security in Log Management",Syngress, 2006

CS3655	IDENTITY AND ACCESS MANAGEMENT	L T P C 3 0 0 3
Goal	To learn identity and access management in network security	

OBJECTIVES	OUTCOMES
The course should enable the students to 1. Learn the foundations of security and access control. 2. Learn the models of identity management 3. Understand the elements of trust paradigms 4. Learn mandatory access control model 5. Learn modern access control model	The students should be able to 1. Realize the foundations of access control 2. Implement the models of identity management 3. Design trust paradigms 4. Design mandatory access control 5. Design modern access control

UNIT I SECURITY AND ACCESS CONTROL IN COMPUTING 9

Elements of Systems Security, Identification and Authentication, Approaches to Reliable Password Management, Auditing, The Security Context, Access Control - Reference-Monitor Topology.

UNIT II IDENTITY-MANAGEMENT MODELS 9

Local identity, Network identity, Federated identity, global web identity - The XNS approach to the global web identity, centralized enterprise-level identity Management.

UNIT III ELEMENTS OF TRUST PARADIGMS IN COMPUTING 9

A third-party approach to identity trust - Kerberos, Implicit third-party authentication paradigm, Explicit third-party authentication paradigm, the public-key infrastructure approach to trust establishment, Trusting a public key: Foundations of trust in PKI - Identification links between a certificate and a CRL, Protecting the CA signing key, PKI Trust Topologies.

UNIT IV MANDATORY-ACCESS-CONTROL MODEL 9

Partial orders, lattices, lattice-based access-control models, the lattice structure of the information flow model, the bell-lapadula flow model, the BIBA model, Comparing information flow in BLP, And BIBA models, the Chinese-wall policy, Access-Matrix Model, The general safety problem of the access-matrix model.

UNIT – V MODERN ACCESS AND PROTECTION MODEL 9

The Take-Grant Model (TGM), The Schematic-Protection Model (SPM), Role-Based Access Control (RBAC).

TOTAL:45

REFERENCE BOOKS

1. Messaoud Benantar, IBM Corp, Austin, TX, USA, Access Control Systems Security, Identity Management and Trust Models, Springer publication, 2006.
2. Ertem Osmanoglu, Identity and Access Management: Business Performance Through Connected Intelligence, Elsevier, 2013.

3. Corbin H. Links,IAM Success Tips: Identity and Access Management Success Strategies, CreateSpace Independent Publishing Platform, 2008
4. Archie Reed, The Definitive Guide to Identity Management, Realtime Publishers, 2004.

CS3656	SECURITY GOVERNANCE RISK AND COMPLIANCE	L T P C
Goal	To learn the governance risk and compliance of an organisation	3 0 0 3

Objectives	Outcomes
The course should enable the students to	The student should be able to
1. Understand the security governance, risk, compliance and internal controls of an organisation 2. Learn strategic metrics and security architecture 3. Understand security risk management 4. Learn security strategies 5. Learn Security Metrics	1. Have an understanding about the fundamentals of GRC 2. Have an understanding on security architecture. 3. Do risk management 4. Apply compliance technology and tools

UNIT I INTRODUCTION **9**

Introduction : Governance, Risk, Compliance. Information Security Governance, Outcomes, Benefits, Security Governance and Regulation, Roles and Responsibilities.

UNIT II STRATEGIC METRICS & SECURITY ARCHITECTURE **9**

Strategic metrics, Strategic Direction, Information Security outcomes- Strategic Alignment, Risk Management, Business process assurance/convergence, Value delivery, Resource management, Performance measurement, Security architecture, ISO/IEC 27001/27002.

UNIT III RISK MANAGEMENT **9**

Risk management responsibilities, Managing risk appropriately, Current State of Security, SABSA, CobiT, CMM, Cyber Security Task Force- Governance Framework, Gap Analysis – SABSA, CMM.

UNIT IV SECURITY STRATEGY **9**

Strategy – Failure, Attributes, Resources, Constraints, Sample Strategy Development – The Process, Implementing Strategy.

UNIT V SECURITY METRICS **9**

Security program Development metrics, Information Security management metrics, CISO Decisions, Information Security operational Metrics, Incident Management and Response Metrics.

TOTAL : 45

REFERENCE BOOKS

1. Information Security Governance: A Practical Development and Implementation Approach, By Krag Brotby.
2. Information Security Risk Management for ISO27001/ISO27002, By Alan Calder, Steve G. Watkins.