ACADEMIC REGULATIONS,

COURSE STRUCTURE

&

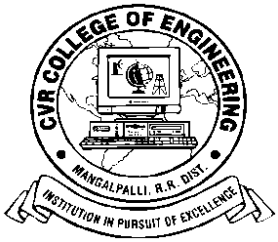
SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

B.Tech. 2nd Year

COMPUTER SCIENCE AND ENGINEERING

Applicable for the batches admitted in second year from 2016-17 onwards



CVR COLLEGE OF ENGINEERING

UGC Autonomous Institution

(Approved by AICTE & Govt. of Telangana and
Affiliated to JNT University Hyderabad)
Vastunagar, Mangalpalli (V), Ibrahimpatan (M),
R.R. Dist, Pin – 501 510

CVR COLLEGE OF ENGINEERING

VISION

- To be a state of the art institution of engineering in pursuit of excellence, in the service of society

MISSION

- To excel in providing quality education at under graduate and graduate levels
- To encourage research and innovation
- To provide infrastructure and facilities to meet the latest technological needs
- To establish Centres of Excellence through active interaction with industry
- To nurture students towards holistic development with human values and ethics

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION:

- To strive continuously in pursuit of excellence in education and research.
- To produce competent Computer Professionals with capability and aptitude to adapt and contribute to the ever changing technological and societal environment at local, national and global levels.

MISSION:

- Providing an enabling environment that harness students abilities in solving real world problems.
- Presenting enriched work-culture that attracts high quality teachers.
- Inculcating research culture in staff as well as students to mould them with creative mindset.
- Making use of existing open source technologies and to contribute to the open source community.
- Actively interacting with alumni, research organizations, National level academic Institutions and industry.
- Encouraging students and faculty to participate in community development using technologies.
- Fostering active interaction among students and faculty through seminars and workshops etc.

B.Tech. COMPUTER SCIENCE AND ENGINEERING

PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

PEO 1:
Computer Science & Engineering graduates will acquire capability to apply their knowledge and skills to solve various kind of computational engineering problems.

PEO 2:
Exhibit the ability to function ethically and responsibly in their profession with active participation to uplift the societal status.

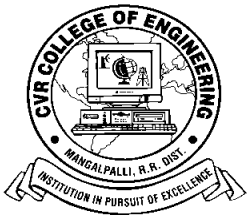
PEO 3:
Able to perform successfully in various vertical domains like manufacturing, finance, utilities etc..

PEO 4:
Continue to learn and to adapt in a world of constantly evolving technologies and pursue research towards academic excellence.

PEO 5:
Display effective managerial skills to adapt to the diverse global environment.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. Thorough understanding of formal language principles and compiler design.
2. Ability to apply the concepts of object oriented analysis and design to develop cost effective applications across multiple functional domains.
3. An understanding of professional, legal, and ethical issues and responsibilities as it pertains to computer engineering.
4. Understand the framework of mathematical models and software suits aimed at secure computing.
5. Hands on experience in construction, deployment and maintenance of web infrastructure using modern architectures like SOA.
6. Ability to apply advanced algorithms aimed at organizing, analyzing and interpreting data coupled with computational intelligence.



CVR COLLEGE OF ENGINEERING

Vastunagar, Mangalpalli, Ibrahimpatan – 501 510

ACADEMIC REGULATIONS - 2016
Choice Based Credit System (CBCS)
B.Tech. PROGRAMMES

(Effective for the students admitted into I year from the Academic Year **2015-16** and onwards)

1.0 Under - Graduate Degree Programme in Engineering & Technology (B.Tech.: Under Graduate Programme (UGP) in Engineering & Technology (E&T))

CVR College of Engineering is an autonomous institution under the University Grants Commission, affiliated to Jawaharlal Nehru Technological University, Hyderabad. The College offers 4 Year (8 Semesters) **Bachelor of Technology** (B.Tech.) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2015-16 onwards, in the following Branches of Engineering.

Table-1

Sl. No.	***Branch***
I.	Civil Engineering
II.	Computer Science and Engineering
III.	Electronics and Communication Engineering
IV.	Electrical and Electronics Engineering
V.	Electronics & Instrumentation Engineering
VI.	Information Technology
VII.	Mechanical Engineering

2.0 Eligibility for Admission

2.1 Admission to the UGP shall be made either on the basis of the merit rank obtained by the qualifying candidate at an Entrance Test conducted by the Telangana State Government (EAMCET), OR the University, OR on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.

2.2 The medium of instruction for the entire UGP in E&T will be ENGLISH only.

3.0 B.Tech. Programme (UGP) Structure

3.1 The B.Tech. Programmes of CVR College of Engineering are of Semester Pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 22 Weeks duration (inclusive of Examinations), with a minimum of 90 Instructional Days per Semester.

3.2 UGC/ AICTE /JNTUH specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are as listed below.

3.2.1 Semester Scheme:

Each UGP is of 4 Academic Years (8 Semesters), with the year being divided into two Semesters of 22 weeks ($\geq$ 90 working days) each, each Semester having - 'Continuous Internal Evaluation (**CIE**)' and 'Semester End Examination (**SEE**)'. Choice Based Credit System (**CBCS**) and Credit Based Semester System (**CBSS**) as denoted by UGC, and Curriculum / Course Structure as suggested by AICTE are followed.

3.2.2 Credit Courses:

All Subjects / Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject / Course in a L:T:P:C (Lecture Periods: Tutorial Periods: Practicals Periods: Credits) Structure, based on the following general pattern :

- One Credit - for One hour/ Week/ Semester for Theory/ Lecture (L) Courses; and,
- One Credit - for Two hours/Week/Semester for Laboratory/ Practical (P) Courses or Tutorials (T).

Other student activities like NCC, NSS, NSO, Study Tour, Guest Lecture etc., and identified Mandatory Courses will not carry Credits.

3.2.3 Subject/ Course Classification:

All Subjects/ Courses offered for the UGP are broadly classified as: (a) Foundation Courses (FnC), (b) Core Courses (CoC), and (c) Elective Courses (EℓC).

- Foundation Courses (FnC) are further categorized as:

- (i) HS (Humanities and Social Sciences),
- (ii) BS (Basic Sciences), and
- (iii) ES (Engineering Sciences);
- Core Courses (CoC)and Elective Courses (EℓC) are categorized as PS (Professional Subjects), which are further subdivided as –

(i) PC (Professional/ Departmental Core) Subjects,
(ii) PE (Professional/ Departmental Electives),
(iii) OE (Open Electives); and
(iv) Project Works (PW);

- Minor Courses (1 or 2 Credit Courses, belonging to HS/ BS/ ES/ PC as per relevance) such as Skill Development Courses of 1 Credit each, and
- Mandatory Courses (MC - non-credit oriented).

3.2.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping for each of the UGP E&T (B.Tech. Degree Programmes), is as listed below (along with AICTE specified % Range of Total Credits).

Table-2

S. No.	*Broad Course Classification*	*Course Group/ Category*	*Course Description*	*Range of Credits*
1	**Foundation Courses (FnC)**	**BS – Basic Sciences**	Includes - Mathematics, Physics and Chemistry Subjects	**15% - 20%**
2		**ES - Engineering Sciences**	Includes fundamental engineering subjects	**15% - 20%**
3		**HS – Humanities and Social Sciences**	Includes subjects related to Humanities, Social Sciences and Management	**5% - 10%**
4	**Core Courses (CoC)**	**PC – Professional Core**	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	**30% - 40%**
5	**Elective Courses (EℓC)**	**PE – Professional Electives**	Includes Elective subjects related to the Parent Discipline/ Department/ Branch of Engg.	**10% - 15%**
6		**OE – Open Electives**	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline / Department / Branch of Engg.	**5% - 10%**
7	**Core Courses**	**Project Work**	B.Tech. Project or UG Project or UG Major Project	**10% - 15%**
8		**Industrial Training/ Mini- Project**	Industrial Training / Internship / Mini-Project	
9		**Seminar / Comprehensive Viva-Voce**	Seminar / Comprehensive Viva-Voce based on core contents related to Parent Discipline / Department / Branch of Engg.	
10		**Minor Courses**	1 or 2 Credit Courses (subset of HS)	**Included**
11		**Mandatory Courses (MC)**	Mandatory Courses (non-credit)	**-**
Total Credits for UGP (B. Tech.) Programme				**192 (100%)**

4.0 Course Work

4.1 A student, after securing admission, shall pursue the B.Tech. UGP in a minimum period of 4 Academic Years, and a maximum period of 8 Academic Years (starting from the Date of Commencement of I Year).

4.1.a. After eight academic years of course of study, a candidate is permitted to write the end examinations for the immediately following **two** years.

4.2 Each student shall register for and secure the specified number of Credits required for the completion of the UGP and Award of the B.Tech. Degree in respective Branch of Engineering.

4.3 Each Semester is structured to provide typically 24 Credits (24 C), totaling to **192** Credits (192 C) for the entire B.Tech. Programme

4.3.a. A student will be declared eligible for the award of the B. Tech degree if he / she registers for **192** credits and secures at least **184** credits with compulsory subjects as listed in Table-3.

Table-3:
Compulsory subjects

Sl. No.	Subject Particulars
1	All practical subjects
2	Industry oriented mini project
3	Comprehensive Viva-Voce
4	Seminar
5	Project Work

4.3.b. The best **184** credits shall be considered for the calculation of Cumulative Grade Point Average (CGPA) and award of class based on CGPA.

4.4. Students who fail to fulfill all the academic requirements for the award of the degree within **ten** academic years from the year of their admission shall forfeit their seat in B. Tech course.

5.0 Course Registration

5.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him about the UGP, its Course Structure and Curriculum, Choice/Option for Subjects/ Courses, based on his competence, progress, pre-requisites and interest.

5.2 Academic Section of the College invites 'Registration Forms' from students apriori (before the beginning of the Semester), through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE Registration requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

5.3 A student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his Faculty Advisor,

which should be submitted to the College Academic Section through the Head of the Department (a copy of the same being retained with Head of the Department, Faculty Advisor and the Student).

5.4 A student may be permitted from III year I semester onwards to Register for Subjects/ Courses of CHOICE with a typical total of 24 Credits per Semester (Minimum being 20 C and Maximum being 28 C, permitted deviation being ± 14%), based on his /her PROGRESS and SGPA/ CGPA, and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses, in the Department Course Structure and Syllabus contents. However, a MINIMUM of **20** Credits per Semester must be registered to ensure the 'STUDENTSHIP' in any Semester.

5.5 Choice for 'additional Subjects /Courses' to reach the Maximum Permissible Limit of 28 Credits (above the typical 24 Credit norm) must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/ Counselor.

5.6 If the student submits ambiguous choices or multiple options or erroneous entries-during ON-LINE Registration for the Subject (s) /Course(s) under a given/ specified Course Group/ Category as listed in the Course Structure, only the first mentioned Subject / Course in that Category will be taken into consideration.

5.7 Subject / Course Options exercised through ON-LINE Registration are final and CAN NOT be changed, and CAN NOT be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within the **FIRST WEEK** from the commencement of Class-work for that Semester.

5.8 Dropping of Subjects / Courses may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor (subject to retaining a minimum of 20 C), 'within 15 Days of Time' from the beginning of the current Semester.

5.9 For Mandatory Courses like NCC / NSS / NSO etc., a 'Satisfactory Participation Certificate' from the concerned authorities for the relevant Semester is essential. No Marks or Grades or Credits shall be awarded for these activities.

6.0 Subjects / Courses to be offered

6.1 A typical Section (or Class) Strength for each Semester shall be 60.

6.2 A Subject/ Course may be offered to the students, ONLY IF a Minimum of 20 Students (1/3 of the Section Strength) opt for the same. The Maximum Strength of a Section is limited to 80 (60 + 1/3 of the Section Strength).

6.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab./ Practicals may be included with the corresponding Theory Subject in the same Semester) in any Semester. However, selection of students will be based on - 'FIRST COME FIRST SERVE Basis and CGPA Criterion'(ie., the first focus shall be on early ON-LINE ENTRY from the student for Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).

6.4 If more entries for Registration of a subject come into picture, then the concerned Head of the Department shall take necessary action, whether to offer such a Subject / Course for TWO (or multiple) SECTIONS or NOT .

6.5 In case of options coming from students of other Departments / Branches / Disciplines (not considering OPEN ELECTIVES), PRIORITY shall be given to the student of the 'Parent Department' first.

7.0 Attendance Requirements

7.1 A student shall be eligible to appear for the End Semester Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/ Courses (excluding Mandatory or Non-Credit Courses) for that Semester.

7.2 Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence.

7.3 A stipulated fee shall be payable towards condoning of shortage of attendance.

7.4 Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

7.5 Students, whose shortage of attendance is not condoned in any Semester, are not eligible to take their End Examinations of that Semester, they get detained and their registration for that Semester shall stand cancelled. They will not be promoted to the next Semester. They may seek re-registration for all those Subjects registered in that Semester in which they are detained, by seeking re-admission for that Semester as and when offered; in case there are any Professional Electives and/ or Open Electives, the same may also be re-registered if offered, however, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the SAME set of Elective Subjects offered under that category.

8.0 Academic Requirements

The following Academic Requirements have to be satisfied, in addition to the Attendance Requirements mentioned in Item No.**7.**

8.1 A student is evaluated in each course for 100 marks (30 internal and 70 external; details in 9). A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Subject/ Course, if he secures not less than 35% marks (25 out of 70 marks) in the End Semester Examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing **P** Grade or above in that Subject/ Course.

8.2 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to Industry oriented Mini-Project/ Seminar/ Comprehensive Viva, if he secures not less than 40% of the total marks (40 marks) to be awarded for each. The student would be treated as failed, if he (i) does not submit a report on his Industry oriented Mini-Project, or does not make a presentation of the same before the Evaluation Committee as per schedule, or (ii) does not present the Seminar as required in the IV year I Semester, or (iii) secures less than 40% of marks (40 marks) in Industry oriented Mini-Project/ Seminar/ Comprehensive Viva-Voce evaluations.

He may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent Semester, as and when it is scheduled.

Promotion Rules:

8.3 Credits required for B.Tech. students to get Promotion from I to II year:

- A student will not be promoted from I year to II year unless he fulfills the academic requirement of securing 50% of total credits of I year (24 credits out of 48 credits) of I year from all the examinations and secures prescribed minimum attendance.

8.4 Credits required for B.Tech. students to get Promotion from II to III year:

- A student will not be promoted from II year to III year unless he fulfills the academic requirement of securing 60% of the credits up to II year I semester or credits upto II year II semester, from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester, irrespective of number of credits registered.

8.5 Credits required for B.Tech. students to get Promotion from III to IV year:

- A student shall be promoted from III year to IV year only if he fulfills the academic requirement of securing 60 % of the credits up to III year I semester or credits upto III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester, irrespective of number of credits registered.

- A student shall register and put up minimum attendance in all **192** credits and earn a minimum of **184** credits. Grades obtained in the best 184 credits shall be considered for the calculation of CGPA.

- Students who fail to earn **184** credits as indicated in the Course Structure within ten academic years (8 years of study + 2 years additionally for appearing for exams only) from the

year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

NB: In case the total number of credits being an odd number, the number of credits considered is rounded off to the nearest lower integer.

The above promotion rule is furnished below in tabulated form.

Promotion From To	**Credits to be considered**
1st year to 2nd year	50% of the credits of 1st year (1st to 2nd semester) 24 credits out of 48 credits
2nd year to 3rd year	a) 60% of the credits upto 2nd year 1st semester (1, 2 & 3 semesters) **or** b) 60% of the credits upto 2nd year 2nd semester (1, 2, 3 & 4 semesters) (Irrespective of number of credits registered).
3rd year to 4th year	a) 60% of the credits upto 3rd year 1st semester (1, 2, 3, 4 & 5 semesters) **or** b) 60% of the credits upto 3rd year 2nd semester (1, 2, 3, 4, 5 & 6 semesters) (Irrespective of number of credits registered).

8.6 A student shall register for all Subjects covering **192** Credits as specified and listed (with the relevant Course/Subject Classifications as mentioned) in the Course Structure, put up all the Attendance and Academic requirements for **192** Credits securing a minimum of **P** Grade (Pass Grade) or above in each Subject, and earn **184** credits securing SGPA $\geq$ 5.0 (in each Semester), and CGPA (at the end of each successive Semester) $\geq$ 5.0, to successfully complete the B.Tech. Programme.

8.7 After securing the necessary **192** Credits as specified for the successful completion of the entire UGP, an exemption of 8 secured Credits is given and the best (in terms of two of their corresponding Subjects/Courses) **184** Credits are considered for UGP performance evaluation, i.e., the performance of the Student in these **184** Credits shall alone be taken into account for the calculation of 'the final

CGPA (at the end of UGP, which takes the SGPA of the IV Year II Semester also into account)', and shall be indicated in the Grade Card of IV Year II Semester; however, the student's performance in the earlier individual Semesters, with the corresponding SGPA and CGPA for which already Grade Cards are given, will not be altered. Further, optional drop out for such 8 secured Credits shall not be allowed for Subjects/ Courses listed as i) Laboratories/ Practicals, ii) Industrial Training/ Mini-Project, iii) Seminar, iv) Major Project, v) Comprehensive Viva – Voce as listed in Table-3.

8.8 If a student registers for some more 'extra Subjects' (in the parent Department or other Departments/Branches of Engg.) other than those listed Subjects totaling to**192** Credits as specified in the Course Structure of the Department, the performances in those 'extra Subjects' (although evaluated and graded using the same procedure as that of the required **192** Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra Subjects' registered, Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in Items 7 and 8.1 – 8.7 above.

8.9 When a student is detained due to shortage of attendance in any Semester, he may be **re-admitted** into that Semester, as and when offered, with the Academic Regulations of the Batch into which he is first admitted. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire Semester in which he got detained.

8.10 When a Student is detained due to lack of Credits in any year, he may be readmitted in the next year, after fulfillment of the Academic Requirements, with the Academic Regulations of the Batch into which he is first admitted.

8.11 A student eligible to appear in the End Semester Examination in any Subject/ Course, but absent at it or failed (thereby failing to secure **P** Grade or above), may reappear for that Subject/ Course at the supplementary examination (SEE) as and when conducted. In such cases, his Internal Marks (CIE) assessed earlier for that Subject/Course will be carried over, and added to the Marks to be obtained in the SEE supplementary examination, for evaluating his performance in that Subject.

9.0 Evaluation - Distribution and Weightage of Marks Evaluation:

9.1 The performance of a student in each Semester shall be evaluated Subject-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory or Practicals or Seminar or Drawing/Design or Industry oriented Mini-Project or Minor Course or Major Project or Comprehensive Viva or Skill Development Courses. These evaluations shall be based on 30% CIE (Continuous Internal Evaluation) and 70% SEE (Semester End Examination), and a Letter Grade corresponding to the % marks obtained shall be given.

9.2 For all Subjects/Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE.

9.3 Distribution and Weightage of Credits

Type of Subject	Semester	
	Period / Week	Credits
Theory	04 03	04 03
Practical	03	02
Drawing	05 03	04 02
Minor Theory	02	02
Skill Development Courses	02	01
Mini Project	--	02
Seminar	06	02
Comprehensive Viva-Voce	--	02
Project work	15	10

9.3.a Theory Subjects:

Theory subjects are allotted 3 or 4 credits. The distribution shall be 30 marks for internal evaluation and 70 marks for the end examination.

There shall be two midterm internal examinations. The syllabus for the mid examination will be the first 2.5 units for the first mid examination and the remaining 2.5 units for the second mid examination.

The midterm internal marks for theory subjects are to be scaled to a maximum of 20 marks. 8 marks are allotted for

assignments and 2 marks for attendance equal to or greater than 75%. There shall be one assignment to be submitted and evaluated before each mid exam. Total internal evaluation marks is therefore 30.

The first Mid-term examination Marks and first assignment marks shall make one set of CIE Marks and the second Mid-term examination marks and second assignment marks shall make second set of CIE marks. Average of these two sets of CIE marks will be taken as the final marks secured by each candidate.

The duration of mid examination is 2 hours for theory subjects.

The end examination duration for theory subjects is 3 hours.

Substitution Test:

- If any candidate is absent for any theory or minor theory subject in a mid examination or both mid examinations, a separate substitution test covering the entire syllabus of the subject will be conducted on payment of prescribed fees before the commencement of the end semester examinations.

- If a candidate has missed both the mid examinations, then the marks scored in the substitution test will be halved and accordingly recorded.

9.4 Practical Subjects:

For practical subjects the distribution shall be 30 marks for internal evaluation and 70 marks for the end semester examination. Out of the 30 marks allotted for internal evaluation, day-to-day work in the laboratory shall be evaluated for 20 marks and internal practical / internal drawing examination for 10 marks. Internal examinations shall be conducted by the concerned teacher, with the help of any other faculty member of the department.

The end examination for practical subjects shall be conducted with an external examiner and laboratory teacher specified by the Head of the Department concerned.

The end examination duration for practical subjects is 3 hours.

External Examiner shall be appointed by Controller of Examinations on the recommendation of the Chairman, Board of Studies of the concerned department. External

examiner can be a teacher from outside the college or a teacher of the college who was not associated with the day-to-day class work of that laboratory.

The Drawing end examinations will be conducted along with the examinations of theory subjects.

9.5 Drawing Subjects:

Drawing subjects are allotted marks as for theory subjects: 30 marks for internal evaluation and 70 marks for the end examination. Out of the 30 marks allotted for internal evaluation, day-to-day practice shall be evaluated for 20 marks, internal drawing examinations for 10 marks.

9.6 Electives:

Departmental Electives include subjects related to the parent discipline, department or branch of engineering.

Interdisciplinary Electives include subjects offered by a department or branch of engineering to other departments or branches of engineering.

Open Electives are subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline department or branch of engineering, that do not require a prerequisite course.

However, students **cannot opt** for an open elective subject offered by their own department, if it is already listed under core / elective subjects offered by that department, in any semester.

Skill Development Courses:

Skill Development Courses are allotted 1 credit. The distribution of marks shall be 30 marks for internal evaluation and 70 marks for the end examination.

The end examination shall be conducted by examiners specified by the Head of the Department.

The end examination duration for Skill Development Courses is 3 hours.

9.7 Industry-Oriented Mini-Project:

An industry-oriented mini-project in collaboration with an industry related to specialization of the department is to be taken up during the vacation following III year II semester examinations. The mini project work shall be submitted in report form to the Head of the Department concerned within the first two weeks of commencement of classes of IV year I semester. The marks allotted for Industry Oriented mini-project is 100 (30 internal + 70 external). The mini-project is to be presented as a seminar which will be evaluated by a committee for 30 marks. The committee consists of the Head of the Department, supervisor of the mini project and a senior faculty member of the department.

The external examination (viva-voce) for mini project shall be conducted by a committee consisting of an external examiner and an internal examiner nominated by the Head of the Department, for 70 marks. This examination is to be scheduled along with the laboratory exams of IV year I semester.

External examiner shall be appointed by the **Dean-Academics** on the recommendations of the Chairman, Board of Studies of the department. External examiner must be a teacher from outside the college.

9.8 Seminar:

There shall be a seminar presentation by each student in IV year – II semester. For the seminar, the student shall collect information on a specialized topic and present the same. The student will also have to submit a technical report to the department showing his / her understanding of the topic. The seminar presentation and the report shall be evaluated for 100 marks by a departmental committee consisting of the Head of the Department, seminar supervisor and a senior faculty member. There shall be **no external** examiner for seminar.

9.9 Comprehensive Viva-Voce:

There shall be a Comprehensive Viva-Voce examination in IV year II semester conducted by a committee consisting of the Head of the Department and two senior faculty members of the department. The Comprehensive Viva-Voce is aimed at assessment of the student's understanding in various subjects he / she studied during the B. Tech course. It is

evaluated for 100 marks by the committee. There are **no internal** marks for Comprehensive Viva - Voce.

9.10 Project Work:

Each Student shall start the Project Work during the IV Year I Semester, as per the instructions of the Project Guide/ Project Supervisor assigned by the Head of the Department. Out of a total of 100 marks allotted for the Project Work, 30 marks shall be for CIE (Continuous Internal Evaluation and 70 marks for the SEE (Semester End Viva-Voce Examination). The Project Viva-Voce shall be conducted by a Committee comprising of an External Examiner, Head of the Department and Project Supervisor. Out of 30 marks allocated for CIE, 15 marks shall be awarded by the Project Supervisor (based on the continuous evaluation of student's performance throughout the Project Work period), and the other 15 marks shall be awarded by a Departmental Committee consisting of Head of the Department and Project Supervisor, based on the work carried out and the presentation made by the student at the time of Viva-Voce Examination.

External examiner shall be appointed by the **Dean-Academics** on the recommendations of the Chairman, Board of Studies of the concerned department. External examiner must be a teacher from outside the college.

9.11 Laboratory examination marks / sessional marks awarded by the examiners are subject to scrutiny and scaling by the Results Committee wherever necessary. The committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the committee are final and binding.

9.12 For NCC/NSS/ NSO types of Courses, and/or any other Mandatory Non-Credit Course offered in a Semester, a 'Satisfactory Participation Certificate' shall be issued to the student from the concerned authorities, only after securing $\geq$ 65% attendance in such a Course. No marks or Letter Grade shall be allotted for these activities.

10.0 Grading Procedure

10.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE + SEE (Continuous Internal

Evaluation + Semester End Examination, both taken together) as specified in Item 9 above, and a corresponding Letter Grade shall be given.

10.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed.

% of Marks Secured (Class Intervals)	*Letter Grade (UGC Guidelines)*	*Grade Points*
80% and above (≥ 80% , ≤ 100%)	**S (Outstanding)**	**10**
Below 80% but not less than 70% (≥ 70% , < 80%)	**A^+ (Excellent)**	**9**
Below 70% but not less than 60% (≥ 60% , < 70%)	**A (Very Good)**	**8**
Below 60% but not less than 55% (≥ 55% , < 60%)	**B^+ (Good)**	**7**
Below 55% but not less than 50% (≥ 50% , < 55%)	**B (above Average)**	**6**
Below 50% but not less than 45% (≥ 45% , < 50%)	**C (Average)**	**5**
Below 45% but not less than 40% (≥ 40% , < 45%)	**P (Pass)**	**4**
Below 40% (< 40%)	**F (FAIL)**	**0**
Absent for the Examination	**Ab (Absent)**	**0**

10.3 A student obtaining **F** Grade in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

10.4 A Letter Grade does not imply any specific % of Marks.

10.5 A student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'. However, he has to repeat all the Subjects/ Courses pertaining to that Semester, when he is detained (as listed in Items 8.10- 8.11).

10.6 A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ Course.

Credit Points (CP)= Grade Point (GP) x Credits for a Course

10.7 The student passes the Subject/ Course only when he gets GP $\geq$ 4 (**P** Grade or above).

10.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

SGPA = { $\sum_{i=1}^{N} C_i \; G_i$ } / { $\sum_{i=1}^{N} C_i$ } .... For each Semester,

where 'i' is the Subject indicator index (takes into account all Subjects in a Semester), 'N' is the no.of Subjects 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), C_i is the no. of Credits allotted to the ith Subject and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that ith Subject.

10.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

CGPA = { $\sum_{j=1}^{M} C_j \; G_j$ } / { $\sum_{j=1}^{M} C_j$ } ... for all S Semesters Registered (i.e., upto and inclusive of S Semesters, S$\geq$ 2),

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards upto and inclusive of the Semester S (obviously M>N), 'j' is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), C_j is the no. of Credits allotted to the jth Subject, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Year I Semester however, the SGPA of that

Semester itself may be taken as the CGPA, as there are no cumulative effects.

10.10.1 For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

10.11 For Calculations listed in Item 10.6 – 10.10, performance in failed Subjects/ Courses (securing **F** Grade) will also be taken into account, and the Credits of such Subjects/ Courses will also be included in the multiplications and summations. However, Mandatory Courses (with no credits) will not be taken into consideration.

10.12 Passing Standards:

10.12.1 A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA $\geq$ 5.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UGP, only when gets a CGPA $\geq$ 5.00; subject to the condition that he secures a GP $\geq$ 4 (**P** Grade or above) in every registered Subject/ Course in each Semester (during the entire UGP) for the Degree Award, as required.

10.12.2 In spite of securing **P** Grade or above in some (or all) Subjects/ Courses in any Semester, if a Student receives a SGPA<5.00 and/ or CGPA<5.00 at the end of such a Semester, then he 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) -

(i) to go into the next subsequent Semester (subject to fulfilling all other attendance and academic requirements as listed under Items 7-8);

(ii) to 'improve his SGPA of such a Semester (and hence CGPA) to 5.00 or above', by reappearing for ONE or MORE (as per student's choice) of the same Subject(s) / Course(s) in which he has secured **P** Grade(s) in that Semester, at the Supplementary Examinations to be held in the next subsequent Semester(s). In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

10.12.3 A student shall be declared successful or 'passed' in any Non-Credit Subject / Course, if he secures a 'Satisfactory Participation Certificate' for that Mandatory Course.

10.13 After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the Registered students of that Semester, indicating the Letter Grades and Credits earned. It will show the details of the Courses Registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA and CGPA.

11.0 Declaration of Results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 10.6 – 10.11.

12.0 Award of Degree

12.1 A student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes the examinations prescribed in the entire UG E&T Programme (UGP), and secures the required number of 184 Credits (with CGPA ≥ 5.0), within 8 Academic Years from the Date of Commencement of the First Academic Year, shall be declared to have 'QUALIFIED' for the Award of the B.Tech. Degree in the chosen Branch of Engineering as selected at the time of Admission.

12.2 Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B.Tech degree he / she shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured
First Class with Distinction	≥ 7.75
First Class	6.75 ≤ CGPA < 7.75
Second Class	5.75 ≤ CGPA < 6.75
Pass Class	5.0 ≤ CGPA < 5.75

12.3 A student with final CGPA (at the end of the UGP) < 5.00 will not be eligible for the Award of the Degree.

13.0 Withholding of Results

13.1 If the student has not paid fees to University/ College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

14.0 Transitory Regulations

14.1 Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/Courses (or equivalent Subjects/ Courses, as the case may be), and same Professional Electives/ Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the Date of Commencement of his I Year I Semester).

15.0 Student Transfers

15.1 There shall be no Branch transfers after the completion of Admission Process.

16.0 Scope

i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”.
ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor / Principal is final.
v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.

17. Disciplinary Action for Malpractices by students in Exams

Sl. No.	Nature of Malpractices / Improper Conduct	Punishment
1. a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculator, Cell Phone, pager, palm computer, blue-tooth equipment or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he/she is appearing but has not made use of it. Material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination.	Expulsion from the examination hall and cancellation of the performance in that subject only.
b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language method or communicates through cell phone or any other communication equipment with any candidate or persons inside or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case will be registered against him / her.
2.	Has copied in the examination hall from any paper, book, programmable calculator, palm computer or by dictation from wireless means any material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester / year. The Hall Ticket of the candidate will be cancelled.

Sl. No.	Nature of Malpractices / Improper Conduct	Punishment
3.	*Impersonates* any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from the examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case registered against him.
4.	*Smuggles* in the Answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred for two

Sl. No.	Nature of Malpractices / Improper Conduct	Punishment
		consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of performance in that subject only.
6.	*Refuses to obey* the orders of the Chief Superintendent / Assistant Chief Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer Incharge or any person on duty in or outside the examination hall, causes any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer Incharge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate (s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.

Sl. No.	Nature of Malpractices / Improper Conduct	Punishment
	to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall *taking away answer script or intentionally* tears the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. Continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. The candidate will be reported to the police.
9.	If a student of the college, who is not a candidate for the particular examination or any	Student of the college is expelled from the examination hall and

Sl. No.	Nature of Malpractices / Improper Conduct	Punishment
	person not connected with the college indulges in any malpractice or improper conduct mentioned in clauses 6 to 8.	cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a *drunken* condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not included in clauses 1 to 11, it shall be reported to the Dean-Academics for further action to award suitable punishment.	As decided by Dean-Academics

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Second Year B.Tech. Computer Science and Engineering (CBCS)

1st Semester Course Structure

Regulations: R15-CBCS **With effect from Academic year 2016-17 Onwards**

Sl. No.	Subject Code	Subject	Category	Periods per Week		Credits	Scheme of Examination Maximum Marks			Page No.
				L	T/P/D		Internal	External	Total	
1	35201	Object Oriented Programming Through Java	PC	3	1	3	30	70	100	1
2	35202	Discrete Structures and Graph Theory	PC	4	0	4	30	70	100	4
3	37202	Boolean Algebra and Circuit Design	PC	3	1	3	30	70	100	6
4	38201	Probability and Statistics	BS	3	1	3	30	70	100	8
5	35203	Unix and Shell Programming	PC	3	1	3	30	70	100	11
6	34201	Electronic Devices and Circuits	ES	3	1	3	30	70	100	13
Practicals										
7	35231	Object Oriented Programming through Java Lab	PC	0	3	2	30	70	100	15
8	32233	Electrical and Electronics Engineering Lab	ES	0	3	2	30	70	100	21
9	38232	Verbal Ability Lab	SDC	0	2	1	30	70	100	23
		Total		**19**	**13**	**24**	**270**	**630**	**900**	
		Total Periods		**32**						

Second Year B.Tech. Computer Science and Engineering (CBCS)
2nd Semester Course Structure

Sl. No.	Subject Code	Subject	Category	Periods per Week		Credits	Scheme of Examination Maximum Marks			Page No.
				L	T/P /D		Internal	External	Total	
1	35251	Principles of Programming Languages	PC	3	1	3	30	70	100	25
2	35252	Data Structures Through Java	PC	3	1	3	30	70	100	36
3	35253	DataBase Management Systems	PC	3	1	3	30	70	100	31
4	38251	Environmental Studies	BS	3	0	3	30	70	100	34
5	37252	Design And Analysis of Algorithms	PC	4	0	4	30	70	100	38
6	37253	Computer Organization	PC	3	1	3	30	70	100	28
Practicals										
7	35281	Data Structures and Algorithms Through Java Lab	PC	0	3	2	30	70	100	40
8	35282	DataBase Management Systems Lab	PC	0	3	2	30	70	100	42
9	38283	Reasoning and Data Interpretation Lab	SDC	0	2	1	30	70	100	46
		Total		**19**	**12**	**24**	**270**	**630**	**900**	
		Total Periods		**31**						

Audit Course (Value added course)										
1	38282	Gender Sensitization	HS	2	0	2	0	0	0	**48**

Note: Lecture Periods (L), Tutorials (T), Practicals (P), Drawing (D) & Credits (C)

PC: Professional Course **BS: Basic Sciences** **ES: Engineering Sciences**
HS: Humanities Sciences **SDC: Skill Development Courses**

35201

OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE & IT)

Instruction	: 3 Periods / week	Sessional Marks	: 30
Tutorial	: 1 Period / week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives:

1. Able to understand and apply various object oriented features like Inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using Java language.
2. The student should be to identify, define exception and implement handling mechanism in the application domain.
3. The student should be apply multi-threading and thread level synchronization to improve the performance of the application.

Unit I - Introduction to Java and Building Blocks of Java:

Basics of Java- History/Background of Java, Java Buzzwords, Java Virtual Machine and Byte code, Java Environment setup, Java Program structure, Data Types, Variables-- Scope and Life Time, Operators, Expressions, Type Conversions and Type Casting, Conditional statements and Control statements, Simple Java Programs, javac and java command flags.

OOP Concepts –I: Encapsulation- Classes and Objects, Classes: Class structure, class components, Objects: Object declaration, Reference variables, Constructors - default Constructor, Parameterized Constructors, Constructor overloading, this keyword and its uses, Arrays concept, static modifier, Access modifiers, Wrapper classes.

Methods and Packages- Passing parameters to methods – Passing primitive types and Passing Objects, Method Overloading, Garbage collection, java. lang. System. gc(), finalize(), Packages – package access, classpath setting, package access rules, Introduction to Java standard library and Java documentation.

Unit II - OOP Concepts –II:

Inheritance- Inheritance concept, super class and subclass relationship, principle of substitution, effect of access modifiers on

inheritance. Usage of super (field, method, constructor) and final(field, class, method) keywords,

Polymorphism- method overriding, Dynamic method dispatch, **Abstract classes and Interfaces -** Abstract classes - concept, usage, Interfaces – declaration, implementation and applications, components of an interface, extending interfaces. **String Handling -** String class, String APIs, String Buffer and String Builder classes, Command-line arguments.

Unit III - Dealing exceptions and I/O:

Concepts of exception handling, benefits of exception handling, exception hierarchy, 3.2.2: usage of try, catch, throw, throws and finally, Built in Exceptions, Custom exceptions, Throwable Class, **Java I/O–I -** byte streams, character streams, input and output streams, formatting classes, buffered streams, readers and writers, scanning concept, **Java I/O-II -** Serialization and Serializable interface, Object streams, File class, Introduction to NIO features.

Unit IV - Essential Concepts- Compiler Mechanisms:

Assertions and Annotations – Enumerations, Reflection API. **Deployment technologies-** JAR, Java Web Start, Introduction to Applets for deployment only. **Multithreading-** Fundamentals, Thread Life Cycle, Ways of creating threads - Thread class and Runnable interface, Thread priorities, Creating multiple threads, core methods of Thread class, Thread Synchronization, Interthread communication, Deadlocks, Introduction to executors.

Unit V - GUI Development:

AWT- Basics of GUI Programming, Event handling – Delegation event model, event sources, event listeners, event classes, adapter classes: nested classes and interfaces, handling keyboard and mouse events. **Swing I**- Containers, components, layout managers, frames and windows, panels, buttons, checkboxes, radio buttons, combo boxes, lists, labels, color choosers, file choosers, text fields, text areas, tool tips, **Swing II-** menus, progress bars, tool bars, trees, editor and text panes, tables concurrency in Swing.

Course Outcomes: Upon successful completion of this course, students should be able to

- **CO 1**: Apply the concepts of data encapsulation, inheritance, and polymorphism to software
- **CO 2**: Acquire the concepts of Graphical User Interfaces

CO 3: To be able to apply an object oriented approach to programming and identify potential benefits of object - oriented programming over other approaches.

CO 4: To be able to reuse the code and write the classes which work like built -in types.

CO 5: To be able to apply object -oriented concepts in real world applications.

Text Books:

1. Core Java Volume I- Fundamentals, Cay S. Horstmann and Gary Cornell, 9th Edition, Prentice Hall, 2012.
2. Core Java Volume II- Advanced Features, Cay S. Horstmann and Gary Cornell, 9th Edition, Prentice Hall, 2013.

References:

1. Java: The Complete Reference, Herbert Schildt, 9th Edition, Oracle Press.
2. Head First Java, Kathy Sierra and Bert Bates, 2nd Edition, O'Reilly Media.

35202

DISCRETE STRUCTURES & GRAPH THEORY

Instruction : 4 Periods/Week	Sessional Marks : 30
Credits : 4	End Examination Marks : 70
	End Exam Duration : 3 Hours

Course Objectives:

1. To inculcate mathematical thinking and problem solving skills associated with writing proofs.
2. To expose students to a wide variety of mathematical concepts that are used in the Computer Science discipline, which may include concepts drawn from the areas Number Theory, Graph Theory, Combinatorics and Probability.

Unit I - Mathematical Logic:

Statements and notations, connectives, Well Formed Formulas, Truth tables, tautology, equivalence implication, Normal forms, Predicative logic, Quantifiers, universal quantifiers, Free & Bound variables, Rules of inference, Consistency, Proof by contradiction, Automatic Theorem proving and Applications.

Unit II - Relations:

Properties of binary Relations, Equivalence, Transitive closure, Compatibility & Partial ordering Relations, Lattice and its properties, Hasse Diagram

Functions: Inverse function, Composition of functions, Recursive functions and Applications.

Unit III - Algebraic structures:

Algebraic systems Examples and general properties, semi groups and Monoids, Groups, sub groups, Homomorphism & Isomorphism and Applications

Unit IV - Elementary Combinatorics:

Basics of counting, combinations & permutations, With repetitions, Constrained repetitions, The principle of inclusion and exclusion, Binomial Coefficients, Binomial & Multinomial theorems, Pigeon hole principles and its applications.

Generating Functions- Generating Functions of sequences, Calculating coefficient of generating function and Applications

Unit V - Graph Theory:

Representation of Graph, Sub graphs and Multi graphs**,** Spanning Trees, DFS, BFS, Planar graphs, Isomorphism, Euler circuits and Hamiltonian graphs, Chromatic Numbers and Applications

Course Outcomes:

CO 1: Apply formal logic proofs and/or informal, but rigorous, logical reasoning to evolve theoretical proofs to real problems, such as predicting the behavior of software or solving problems such as puzzles.
CO 2: Apply the logical notations to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
CO 3: Understand and appreciate simple proofs of problems result in group theory.
CO 4: Apply the concept of permutations and combinations to problem solving.
CO 5: Demonstrate knowledge of fundamental concepts in graph theory.

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and R. Manohar, Tata McGraw-Hill Publishing Company, 2008
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott., A. Kandel and T.P. Baker, 2nd Edition, Prentice Hall, 2009.

References:

1. Discrete Mathematics and its Applications, Kenneth H.Rosen, 7th Edition, TMH, 2015.
2. Discrete and Combinatorial Mathematics - An Applied Introduction, Ralph P. Grimaldi, 5th Edition, Pearson Education, 2008.
3. Elements of Discrete Mathematics – A computer Oriented Approach, C L Liu, and D P Mohapatra, 3rd Edition, Tata McGraw-Hill, 2008.

37202

BOOLEAN ALGEBRA AND CIRCUIT DESIGN

(Common to CSE & IT)

Instruction	: 3 Periods / week	Sessional marks	: 30
Tutorial	: 1 Period / week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives :

1. To perform basic arithmetic operations with signed integers represented in binary.
2. To Analyze and design combinational systems using standard gates and minimization methods (such as Karnaugh maps).
3. To Analyze and design Combinational circuits composed of Decoders, Encoders, Multiplexer, Demultiplexer etc.
4. To Analyze and design sequential systems composed of standard sequential modules, such as counters and registers.

Unit I - Binary Systems:

Digital systems, Binary numbers, Number base conversions, Octal and Hexadecimal numbers, Complements, Signed binary numbers, Binary logic.

Boolean Algebra and Logic Gates- Basic definitions, axiomatic definition of Boolean algebra, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, digital logic gates, Integrated Circuits

Unit II - Gate Level Minimization:

The map method, four-variable map, five-Variable map, product of sums simplification, don't-care conditions, NAND and NOR implementation, other Two- level implementations, Exclusive – OR function, Quine-McClusky mothod

Unit III - Combinational Logic:

Combinational circuits, analysis procedure, design procedure, binary adder- subtractor, decimal adder, binary multiplier, Magnitude comparator, decoder, encoders, multiplexers, Demultiplexer, Realization of combinational logic using Multiplexer and Decoder

Unit IV - **Synchronous Sequential Logic:**

Sequential circuits, latches, Flip-Flops, analysis of clocked sequential circuits, state reduction and assignment, Design Procedure

Registers and Counters- Registers, shift registers, Ripple counters, synchronous counters, other counters (counter with unused states, ring counter, Johnson counter)

Unit V - Memory and Programmable Logic:

Introduction, Random-access memory, memory decoding, error detection and correction, read only memory, Programmable Logic Array, Programmable Array Logic, sequential programmable devices

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

CO 1: know the different types of number system and Boolean algebra.
CO 2: do basic binary operations using the logic gates.
CO 3: design and realize combinational circuits.
CO 4: design and realize sequential circuits.
CO 5: design and realize elements of CPU.

Text Books:

1. Digital Design with an introduction to Verilog HDL, M. Morris Mano and Mikchael D. Ciletti, 5th Edition, Pearson Education / PHI, 2012
2. Fundamentals of Logic Design, Charles H. Roth, 5th Edition, Thomson, 2004.

References:

1. Switching and Finite Automata Theory, Zvi Kohavi, Tata McGraw-Hill.
2. Switching Theory and Logic Design, CVS Rao, Pearson Education, 2007.
3. Digital Principles and Design, Donaldo D. Givone, Tata McGraw-Hill.
4. Fundamentals of Digital Logic & Micro Computer Design, M.Rafiquzzaman, 5th Edition, John Wiley.

38201

PROBABILITY AND STATISTICS
(Civil, CSE & IT)

Instruction	: 3 Periods/Week	Sessional Marks	: 30
Tutorial	: 1 Period/Week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives :

1. To introduce concepts of Probability and Statistics
2. To Learn how to apply Probability and Statistics to solve Engineering problems
3. To keep balance between theory and methodology
4. To show the applications of Probability and Statistics in Engineering with examples

Unit I - Probability:

Basic concepts in Probability. Mathematical, statistical and axiomatic definitions of probability. Review of permutations and Combinations. Addition, multiplication and Bayes' theorems. Problems on Probability.

Unit II - Univariate Random Variables and Probability Distributions :

Univariate random variables (discrete and continuous), probability mass and density functions and cumulative distribution function. Mathematical expectation, mean and variance of a univariate random variable. Binomial, Poisson, Normal and Exponential distributions and their properties. Fitting of Binomial and Poisson distributions only.

Unit III - Multivariate Random Variables, Correlation and Regression Analysis :

Multivariate random variable(discrete and continuous), joint probability mass, density functions and joint cumulative distribution functions of a multivariate random variable, conditional and marginal probability functions .Covariance and correlation coefficient of bivariate random variable. Bivariate normal distribution. Computation of correlation coefficient, rank correlation, regression coefficients, regression lines for bivariate data.

Unit IV - Sampling Distributions and Testing of Hypothesis :
Sampling- Definitions of population, sample, parameter, statistic, sampling distribution and standard error. Types of sampling.

Expected value of sample mean and sampling distribution of sample mean.

Estimation- Point and Interval Estimation. Confidence Intervals for Population mean(s) and Proportion(s).

Testing of Hypothesis- Null and alternative hypothesis, type I and type II errors, critical region, level of significance, power of test and tails of the test.

Large Sample Tests- Tests for one and two population means when population variances are known or unknown. Test for one and two population proportions.

Small Sample Tests- Student's t, Snedecor's F and chi-square distributions and their properties.

t-test for single and two population means. F-test for two population variances. Chi-square test for single population variance, goodness of fit and independence of attributes.

Unit V - Queueing Theory and Stochastic Processes :

Queueing Theory- Characteristics of a queue. Pure birth and death processes. M/M/1 model with infinite and finite queues.

Stochastic Processes- Classification of stochastic processes, stationarity, markov chain, classification of markov chains and limiting distribution of a markov chain.

Course Outcomes : At the end of the course a student acquires the ability to

CO 1: represent the engineering problem as an appropriate statistical model

CO2: collect and analyze the data in engineering problem using different statistical methods

CO 3: draw conclusions after analyzing the data and implementing them in the engineering problem.

Text Books:

1. Fundamentals of Mathematical Statistics, S.C. Gupta and V. K. Kapoor, 11th Edition, Sultan Chand & Sons, 2014.
2. Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 5th Edition, Academic Press, 2014.
3. A first course in Probability and Statistics, B.L.S.Prakasa Rao, World Scientific, 2009.

References:

1. Probability and Statistics, T.K.V.Iyengar, B.Krishna Gandhi, et al., 6th Edition, S.Chand, 2014.
2. Applied Statistics and Probability for Engineers, D.C. Montgomery and G.C. Runger, 6th Edition, John Wiley, 2014.

35203

UNIX AND SHELL PROGRAMMING

Instruction	: 3 Periods / week	Sessional Marks	: 30
Tutorial	: 1 Period / week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives :

1. On completion of this course the student should be able to:
2. Students will learn UNIX structure, commands, and utilities.
3. Also, students will become versed with regular expressing and shell programming.

Unit I- Introduction to UNIX:

Architecture of UNIX, Types of Shell, Features of UNIX, UNIX Commands - echo, printf, script, passwd, uname, date, cal, man and Structure of man pages.

Unix Utilities- Introduction to UNIX file system, hierarchical structure of file system, contents of /etc directory, absolute and relative paths, importance of umask and default permissions, file creation using cat and vi editor, concepts related to hard links and soft links, file attributes and types of files, changing the file attributes using chmod, chown. Significance of read, write and execute permissions on regular files and directories towards security. Standard streams, redirection, pipes, tee command.

Unit II - Directory related commands:

mkdir, rmdir, cd, cp, mv. process utilities, ps, disk utilities, unlink, mount, umount, find, ulimit.
Simple filters- filters and pipes, concatenating files, display beginning and end of files, cut and paste, sorting, translating characters, files with duplicate lines, count characters, words or lines, comparing files using difff, comm., cmp.

Unit III - Filters using regular expressions:

Patterns, regular expressions, grep family, regular expressions supported by grep family, searching based on content.
AWK- Execution, fields, and records, scripts, operations, patterns, actions, associative arrays, string functions, mathematical functions, user-defined functions, using system commands in awk, applications.

Unit IV - Interactive Korn shell:

KORN shell features, two special files, variables, output, input, exit status of a command, eval command, environment variables, options, startup scripts, command history, command execution process.
Korn shell programming- basic script concepts, expressions, decisions, making selections, repletion, special parameters and variables, changing positional parameters, argument validation, debugging scripts, script examples.

Unit V - System Administration:

The system administrator's login, the administrator's privileges, user management, init process, device files, file system checking, managing disk space, backing up files, installing programs with rpm.
Networking tools- TCP/IP basics, client –server, ping, telnet, ftp

Course Outcomes:

CO 1: Appreciate the architecture of UNIX, shell and the importance of environment variables.
CO 2: Make use of well defined Bash shell utilities and develop new filters using pipe concepts
CO 3: Understand the File System Hierarchy standard.
CO 4: Master the text processing tools and be able to write scripts.
CO 5: To configure the system services and network services

Text Books:

1. Unix and Shell Programming, Behrouz A. Forouzan and Richard F.Gilberg, Thomson/Brooks /Cole Publishing, 2003.
2. Your UNIX: The Ultimate Guide, Sumitabha Das, 3rd Edition, TMH, 2006.

References:

1. UNIX for Programmers and Users, Graham Glass and King Ables, 3rd Edition, Pearson Education, 2003.
2. Unix Programming Environment, Brian W. Kernighan and Rob Pike, PHI/Pearson Education, 1984.
3. UNIX: The Complete Reference, Kenneth Rosen, Douglas Host, Rachel Klee and Richard Rosinski, 2nd Edition, McGraw-Hill Professional, 2006.

34201

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE & IT)

Instructions	:3 periods/week	Sessional Marks	: 30
Tutorials	:1 period/week	End Examination Marks	: 70
Credits	:3	End Examination Duration	: 3 Hours

Course Objectives:

1. To characterize the devices - Diode, BJT and FET
2. To realize the rectifier circuits
3. To analyze the concepts of transistor configurations and biasing

Unit I – P-N Junction Diode:

Intrinsic and Extrinsic Semiconductors, Fermi Levels, PN Junction as a Diode , Volt-Ampere Characteristics, Ideal versus Practical, Diode as a Switch, Temperature Dependence of V-I Characteristics, Resistance Levels (Static and Dynamic), Specifications and Applications of Diodes, Drift and Diffusion Currents, Quantitative theory of PN junction Diode–Diode Equation, Transition and Diffusion Capacitances.

Unit II – Rectifiers, Filters and Special Purpose Electronic Devices:

Rectifiers- Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Inductor Filter, Capacitor Filter, L-section, ∏-section filter, Comparison of various Filter Circuits. Special Purpose Electronic Devices: Zener Diode Characteristics, Voltage Regulation using Zener Diode, Principle of Operation & Characteristics of Tunnel Diode, Varactor Diode, Light Emitting Diode and Semiconductor Photo Diode.

Unit III – BJT Characteristics and Transistor Biasing:

The Junction Transistor, Transistor Construction, BJT Operation, Transistor Current Components, Common Base, Common Emitter and Common Collector Configurations and Characteristics, Comparison of Transistor Configurations Transistor Biasing and Stabilization: Need for Biasing, Operating Point, Bias Stability, The DC Load Line, Fixed Bias, Collector to Base Bias, Voltage Divider Bias, Stabilization Factors, Bias Compensation, Thermal Runaway, Thermal Stability.

Unit IV – Small Signal Low Frequency Transistor Models:

Transistor as an Amplifier, Two Port Network & Transistor Hybrid Model, Determination of *h*-Parameters from Transistor Characteristics, Qualitative Analysis of a Transistor CE Amplifier Circuit using *h*-Parameters.

Unit V – Field Effect Transistor:

The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol), Pinch-Off Voltage, Volt-Ampere Characteristics, Comparison of BJT and FET, MOSFET (Construction, Principle of Operation, Symbol), MOSFET Operation in Enhancement and Depletion Modes, Construction, Principle of Operation, Symbol and Characteristics of Uni-junction Transistor and Silicon Controlled Rectifier

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

CO1: To analyze diode parameters
CO2: To analyze and design different rectifier circuits
CO3: To comprehend different transistor configurations and biasing techniques
CO4: To analyze different small signal amplifiers at low frequency
CO5: To gain familiarity of the devices FET, MOSFET, UJT, SCR and their characteristics

Text Books:

1. Electronic Devices and Circuits, J. Millman and C. C. Halkias, Tata McGraw-Hill, 2007.
2. Integrated Electronics, J. Millman& Christos, C. Halkias, TMH, 2nd Edition, TMH, 2010.
3. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.

References:

1. Electronic Devices and Circuits, Anil K. Maini and Varsha Agarwal, Wiley India Pvt. Ltd, 2009.
2. Introduction to Electronic Devices and Circuits, Rober T. Paynter, 7th Edition, Pearson Education, 2009.
3. Electronic Devices and Circuits, K. Lal Kishore, 2nd Edition, B.S. Publications, 2008.

35231

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to CSE & IT)

Practical	: 3 Periods / week	Session Marks	: 30
Credits	: 2	End Examination Marks	: 70
		End Exam Duration	: 3 Hours

Course Objectives:

1. To implement the basic concepts of object-oriented programming.
2. To implement the practical aspects of exception handling mechanism, Java I/O.
3. To implement the multithreading nature of Java programs.
4. To know the various deployment technologies.
5. To be able to design GUIs.

Note: Practice problems and activities are meant for additional practice, and can be done either in scheduled or additional lab sessions. Teachers are advised to provide more exercises for practice at home as well as regular assignments.

Week 1:

Lab Problems:

1. Write a simple program with a main () method to print messages to the console; the purpose is to learn how to invoke the compiler and virtual machine through a console window..
2. Write a program to implement the different types of operators, to perform the following tasks: comparison of values, simple arithmetic, and bit-wise operations.

Practice Problems/Activities:

1. Learn to install JDK and set up the PATH variable. Understand the various folders that are part of JDK and learn their purpose after installation.
2. Learn the nature of javac and java commands. Try to figure out the purpose various flags and options.

Week 2:

Lab Problems:

1. Write a program to check and print the grade of a student when the score is given as an integer. Use a switch statement. Rewrite the program to use a sequence of if-else statements.

2. Write a program to demonstrate the task of overloading of constructors.
3. With a well-written program demonstrate the usage of this keyword and thereby understand the implications of using same identifier for fields and parameters.

Practice Problems/Activities:

1. Write a program to print the minimum and maximum values of integer and float types. Use the constants available in the wrapper classes.
2. Use an array of integers and find the sum and average of the elements of that array.
3. Write a program to understand the concept of type casting.

Week 3:

Lab Problems:

1. Write a program to check the difference in passing primitive values and object references as arguments to a method.
2. Write a program to understand method overloading.
3. Write a program to utilize both standard and custom packages. The program should reflect the usage of packages in a correct manner, along with the purpose of access modifiers.

Practice Problems/Activities:

1. Learn to understand the usage of Java SE API documentation. Bookmark the main page in your browser. Look at the available packages. Learn classpath settings.
2. Write a program to use gc() method of both System and Runtime classes. Experiment with other methods of those classes.
3. Practice further programs on the usage of arrays.

Week 4:

Lab Problems:

1. To illustrate the concept of inheritance, write a program using the hierarchy of employees in a university.
2. Use the above program to illustrate the super and final keywords.

Practice Problems/Activities:

1. Learn the effect of access modifiers while using inheritance. Write programs to that effect.
2. Write a program to understand polymorphic invocation of methods, while overriding the methods. Use an employee base

class and manager sub class; override the computeSalary() method to illustrate the concept.

Week 5:

Lab Problems:

1. Demonstrate the use of abstract classes. Write a Person abstract class and then subclass that into Student and Faculty classes. Use appropriate fields and methods.
2. Write a program to demonstrate the usage of interfaces.

Practice Problems/Activities:

1. Write a program which shows the concept of interface extension.
2. Use a program to show the advantages of inheriting from multiple interfaces.

Week 6:

Lab Problems:

1. Write a program to understand the full capability of String class. Implement as many methods as required. Consult API documentation to read through the methods.
2. Write programs using StringBuffer and StringBuilder library classes.

Practice Problems/Activities:

1. Write a program to demonstrate the command-line arguments.
2. Develop an application that uses inheritance. Use the class Account and then subclass it into different account types. Then making use of Customer and Employee classes to develop the application to reflect the nature of banking operations. Use minimum operational sequence.

Week 7:

Lab Problems:

1. Write a program to demonstrate the usage of try and associated keywords. Introduce bugs into the program to raise exceptions and then catch and process them.
2. Learn how to throw an exception from your method, when an exception arises.

Practice Problems/Activities:

1. Learn how to create and use custom exceptions.
2. Experiment on using various methods of Throwable and Exception classes.
3. Practice on chaining the exceptions.

Week 8:

Lab Problems:

1. Using byte streams, write a program to both read from and write to files.
2. Using FileReader and FileWriter, write a program to perform file copying and any other suitable operations.

Practice Problems/Activities:

1. Write a Java Program that displays the number of characters, lines and words in a text file.
2. Use the classes StringTokenizer, StringReader and StringWriter to write a program to find the capabilities of these classes.

Week 9:

Lab Problems:

1. Write a program using the object streams.
2. Write a program to show the power of Serialization.

Practice Problems/Activities:

1. Write a program to check the characteristics of a file after getting the filename form the user.
2. Write programs to find the usage of other stream classes. Consult API documentation.

Week 10:

Lab Problems:

1. Write a program to demonstrate enumerations.
2. Write a program to understand the usage of assertions and various annotations.

Practice Problems/Activities:

1. Demonstrate reflection capabilities through simple programs.

Week 11:

Lab Problems:

1. Use jar command and understand the various command options.
2. Use an applet to demonstrate deployment of an application.

Practice Problems/Activities:

1. Demonstrate the use of Java Web Start.
2. Explore the applet concept.

Week 12:

Lab Problems:

1. Write programs to illustrate the use of Thread class and Runnable interface.
2. Write a program to show the assignment of thread priorities.
3. Write a program to synchronize threads. Use any problem to illustrate the concept.

Practice Problems/Activities:

1. Use the core methods of Thread class to write a program to learn the nature of execution of threads.

Week 13:

Lab Problems:

1. Write a program to design a frame and control its various display properties.
2. Write a program to understand nested classes.
3. Write a program to understand key events and mouse events.

Practice Problems/Activities:

1. Write a program to understand adapter classes.

Week 14:

Lab Problems:

1. Write programs to understand the usage of swing widgets.
2. Write a program to understand the usage of tool tips, file choosers.
3. Write a program to demonstrate any layout manager. Use a suitable application.

Practice Problems/Activities:

1. Write a program to demonstrate other core swing widgets.
2. Explore using the other layout managers.

Week 15:

Lab Problems:

1. Write a program to attach menus to a window.
2. Write a program using Tables.

Practice Problems/Activities:

1. Practice on using a progress bar.
2. Explore on using Trees.

Week – 16 & Week – 17

Develop a standalone application using a Banking (or any other) enterprise as a base concept. Use appropriate classes and interfaces and develop a swing-based GUI application to present the activities of the organization. Use only simple activities to demonstrate the usage of IO streams, multithreading and exception handling concepts. Keeping in view this application goals, use appropriate practice programs in the previous weeks.

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

CO1: implement object oriented programming concepts.
CO 2: use exception handling mechanism.
CO 3: create multithreaded programs.
CO 4: use I/O streams.
CO 5: write GUI-based applications.

32233

ELECTRICAL AND ELECTRONICS ENGINEERING LAB
(Common to CSE & IT)

Instructions	:3 periods/week	Sessional Marks	: 30
Credits	:2	End Examination Marks	: 70
		End Exam Duration	: 3 Hours

Course Objectives:

1. To understand the characteristics of diodes, BJT and FET
2. To understand rectifier circuits and Zener diode applications
3. To understand the frequency response of different BJT and FET amplifiers

PART A : (Only for Viva-Voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions)

1. Identification, Specifications, Testing of R,L,C Components (Color Codes), Potentiometers, Switches (SPDT,DPDT and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Low Power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, UJT
3. Study and operation of electronic components
    - Multimeters (Analog and Digital)
    - Function Generator
    - Regulated Power Supplies
    - CRO

PART B:
(For Laboratory Examination-Minimum of 10 Experiments)

1. Forward and Reverse Bias Characteristics of PN Junction Diode
2. Zener Diode Characteristics and Zener as Voltage Regulator
3. Half Wave Rectifier with & without filters
4. Full Wave Rectifier with & without filters
5. V-I Characteristics of SCR
6. Input & Output Characteristics of Transistor in CB Configuration and calculation of h-parameters
7. Input & Output Characteristics of Transistor in CE Configuration and calculation of h- parameters
8. Input & Output Characteristics of Transistor in CC Configuration and calculation of h-parameters
9. FET Characteristics
10. V-I Characteristics of UJT

11. Frequency Response of CE Amplifier
12. Frequency Response of CC Amplifier

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

CO1: analyze diode, transistor and FET parameters
CO2: design different rectifier circuits
CO3: analyze small signal amplifiers at low frequencies

38232

VERBAL ABILITY LAB
(Common to CSE & IT)

Instruction: 2 periods/week	Sessional Marks : 30
Credits : 1	End Examination Marks : 70
	End Exam duration : 3 Hours

Course Objectives:

1. Students will be trained to become proficient in word formation, spellings and vocabulary
2. Students will develop linguistic competence through appropriate use of Idioms and Phrases
3. Students will develop professional writing skills through business letters
4. Students will be trained to identify the common errors in English and write grammatically correct sentences
5. Students will develop verbal reasoning through Word Classification and Analogy

The students will be given practice exercises covering the following topics:

1. Word Formation
2. Spellings
3. Synonyms and Antonyms
4. Homonyms
5. One word substitutes
6. Idioms
7. Phrasal verbs
8. Correction of Sentences
9. Word Classification
10. Verbal Analogy
11. Vocabulary in the Corporate scenario
12. Business Letter writing

Course Outcomes:

CO 1: Students will develop familiarity with Corporate English
CO 2: Students will have enriched vocabulary
CO3: Students will develop the ability to write grammatically correct sentences and enhance their professional writing skills
CO4: Students will be proficient in answering reasoning based questions

References:

1. Objective English, Edgar Thorpe & Showick Thorpe, S.Chand & Co., 2011.
2. A Modern Approach to Verbal Reasoning, R. S. Aggarwal, S.Chand & Co., 2011.
3. Barron's Essential Words for GRE, Philip Geer, Barron's Educational Series, 2011.
4. How to prepare for Verbal Ability and Reading Comprehension for the CAT, Arun Sharma and Meenakshi Upadhyay, Tata McGraw-Hill, 2011.
5. Word Power Made Easy, Norman Lewis, Goyal publishers & Distributors, 2011.
6. English Idioms in Use, Michael McCarthy and Felicity O'Dell, Cambridge University Press, 2013.

35251

PRINCIPLES OF PROGRAMMING LANGUAGES

Instruction	: 3 Periods / Week	Sessional Marks	: 30
Tutorial	: 1 Period / Week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives:

1. To briefly describe various programming paradigms.
2. To provide conceptual understanding of High level language design and implementation.
3. To demonstrate the importance of understanding the structures
4. To introduce the power of Functional Programming languages.

Unit I - Preliminary Concepts:

Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming,Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments.
Syntax and Semantics- General problems of describing syntax BNF, EBNF for common programming language features and ambiguous grammar.

Unit II - Data types:

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

Unit III - Subprograms and Blocks:

Fundamentals of sub-programs, Scope of life time of variables, static and dynamic scope, design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that

are sub-program names, design issues for functions user defined overloaded operators, co routines.

Unit IV - Abstract Data Types:

Abstractions and encapsulation, Introduction to Data Abstraction, Design Issues, Language Examples, C++ parameterized abstract data types, OOP in small talk, C++, java,c#, ada95.
Exception handling- Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.
Logic Programming Language- Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

Unit V - Functional Programming Languages:

Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

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

CO 1: express syntax and semantics in formal notation.
CO 2: apply suitable programming paradigm for the application.
CO 3: gain knowledge and comparison of the features programming languages.
CO4: demonstrate correspondences between grammars, languages and automata.
CO5: demonstrate the power of binding features of scripting languages.

Text Books:

1. Concepts of Programming Languages, Robert. W. Sebesta, 8th Edition, Pearson Education, 2008.
2. Programming Language Design Concepts, David A. Watt, Wiley Dream Tech, rp-2007.

References:

1. Programming Languages, A.B. Tucker and R.E. Noonan, 2nd Edition, TMH.
2. Programming Languages, K.C. Louden, 2nd Edition, Thomson, 2003.
3. LISP, Patric Henry Winston and Berthold Klaus Paul Horn, Pearson Education.
4. Programming in Prolog, W.F. Clocksin & C.S. Mellish, 5th Edition, Springer.
5. Programming Python, M. Lutz, 3rd Edition, O'Reilly, SPD, rp-2007.
6. Core Python Programming, Wesly J. Chun, 2nd Edition, Pearson Education, 2007.
7. Guide to programming with Python, Michel Dawson, Thomson, 2008.

37253

COMPUTER ORGANIZATION
(Common to CSE & IT)

Instruction	: 3 Periods/week	Sessional marks	: 30
Tutorial	: 1 Period/week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives:

1. To understand the underlying concepts related to computer hardware.
2. To develop thorough understanding of various number systems, and understand their significance in hardware design. They should be able to master the binary and hexadecimal number systems including computer arithmetic.
3. To be familiar with the basic notations expressed in Register Transfer Language and mnemonics for assembly language instructions. They must also be familiar with assembly language programming including addressing modes and instruction formats.
4. To understand the design and implementation of basic functional units using logic gates. They should be able to design the basic ALU, Control unit etc.
5. To understand the concepts like memory, cache memory related issues, pipelining, multiprocessors.

Unit-I - Basic Structure of Computers:

Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, Reduced Instruction set computer, Data Representation. Fixed Point Representation. Floating – Point Representation, Computer Arithmetic: Multiplication and Division Algorithms.

Unit II - Register Transfer Language and Micro-operations:

Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes. Computer Registers, Computer instructions – Instruction cycle, I/P-O/P and Interrupt.
Instruction Sets- STACK organization, Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, IA-32 Architecture and instruction set.

Unit III - Micro Programmed Control:

Control memory, Address sequencing, micro-program example, design of control unit, Micro-programmed control.
The Memory System: Basic concepts of semiconductor RAM memories, Read – only memories, Cache memories, performance considerations, virtual memories, secondary storage.

Unit IV – Input - Output Organization:

Peripheral Devices, DMA, Input – Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, PCI Bus.
Pipeline And Parallel Processing- Parallel processing , Flynn's classification, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

Unit V – Multiprocessors:

Characteristics of Multiprocessors, Vector Processing, Array Processors, Interconnection Structures, Inter processor Arbitration, Inter Processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.

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

CO 1: solve problems on binary and hexadecimal number systems including computer arithmetic.
CO 2: understand functional units of the processor such as registers and arithmetic – logical unit, instruction execution timing, bus operation, addressing modes, instruction formats and have basic understanding of assembly language programming.
CO3: attain the knowledge of micro programming and understand the concepts of memory.
CO 4: understand the basics of the system topics: single – cycle (MIPS), multi cycle (MIPS), parallel, pipelined, super scalar and RISC architectures.
CO 5: understand parallelism both in terms of a single processor and multiple processors.

Text Books:

1. Computer Systems Architecture, M. Morris R. Mano, 3rd Edition, Pearson/ PHI
2. Computer Organization, Carl Hamacher, Zvonko Vranesic, and Safwat Zaky, 5th Edition, McGraw-Hill. (Units I & V)

References:

1. Computer Organization and Architecture , William Stallings, 6th Edition, Pearson/PHI
2. Structured Computer Organization, Andrew S.Tanenbaum, 4th Edition, Pearson/PHI
3. Fundamentals of Computer Organization and Design, Sivarama Dandamudi P., Springer Verlag.
4. Computer Organization, G. V. Anjaneyulu, Himalaya Publishing House.

35253

DATABASE MANAGEMENT SYSTEMS

(Common to CSE & IT)

Instruction : 3 Periods/Week	Sessional Marks : 30
Tutorial : 1 Period/Week	End Examination Marks : 70
Credits : 3	End Exam Duration : 3 Hours

Course Objectives:

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product specific tools.
2. To give a good formal foundation on the relational model of data.
3. To present SQL and procedural interfaces to SQL comprehensively.
4. To given an introduction to systematic database approaches covering conceptual design, logical design and overview of physical design.
5. To present the concepts and techniques relating to query processing by SQL engines.

Unit I - Introduction to DBMS:

History of DBMS, Concepts and overview of DBMS, Data models - ER model, Relational model, Levels of Abstraction in DBMS, Data Base Languages, Architecture of DBMS, Data Base Users and Administrators

ER-Model (UML Notations) Data base design and ER model, ER modeling Constructs, Additional features of ER Model, Class Hierarchies, Aggregation, Conceptual Design with ER model, Case study: ER design for Large Enterprises

Unit II - Relational Algebra and Calculus:

Introduction to relational model, Relational Algebra - Selection and Projection, Set operations, Renaming, joins, Examples of Relational Algebra Relational Calculus- Tuple relational Calculus, Domain relational calculus

Introduction to Query Language- Form of Basic SQL Query, Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set Comparison Operator-Aggregate Operators, NULL values and Comparison using Null values, Logical connectivity's – AND, OR and NOT, OUTER Joins, Disallowing NULL Values

Unit III - Schema Refinement:

Introduction to schema refinement, Problems caused by decomposition, Functional dependencies (FDs) and reasoning about FDs, Normal Forms (NF), Properties of Decomposition, Schema Refinement in Data Base Design, Case studies using Normal Forms

Unit IV - Transaction Management:

Transaction concept & state, Implementation of atomicity and durability, Concurrent executions of transaction, Serializability and Recoverability, Implementation of Isolation, Testing for serializability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based, Protocols, Multiple Granularity

Unit V - Recovery System:

Recovery and Atomicity, Log based Recovery, Recovery with concurrent transaction, Buffer Management, Failure with Loss of Nonvolatile Storage, Remote Backup Systems.
Storage and Indexing- Data on External storage, File Organization and Indexing, Cluster Indexes, Primary and secondary indexes, Index data structures, Hash based indexing - Static hashing and Extensible Hashing, Tree based indexing - Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index structure

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

CO 1: perform conceptual modeling and logical design of centralized databases. Data modeling using entity-relationship (ER) model. Demonstrate the use of constraints and relational algebra operations.
CO 2: demonstrate Data Manipulation operations using Structured Query Language and also using stored procedures, sequences and triggers. Mathematical approach towards querying database.
CO 3: implement the relational database logical design using normalization.
CO 4: learn the database transaction processing and concurrency control.
CO 5: learn backup and recovery techniques and File Organization techniques and file organization in Database management systems.

Text Books:

1. Database System Concepts, A.Silberschatz, H.F. Korth and S.Sudarshan, 6th Edition, McGraw-Hill, 2006.
2. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B.Navathe, 7th Edition, Pearson Education, 2008.
3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, TMH, 2003.

References:

1. Database Systems: The Complete Book, Hector Garcia-Molina, Jeffery D.Ullman and Jennifer Wisdom, 2nd Edition, Pearson Education, 2008.
2. Database Management System Oracle SQL and PL/SQL, Pranab Kumar Das Gupta and P. Radha Krishna, 2nd Edition, PHI.

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ENVIRONMENTAL STUDIES
(Common to CIVIL, CSE, EEE & EIE)

Instruction	: 3 Periods/week	Sessional marks	: 30
Credits	: 3	End Examination Marks	: 70
		End Exam Duration	: 3 Hours

Course Objectives:

1. To make students aware of the Environmental problems
2. To educate students about the role of Green technology to attain Sustainable Development
3. To develop awareness in the students about the significance of proper resource utilization
4. To make students aware of the modern concepts, legal rules and tools related to pollution control.

Unit I - Ecosystems and Biodiversity:

Ecosystems- Concept of Ecosystem, Structure and Functions of Ecosystem, Food Chains(Grazing and Detritus), Food webs and Ecological Pyramids, Flow of Energy, Biogeochemical cycles or Nutrient cycles: Carbon cycle and Nitrogen cycle, Food Chain Concentration: Bio magnification.
Biodiversity- Definition**,** Types of biodiversity (Species, Genetic and Ecosystem),Hotspots of biodiversity, Threats to biodiversity**,** Conservation of biodiversity: Insitu and Exsitu conservation.

Unit II- Natural Resources:

Renewable and Non-renewable Resources, Water Resources: Surface and Ground water, Dams-Benefits and Problems, Mineral Resources: Mining and its Environmental Impacts, Renewable Energy Resources: Solar Energy, Wind Energy, Hydro Energy, Tidal Energy, Geothermal Energy and Bioenergy.

Unit III - Environmental Pollution and Control:

Air Pollution: Global Warming, Kyoto Protocol and Clean Development Mechanism, Ozone layer depletion, Montreal Protocol and Earth Summit,1992.Water Pollution and Waste Water Treatment Methods: Effluent Treatment Plant (ETP), Sewage Treatment Plant (STP), Common Effluent Treatment Plant (CETP), Soil Pollution and Noise Pollution.

Unit IV - Environmental Impact Assessment:

Definition and Scope of EIA, Definition of Impact, Classification of Impacts, Base Line Data Acquisition, Impact Assessment Methodologies, Environmental Impact Statement (EIS), Environmental Management Plan (EMP), Rain water Harvesting, Green Building, Role of IT - Remote Sensing and GIS.

Unit V - Environmental Legislation and Sustainable Development:

Air (Prevention and Control of Pollution) Act-1981, Water (Prevention and Control of Pollution) Act-1974, Water Pollution Cess Act-1977, Environment Protection Act-1986, Solid Waste: Types and Disposal Methods, Municipal Solid Waste Management and Handling rules, Biomedical Waste Management and Handling Rules, Hazardous Waste Management and Handling rules. Sustainable Development: Threats and Strategies.

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

CO 1: develop awareness about the hazards to environment
CO2: develop awareness about optimum utilization of natural resources
CO3: learn about GREEN TECHNOLOGIES to maintain sustainable development
CO4: get awareness about rules and regulations applicable for pollution control

Text Books :

1. Text Book of Environmental Science and Technology, M. Anji Reddy, B.S. Publications, 2013.
2. Text Book of Environmental Studies, Anubha Kaushik and C.P. Kaushik, 4th Edition, New Age International Pvt. Ltd., 2014.
3. Text Book of Environmental Studies, O.V.K.Reddy, Professional Publications, 2013.

References:

1. Environmental Science: Towards a Sustainable Future, Richard T.Wright and Dorothy F. Boorse, 11th Edition, PHI, Learning Pvt. Ltd., 2010.
2. Environmental Engineering and Science, Gilbert M. Masters and Wendell P. Ela, 3rd Edition, PHI Learning Pvt. Ltd., 2011.

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DATA STRUCTURES THROUGH JAVA

(Common to CSE & IT)

Instruction	: 3 Periods / Week	Sessional Marks	: 30
Tutorial	: 1 Period / Week	End Examination Marks	: 70
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives:

1. The student should be able to appreciate the importance of generic programming.
2. The student should be able to understand and demonstrate the importance of Java's collection framework.
3. The student should demonstrate the application of various basic data structure like stacks, queues, linked lists etc.
4. The student should learn and various data structures for implementing dictionaries.
5. The student should be able to implement pattern matching algorithms.

Unit I - **Generics:**

Introduction to Generics, simple Generics example, Generic Types, Generic methods, Bounded Type Parameters and Wild cards, Inheritance & Sub Types, Generic super class and sub class, Type Inference, Restriction on Generics

Unit II - 1D and 2D Collections:

1D Collection Interfaces, Set, List, Sorted Set, 1D Collection Classes, Hash Set, Linked HashSet, Tree Set, ArrayList, LinkedList, 2D Collection Interfaces, Map, SortedMap, 2D Collection Interface, HashMap, LinkedHashMap, TreeMap

Unit III - **Dictionaries:**

Introduction and their implementation-I - Sorted Lists, introduction, insertion and searching, deletion, Hashing, hash table representation, hash functions, Collision resolution strategies, separate chaining, open addressing – linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

Unit IV - Dictionaries implementation-II:

Binary Search Tree, definition, implementation of operations: searching, traversals implementation of operations: insertion and deletion, AVL Tree definition, height of an AVL tree, representation,

operations rotations, insertion, and searching deletion. B-Tree, B-Tree of order m, height of a B-Tree, searching, insertion, deletion.

Unit V - Priority Queues and Pattern Matching:

Priority Queue, definition, max and min heaps, realizing priority queues using heaps, definition, insertion, deletion, heap sort, Pattern Matching, Introduction, Brute Force algorithm, Boyer Moore algorithm, Knuth-Morris-Pratt algorithm, Tries, Standard Tries, Compressed Tries, Suffix trees

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

CO1: understand different data structures like stacks, queues, dictionaries and trees and implement them using classes in java.util package
CO2: apply appropriate data structures to a given problem definition
CO3: implement dictionaries using various linear and nonlinear data structures
CO4: analyze the advantages and disadvantages of height balanced trees.
CO5: evaluate various pattern matching algorithms in terms of their complexity and efficiency.

Text Books:

1. Data Structures and Algorithms in Java, Michael T Goodrich, Roberto Tamassia and Michael H. Goldwasser, 6th Edition, Wiley Publications.
2. Data Structures and Problem Solving Using Java, Mark A. Weiss, 4th Edition, Pearson.

References:

1. Data Structures, Algorithms and Applications In Java, Sartaj Sahni, 2nd Edition, Universities Press.
2. Data Structures: Abstraction and Design Using Java, Elliot B. Koffman and Paul A. T. Wolfgang, 2nd Edition, Wiley publications, January,2010.
3. Java: The complete reference, Herbert Schildt, 7th Edition, TMH, 2006.
4. Head First Java, Kathy Sierra and Bert Bates, 2nd Edition, O'Reilly Publications., 2005

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DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE & IT)

Instruction	: 4 Periods / week	Sessional Marks	: 30
Tutorial	: NIL	End Examination Marks	: 70
Credits	: 4	End Exam Duration	: 3 Hours

Course Objectives:

1. To Analyze the asymptotic performance of algorithms.
2. To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To solve problems using algorithm design methods such as the Greedy method, Divide and Conquer, Dynamic Programming, Backtracking and Branch and Bound.

Unit I - Introduction:

Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Time complexity, Space complexity, Asymptotic Notation-Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.

Unit II - Searching and Traversal Techniques:

Efficient non - recursive binary tree traversal algorithms, Disjoint set operations, Union and find algorithms, AND/OR graphs, Connected components, Identification of articulation points, Bi-connected components.

Unit III - Divide and Conquer:

General method, solving recurrence relations, applications- Binary search, Merge sort, Quick sort.
Greedy method: General method, applications - Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Unit IV -Dynamic Programming:

General method, applications - Multistage graphs, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.
Backtracking: General method, applications-N-queen problem, Sum of subsets problem, Graph coloring.

UNIT V - Branch and Bound:

General method, applications - Traveling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.
NP-Hard and NP-Complete problems- Basic concepts, Non deterministic algorithms, NP-Hard and NP-Complete classes.

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

CO1: analyze algorithms, improve the efficiency of algorithms and ability to understand and estimate the performance of algorithm.

CO2: choose the appropriate data structure and algorithm design method for a specified application.

CO3: apply different designing methods for development of algorithms to realistic problems, such as Divide and conquer, Greedy Method. Synthesize Divide and conquer, Greedy algorithms, and analyze them.

CO4: describe the Dynamic programming, Backtracking paradigms and explain when an algorithmic design situation calls for it. Recite algorithms that employ these paradigms.

CO5: synthesize dynamic-programming, Backtracking algorithms, and analyze them. To apply algorithm design paradigms for complex problems and solve novel problems, by choosing the appropriate algorithm design technique for their solution and justify their selection.

Text Books:

1. Fundamentals of Algorithms, E. Horowitz and S.Sahni, 2nd Edition, Galgotia Publications, 2010.
2. Introduction to Algorithms, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, 2nd Edition, PHI/Pearson Education, 2001

References:

1. Algorithm Design: Foundations, Analysis and Internet Examples, Michael T. Goodrich and Roberto Tamassia, Wiley India, 2006.
2. The Design and Analysis of Computer Algorithms, Alfred V. *Aho,* John E. *Hopcroft* and Jeffrey D. *Ullman*, PHI/Pearson Education, 1974.

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DATA STRUCTURES & ALGORITHMS THROUGH JAVA LAB
(Common to CSE and IT)

Instruction : 3 Periods / Week
Credits : 2
Sessional Marks : 30
End Examination Marks : 70
End Exam Duration : 3 Hours

Course Objectives:

1. The student should be able to implement generic programming using Java.
2. The student should be able demonstrate the usage of classes available in Java collection framework.
3. The student should be able apply collection framework for implementing basic data structures like stacks, queues, linkes, etc.
4. The student should be able apply collection framework for implanting advanced data structures like dictionaries.
5. The student will be able to implement pattern matching algorithms using Java.

1. Write a Java program to design a Stack using Arrays and user-defined linked list.

2. Write a Java program to design a Queue using Arrays and user-defined linked list.

3. Design a Generic stack based on program 1 to deal with Integer and String data

4. Design a Generic queue based on program 1 to deal with Integer and String data.

5. a) Design a java program to implement stacks using LinkedList Collection class
b) Design a java program to implement stacks using ArrayList Collection class

6. a) Design a java program to implement queues using LinkedList Collection class
b) Design a java program to implement queues using ArrayList Collection class

7. Design a java program demonstrate the use of following collections
a. HashSet b. LinkedHashSet c. TreeSet

8. a) Design a java program to demonstrate usage of Set Interface
b) Demonstrate usage of SortedSet Interface

9. Design a java program to demonstrate usage of Map and HashMap Interface

10. Implement BST using Collections API. Override toString() method to display inOrder, preOrder & postOrder Traversals.

11. Implement AVL tree using Collections API

12. Implement BTree using java Collections API.

13. Write a java program to implement Heap Sort

14. Write a java program to implement BM algorithm.

15. Write a java program to implement KMP algorithm.

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

CO1: Implement stacks and queues using arrays and linked lists using Java
CO2: Implement stacks and queues using java.util package
CO3: Implement dictionaries using various data structures like sorted lists, binary search trees and AVL trees using classes in java.util package
CO4: Implement Heap Sort using Max or Min Heap.
CO5**:** Implement Pattern Matching Algorithms like Boyer Moore and Knuth-Morris-Pratt.

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DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE & IT)

Instruction	: 3 Periods/Week	Sessional Marks	: 30
Credits	: 2	End Examination Marks	: 70
		End Exam Duration	: 3 Hours

Course Objectives:

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
2. To give a good formal foundation on the relational model of data.
3. To present SQL and procedural interfaces to SQL comprehensively.
4. To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design.
5. To present the concepts and techniques relating to query processing by SQL engines.

Database Description: This lab enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example company named **XYZ ONLINE SHOPPING** whose description is as given below. The student is expected to practice the designing, developing and querying a database in the context of example database "XYZ ONLINE SHOPPING". Students are expected to use **MySql** database.

XYZ ONLINE SHOPPING is in business since 2010 with several items selling online across India. Its main office is located in Hyderabad. The sellers has to register their products/items in order to sell. The customer has to register before buying the products/items. The Provider will provide an environment to view the items and provision to pay online or cash on delivery based upon the selling item.

Week 1: E-R Model

Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Example: **Entities:**

1. CUSTOMER
2. SELLER
3. ITEM
4. PROVIDER

PRIMARY KEY ATTRIBUTES:

1. ItemID (ITEM Entity)
2. CustID (CUSTOMER Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Week 2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.

Week 3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multi valued, and Derived) have different way of representation.

Customer

CustID	Name	Mail_ID	Phone No.

Week 4: Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.
You can do the second and third normal forms if required.

Week 5: Installation of Mysql and practicing DDL commands

Installation of MySql. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases If not required. You will also try truncate, rename commands etc.

Week 6: Practicing DML commands

DML commands are used to for managing data within schema objects. Some examples:

- SELECT - retrieve data from the a database
- INSERT - insert data into a table
- UPDATE - updates existing data within a table
- DELETE - deletes all records from a table, the space for the records remain

Week 7: Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Week8 and week 9: Querying (continued…)

You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Week 10: Triggers

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

Week 11: Procedures

In this session you will learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

Week 12: Cursors

In this week you will learn Declare a cursor that defines a result set. Open the cursor to establish the result set. Fetch the data into local variables as needed from the cursor, one row at a time. Close the cursor when done.

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

CO 1: explain the underlying concepts of database technologies. Design and implement a database schema for a given problem-domain

CO 2: normalize a database.

CO 3: populate and query a database using SQL DML / DDL commands To motivate the students to relate all these to one or more commercial product environments as they relate to the developer tasks.

CO 4: declare and enforce integrity constraints on a database, explain to create triggers and administrative commands

Text Books:

1. Introduction to SQL, Rick F.Vander Lans, Pearson Education, 2007.
2. Oracle PL/SQL, Benjamin Rosenzweig and Elena Silvestrova, Pearson Education, 2015.
3. Oracle PL/SQL Programming, Steven Feuerstein and Bill Pribyl, 6th Edition, O'Reilly Media Inc., 2014.

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REASONING AND DATA INTERPRETATION LAB
(Common to CSE & IT)

Instruction:	2 periods/week	Sessional Marks	: 30
Credits :	1	End Examination Marks	: 70
		End Exam Duration	: 3 Hours

Course Objectives:

1. To train the students to face the questions that require reasoning and interpretation of data with greater facility and help them face requirement tests and entrance examinations for all courses of higher education successfully.
2. To develop the use of analytical, reasoning and logical skills in formal and informal situations.
3. To introduce Graphs, Charts, problem solving with Data, Puzzles and logical questions
4. To train the students towards preparation for placement, Competitive examinations like CAT, GRE etc.

Syllabus

Exercises/ experiments on the following topics will be done during the course with necessary illustrations.

1. Introduction to Data Interpretation
2. Tabular Data
3. Bar Charts
4. Line Graphs
5. X-Y Charts
6. Pie charts
7. Series
8. Analogy
9. Classification
10. Coding and Decoding
11. Direction sense Test
12. Blood Relations
13. Syllogism
14. Puzzles
15. Data Sufficiency

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

CO 1: understand the concepts of Statement-Argument, Assumption and Course of Action and use reasoning as a tool to match statements with arguments etc.

CO 2: look at data and find links and patterns, link data with conclusions and study data logically.

CO 3: study problem situations and use reasoning as a tool to find solutions.
CO 4: nurture the ability to use reasoning as a skill in real time problems solving.
CO 5: analyze and infer the data with respect to trend and case based.

Text Books:

1. How to prepare for Data Interpretation for CAT , Arun Sharma, McGraw-Hill
2. A Modern Approach to Verbal and Nonverbal Reasoning, R.S. Aggarwal, S Chand

References:

1. Quantitative Aptitude, R.S Aggarwal, S. Chand
2. A Modern Approach to Logical Reasoning, R.S Aggarwal, S. Chand

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GENDER SENSITIZATION

(Common to all Branches)

Instruction: 2 periods/week
Credits : 2

Sessional Marks : --
End Examination Marks : --
End Exam duration : --

Course Objectives:

1. To develop student's sensibility with regard to issue of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Unit I – UNDERSTANDING GENDER:

Gender: Why Should We Study It? **(Towards a World of Equals: Unit -1)**
Socialization: Making Women, Making Men **(Towards a World of Equals: Unit -2)**
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.
Just Relationships: Being Together as Equals **(Towards a World of Equals: Unit-12)**
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers.
Further Reading: Rosa Parks- The Brave Heart.

Unit II - GENDER AND BIOLOGY:

Mission Women: Sex Selection and Its Consequences **(Towards a World of Equals: Unit-4)**
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary **(Towards a World of Equals: Unit-10)**
Two or Many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health **(Towards a World of Equals: Unit-13)**

Unit III - GENDER AND LABOUR:

Housework: the Invisible Labour (Towards a World of Equals: Unit-3)
"My Mother doesn't Work." "Share the Load".
Women's Work: Its Politics and Economics **(Towards a World of Equals: Unit-7)**
Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit IV - ISSUES OF VOILENCE:

Sexual Harassment: Say No! (Towards a World of Equals: Unit-6)
Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Further Reading: " Chupulu"
Domestic Violence: Speaking Out (Towards a World of Equals: Unit-8)
Is Home a Safe Place? When Women Unite (Film). Rebuilding Lives. Further Reading: New Forums for justice.

Thinking about Sexual Violence (Towards a World of Equals: Unit-11)
Blaming the Victim – " Fought for my life…"- Further Reading: The Caste Face of Violence.

Unit V - GENDER STUDIES:

Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit-5)
Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.
Whose History? Questions for Historians and Others (Towards a World of Equals: Unit-9)
Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All the Units in the Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" , A.Suneetha, Uma Bhrugubanada, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Note: Since it is interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

Course Outcomes:

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.
CO 5: Men and women students and professionals will be better equipped to work and live together as equals.
CO 6: Students will develop a sense of appreciation of women in all walks of life
CO 7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

References:

1. Sen, Amartya. "More than One Million Women are Missing. "New York Review of Books 37.20 (20 December 1990). Print "We Were Making History…….' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989
2. Tripti Lahiri. "By the Numbers: Where Indian Women Work." Women's Studies Journal (14 November 2012) Available online at: http://blogs.wsj.com/India real time/2012/11/14by-the-numbers-where-Indian-women-work/
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://harpercollins.co.in/BookDetail.asp?Book Code=3732
4. Vimala. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Tharu and K. Lalitha. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Helath and Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.

6. Stree Shakti Sanghatana. "We Were Making Histroy…", Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
7. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
8. Jayaprabha, A. "Chupulu (stares)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K. Lalitha. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayan and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis." International Journal of Humanities and Social Science Invention 2.4 (2013)
10. Gautam, Liela and Gita Ramaswamy. "A'conversation' between a Daughter and a Mother." Broadsheet on Contemporary Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research Center for Women's Studies, 2014.
11. Abdulali Sohaila. "I Fought For My Life… and Won." Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-wonsohaila-abhulal/
12. Jeganathan Pradeep, Partha Chatterjee (Ed). "Community, Gender and Violence Subaltern Studies XI". Permanent Black and Ravi Dayal Publishers, New Delhi, 2000.
13. K. Kapadia. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
14. S. Benhabib. Situating the Self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992.
15. Virginia Woolf. A Room of One's Own. Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997.