FOREWORD

CMR Technical Campus, established in the year 2009, Approved by AICTE, New Delhi, Permanently Affiliated to JNTUH, twice Accredited by NBA and has been bestowed with NAAC 'A' Grade of 3.12 score on 04 scale in February 2019 for its remarkable academic accomplishments accompanied by its unflinching spirit and dedication to impart quality technical education to the deserving aspirants. The institution has commenced functioning independently within the set norms prescribed by UGC and AICTE. The performance of the institution manifests the confidence that the prestigious monitoring body, the UGC has on it, in terms of upholding its spirit and sustenance of the expected standards of functioning on its own consequently facilitating the award of degrees for its students. Thus, an autonomous institution is provided with the necessary freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

CMR Technical Campus takes pride for having won the confidence of such distinguished academic bodies meant for monitoring the quality in technology education. Besides, the institution is delighted to sustain the same spirit of discharging the responsibilities that it has been conveying since a decade to attain the current academic excellence, if not improving upon the standards and ethics. Consequently, statutory bodies such as the Academic Council and the Boards of Studies have been constituted under the supervision of the Governing Body of the College and with the recommendations of the JNTU Hyderabad, to frame the regulations, course structure and syllabi for autonomous status.

The autonomous regulations, course structure and syllabi have been framed in accordance with the vision and mission of the institution along with certain valuable suggestions from professionals of various ancillary fields such as the academics, the industry and the research, all with a noble vision to impart quality technical education and contribute in catering full-fledged engineering and management graduates to the society.

All the faculty members, the parents and the students are requested to study all the rules and regulations carefully and approach the Director to seek any clarifications, if needed, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the institution and for brightening the career prospects of engineering and management graduates.

DIRECTOR

Vision:

To impart quality education in serene atmosphere thus strive for excellence in Technology and Research.

Mission:

- To create state of art facilities for effective Teaching – Learning process.
- Pursue and Disseminate knowledge based research to meet the needs of Industry & Society.
- Infuse Professional, Ethical and Societal values among Learning Community.

Quality Policy:

- The management is committed in assuring quality service to all its stakeholders like parents, students, alumni, employees, employers and the community.
- Continual quality improvement by establishing and implementing mechanisms and modalities.
- Transparency in procedures and access to information and actions.

Core Values:

The CMR Technical Campus is guided by the following core values in delivering its mission and pursuing its vision.

- **A**ccountability: Demonstrate responsibility for our actions; establish and communicate clearly defined and articulated goals and objectives.
- **B**enchmark: To develop and pursue high standards by encouraging skill development and entrepreneurship to meet industry and society needs.
- **C**ommitment: Focus on students and stakeholders needs; continuously evaluate and improve academics, research and infrastructure.
- **D**ignity: Recognize the expertise of all members of the institute and encourage individual contribution and also include stakeholders in the decisions that affect them.

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
Kandlakoya (V), Medchal Road, Hyderabad–501401, Telangana State (India)

Academic Regulations [R20]
B.Tech. - Regular Four Year Degree Programme
(For students admitted from the academic year 2020 - 21)
&
B.Tech. - Lateral Entry Scheme
(For students admitted from the academic year 2021 - 22)

CMR Technical Campus (CMRTC) offers a 4-year (8 semesters) Bachelor of Technology (B.Tech.) degree programme, under Choice Based Credit System (CBCS).

1. UNDER GRADUATE PROGRAMS OFFERED (E & T)

CMRTC (Autonomous), affiliated to JNTUH, offers 4 Year (8 Semesters) **B.Tech.** Degree Programme in the following Branches of Engineering:

1) Civil Engineering
2) Mechanical Engineering
3) Electronics and Communication Engineering
4) Computer Science and Engineering
5) Information Technology
6) Computer Science and Engineering (Artificial Intelligence and Machine Learning)
7) Computer Science and Engineering (Data Science)
8) Artificial Intelligence and Machine Learning
9) Computer Science and Design

2. ADMISSION CRITERIA AND MEDIUM OF INSTRUCTION

2.1. Admission into first year of four year B.Tech. (Regular) Degree Programme:

2.1.1. Eligibility: A candidate seeking admission into the first year of four year B. Tech. Degree Programme should have:

(i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per guidelines defined by the Regulatory bodies of Telangana State Council for Higher Education (TSCHE) and AICTE.

(ii) Secured a rank in the TSEAMCET examination conducted by TSCHE for allotment of a seat by the Convenor, TSEAMCET.

2.1.2. Admission Procedure: Admissions are made into the first year of four year B.Tech. Degree Programme as per the stipulations of the TSCHE.

(a) Category A: 70% of the seats are filled through TSEAMCET counseling.
(b) Category B: 30% of the seats are filled by the Management.

2.2. Admission into the second year of four-year B. Tech. (Regular) Degree Programme Under Lateral Entry Scheme.

2.2.1 Eligibility: A candidate seeking admission into the II year I Semester B. Tech. Regular Degree

Programme under Lateral Entry Scheme (LES) should have passed the qualifying examination (B.Sc. Mathematics or Diploma in concerned course) and have secured a rank at Engineering Common Entrance Test TSECET (FDH). Admissions are made in accordance with the instructions received from the Convenor, TSECET and Government of Telangana State.

2.2.2 **Admission Procedure:** Admissions are made into the II year of four year B.Tech. (Regular) Degree Programme through Convenor, TSECET (FDH) against the sanctioned intake in each Programme of study as lateral entry student.

2.3. **Branch Transfers:** There shall be no Branch transfers after the completion of Admission Process.

2.4. **Medium of Instruction:** The Medium of Instruction and Examinations for the entire B.Tech. programme will be in **English** only.

3. B.Tech. PROGRAMME STRUCTURE

3.1 Admitted under Four year B. Tech. (Regular) degree Programme:

3.1.1 A student after securing admission shall pursue the under graduate programme in B.Tech for a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which, students shall forfeit their seat in B.Tech course.

3.1.2 As per AICTE guidelines, a 3-week mandatory **"Induction Programme"** shall be offered to I - B.Tech newly admitted students to get acquainted with the professional environment and prepare them for the academic schedules ahead.

3.1.3 The entire B.Tech. programme is structured for a total of 160 credits. Distribution of credits Semester-wise is available in the respective course structure.

3.1.4 Each student shall register and secure 160 credits (with CGPA $\geq$ 5) for the completion of the under graduate programme and award of the B.Tech degree.

3.2 Admitted under Lateral Entry Scheme (LES) into B. Tech. degree Programme:

3.2.1 After securing admission into II year B.Tech. I Semester, the LES students shall pursue a course of study for not less than three academic years (6 Semesters) and not more than six academic years (12 Semesters), failing which students shall forfeit their seat in B.Tech. programme.

3.2.2 The student shall register and secure 120 credits (with CGPA $\geq$ 5) from II year to IV year B.Tech. programme (LES) for the award of B. Tech degree.

3.3 The Course Structure is organized based on the AICTE Model Curriculum (Jan-2018) for Under-Graduate Degree Courses in Engineering & Technology. **UGC / AICTE** specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are listed below:

3.3.1 **Semester Scheme:**
The evaluation of course is on the basis of Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC while the course Curriculum / Course Structure is as suggested by AICTE.

- B.Tech. (Regular) Programme is of 4 Academic Years (8 Semesters)
- B.Tech. (LES) Programme is of 3 Academic Years (6 Semesters),
- Each academic year is divided into two semesters
- Each semester is of 22 weeks ($\geq$ 90 Instructional days per semester)
- Each Semester is having - 'Continuous Internal Evaluation (CIE)' and 'End Semester Examination (ESE).

3.3.2 Credit Courses:

a) 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: Practical Periods : Credits) Structure based on the following general pattern:

Theory		Practical	
1 Hr. Lecture (L)	1 credit	1 Hr. Practical (P)	0.5 credit
1 Hr. Tutorial (T)	1 credit	2 Hrs Practical (Lab)	1.0 credit

All Mandatory Courses, Study Tour, Guest Lecture, etc., will not carry any Credits.

b) **Contact Hours:** Weekly contact hours – maximum of 30 hours per week (1 hour = 60 Minutes) including credit and non-credit courses.

3.3.3 Subject / Course Classification:

CMRTC has followed the guidelines specified by AICTE / UGC / JNTUH. The subjects / courses offered in B.Tech. programme are broadly classified as mentioned below.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses	BS – Basic Sciences	Includes mathematics, physics and chemistry subjects
2		ES - Engineering Sciences	Includes fundamental engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	Elective subjects which include inter - disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
7	Core Courses	PR- Project Work	B.Tech. project or UG project or UG major project or Project Stage I & II
8		Industrial training/ Mini- project	Industrial training/ Summer Internship Industrial Oriented Mini-project/ Mini-project
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor courses	-	1 or 2 Credit courses (subset of HS)
11	Mandatory Courses	MC	Mandatory courses (non-credit)
12	Audit Courses	AC	

3.3.4 Subject Code Nomenclature:

1	2	3	4	5	6	7	8	9

1, 2 - Year of implementation of Regulation
3, 4 - Department Code (Course offering department)
5 - Serial No. of Semester (1 to 8)
6, 7 - Serial No. of Subject, Semester wise
8, 9 - Course Group/ Category

Example: - 19EC302PC

4. COURSE REGISTRATION

4.1 A '**Faculty Advisor/Mentor**' shall be assigned to each student to advise the student about the B.Tech. programme, course structure and curriculum, choice / option for subjects / courses, based on his/her competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites 'registration forms' from students before the beginning of the semester through online submission, ensuring '**date** and **time stamping**'. The online registration requests for any 'current semester' shall be completed **before the commencement of ESEs (End Semester Examinations) of the 'preceding semester'**.

4.3 A student can apply for **online** registration, **only after** obtaining the '**written approval**' from his faculty advisor or Mentor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor and the student.

4.4 A student has to register for all subjects/courses in a semester as specified in the course structure and may be permitted to register one additional theory subject / course limited to 3 credits, based on the student's **progress** and SGPA / CGPA, and completion of the ' **pre-requisites'** as indicated for various subjects/courses, in the department course structure and syllabus contents.

4.5 If the student submits ambiguous choices or multiple options or erroneous (incorrect) entries during **online** 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.

4.6 Subject / course options exercised through **online** registration are final and **cannot** be changed or inter- changed; further, alternate choices also will not be considered. However, if the subject / course that has already been listed for registration by Head of the 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 Head of the Department, with due notification and time-framed schedule, within the **first week** from the commencement of class-work for that semester.

4.7 Dropping of additional registered subject / course (refer 4.4) may be permitted only after obtaining prior approval from the faculty advisor / Mentor, '**within a period of 15 days**' from the commencement of that semester.

4.8 **Open electives**: Students can choose open electives, wherever offered, from the list of open electives given for their stream. However, student has to opt for at least one HS Open elective and cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.9 **Professional electives**: Students have to choose professional elective, wherever offered, from the list of professional electives given. However, students may opt for professional

elective subjects offered in the related area.

4.10 **Mandatory Courses (Non-Credit):** All mandatory courses, wherever offered, require prior registration.

5. SUBJECTS / COURSES TO BE OFFERED

5.1 A typical Section (or Class) Strength for each Semester shall be 60. A subject / course may be offered to the students, **if only** a minimum 1/3 of students register to the course. The Maximum Strength of a Section is limited to 80 (60 + 1/3 of the Section Strength).

i) More than **one faculty member** may offer the **same subject** (lab / practical's may be included with the corresponding theory subject in the same semester) in any semester.

ii) However, selection of choice for students will be based on '**first come first serve** basis and CGPA criterion' (i.e. 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 s tudent).

iii) If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary decision, whether or not to offer such a subject / course for **two (or multiple) sections**.

6. ATTENDANCE REQUIREMENTS

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum 75% of attendance in aggregate (excluding the days of midterm examinations) for all the subjects / courses, excluding attendance in mandatory courses in that semester.

6.2 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.

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

6.4 Shortage of attendance below 65% in aggregate shall in **no** case be condoned.

6.5 **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 student was detained, by seeking re-admission into that semester as and when offered; in case if 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.

6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7. ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no. 6.

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course, if student secures not less than 35% marks (24 out of 70 marks) in the End Semester Examination (ESE), and a minimum of 40% of marks (40 out of 100) in the sum total of the Continuous Internal Evaluation (CIE) and End Semester Examination (ESE) taken together; in terms of letter grades, this implies securing **C** grade or above in that subject / course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits

allotted to summer internship and project courses, if student secures not less than 40% of the total marks in each of them. The student would be treated as failed, if student does not submit a report on his project(s), or does not make a presentation of the same before the evaluation committee as per the schedule. Student may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such 'one re-appearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

7.3.1 B.Tech. (Regular):

S. No.	Promotion	Conditions to be fulfilled
1	First Semester to Second Semester	Regular course of study of First Semester
2	Second Semester to Third Semester	**(i)** Regular course of study of Second Semester Must have secured at least 50% credits (20 out of 40 credits) up to Second Semester from all the relevant regular and supplementary examinations whether the student takes those examinations or not.
3	Third Semester to Fourth Semester	Regular course of study of Third Semester
4	Fourth Semester to Fifth Semester	**(i)** Regular course of study of Fourth Semester Must have secured at least 60% credits (48 out of 80 credits) up to Fourth Semester from all the relevant regular and supplementar y examinations, whether the student takes those examinations or not.
5	Fifth Semester to Sixth Semester	Regular course of study of Fifth Semester
6	Sixth Semester to Seventh Semester	**(i)** Regular course of study of Sixth Semester Must have secured at least 60% credits (72 out of 120 credits) up to Sixth Semester from all the relevant regular and supplementar y examinations, whether the student takes those examinations or not.
7	Seventh Semester to Eighth Semester	Regular course of study of Seventh Semester

7.3.2 B. Tech - Lateral Entry Scheme (LES):

S. No.	Promotion	Conditions to be fulfilled
1	Third Semester to Fourth Semester	Regular course of study of Third Semester
2	Fourth Semester to Fifth Semester	**(i)** Regular course of study of Fourth Semester Must have secured at least 50% credits (20 out of 40 credits) up to Fourth Semester from all the relevant regular and supplementar y examinations, whether the student takes those examinations or not.
3	Fifth Semester to Sixth Semester	Regular course of study of Fifth Semester
4	Sixth Semester to Seventh Semester	**(i)** Regular course of study of Sixth Semester Must have secured at least 60% credits (48 out of 80 credits) up to Sixth Semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Seventh Semester to Eighth Semester	Regular course of study of Seventh Semester

7.4 A student has to register for all subjects covering 160 credits (120 credits in case of LES) as specified and listed (with the relevant course / subject classifications as mentioned) in the course structure, fulfill all the attendance and academic requirements for 160 credits (120 credits in case of LES) securing a minimum of **'C'** grade or above in each subject, and 'earn all 160 credits (120 credits in case of LES) securing SGPA ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0, to successfully complete the under graduate programme.

7.5 If a student registers for '**additional subjects'** (in the parent department or other departments / branches of engineering) other than those listed subjects totaling to 160 credits (120 credits in case of LES) as specified in the course structure of parent department, the performances in those '**additional subjects**' (although evaluated and graded using the same procedure as that of the required 160 credits (120 credits in case of LES)) will not be taken into account while calculating the SGPA and CGPA. For such ' **additional subjects'** registered, % of marks and 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 regulations 6 and 7.1 to 7.4 above.

7.6 A student eligible to appear in the End Semester Examination for any subject / course, but absent from it or failed (thereby failing to secure **'C'** grade or above) may reappear for that subject / course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject / course will be carried over, and added to the marks to be obtained in the ESE supplementary examination for evaluating performance in that subject.

7.7 A student **detained in a semester due to shortage of attendance may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements**. The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.

7.8 A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which student has been readmitted shall be applicable.

8. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

8.1 The performance of a student in each semester shall be evaluated subject-wise / course-wise (irrespective of credits assigned) with a maximum of 100 marks. These evaluations shall be based on 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for ESE (End Semester Examination), and a letter grade corresponding to the percentage of marks obtained shall be given.

8.2 Evaluation of Theory Subjects / Courses

A) **Continuous Internal Evaluation:** For each theory subject, during the semester, there shall be 2 Mid-term examinations of 30 marks each. Each Mid-term examination consists of subjective paper for 25 marks & assignment for 5 marks and the final CIE marks (for total of 30) are calculated by taking average of the two Mid-term examinations.

- The first Mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.
- The subjective paper shall be conducted for duration of 90 minutes. Each subjective paper shall contain 2 parts (Part-A and Part-B). Part-A consists of one compulsory question with five sub questions carrying two marks each. Part-B consists of three questions carrying 5 marks each (may contain sub questions) with internal choice; the

student has to answer all the questions.

- First assignment should be submitted before the commencement of the first mid-term examinations, and the second assignment should be submitted before the commencement of the second mid-term examinations. The assignments shall be specified / given by the concerned subject teacher.

B) End Semester Examinations: The duration of ESE is 3 hours. The details of the question paper pattern is as follows:

- The end semester examinations will be conducted for 70 marks consisting of two parts viz. i) **Part- A** for 20 marks, ii) **Part - B** for 50 marks.
- Part-A is compulsory, which consists of one question with ten sub questions (two from each unit) carrying 02 Marks each.
- Part-B consists of five questions (numbered from 02 to 11) carrying 10 marks each. One question from each unit (may contain sub-questions) with internal choice.

8.3 Evaluation of Practical Subjects / Courses: In any semester, a student has to complete at least 08 to 10 experiments / exercises in each laboratory course and get the record certified by the Subject teacher and concerned Head of the Department to be eligible for End Semester Examination.

For practical subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks and 70 marks for End Semester Examination (ESE).

A) Continuous Internal Evaluation (CIE): Out of the 30 marks, 15 marks are allocated for day-to-day work evaluation and the remaining 15 marks for internal practical examination. There shall be two internal practical examinations of 15 marks each conducted by the concerned laboratory teacher and the average of the two is considered.

B) End Semester Examination (ESE): The ESE for practical subject / course shall be conducted at the end of the semester with duration of 3 hours by one internal and one external examiner appointed by the Head of the Institution as per the recommendation of the concerned Head of the Department.

8.4 Evaluation of Design / Drawing Subjects / Courses: For the subjects such as Engineering Graphics, Machine Drawing, Production drawing and any such subject, the distribution shall be 30 marks for CIE (15 marks for day-to-day work and 15 marks for Mid-Term examination) and 70 marks for ESE.

A) Continuous Internal Evaluation: There shall be two Mid-Term examinations in a Semester and the Marks for 15 can be calculated taking average of the two Mid -term examinations and these are added to the marks obtained in day to day work evaluation.

B) End Semester Examinations: The duration of ESE is 03 hours consisting of five questions carrying 14 marks each. One question from each unit (may contain sub-questions) with internal choice.

8.5 Evaluation of Summer Internship: The Summer internship (02 - 04 weeks) registered by the students in consultation with course coordinator and carried out in Industries and/or R&D Organizations immediately after their VI semester course work. The completion report will be assessed in VII semester for 'Satisfactory' or 'Unsatisfactory' by a committee consisting of Head of the Department, supervisor and a senior faculty member of the department.

8.6 Evaluation of Project work: Student(s) shall start the Project Work during the VII Semester

(IV-B.Tech.–I–Semester) as per the instructions of the Project Guide / Project Supervisor assigned by the Head of the Department. The topics for Summer Internship, Project Stage – I and Technical seminar shall be different from one another.

a) The Project Work shall be carried out in two stages: Project-I (Stage – I) during VII Semester (IV-B.Tech.–I–Semester), and Project-II (Stage – II) during VIII Semester (IV-B.Tech.–II–Semester), and the student has to prepare two independent Project Work Reports – *one each during each stage*. First Report shall include the Project Work carried out under Stage – I, and the Second Report (Final Report) shall include the Project Work carried out under Stage – I and Stage – II put together. Stage – I and Stage – II of the Project Work shall be evaluated for 100 marks each.

b) Out of the total 100 marks allotted for each stage of the Project Work, 30 marks shall be for the Continuous Internal Evaluation(CIE), and 70 marks shall be for the End Semester Viva-voce Examination (ESE). The marks earned under CIE for both the stages of the Project shall be awarded by the Project Guide / Supervisor (based on the continuous evaluation of student's performance during the two Project Work stages); and the marks earned under ESE shall be awarded by the Project Viva-voce Committee / Board (based on the work carried out, report prepared and the presentation made by the student at the time of Viva-voce Examination).

c) For the Project Stage - I, the Viva-voce shall be conducted at the end of the VII Semester, before the commencement of the End semester Examinations, by the Project Evaluation Committee comprising of the Head of the Department or One Senior Faculty member and Supervisor and the Project Stage – II Viva-voce shall be conducted by the Committee comprising of an External Examiner appointed by the Head of the Institution, Head of the Department and Project Supervisor at the end of the VIII Semester, before the commencement of the End Semester Examinations.

d) If a student does not appear (or fails) for any of the two Viva -voce examinations at the scheduled times as specified above, he may be permitted to reappear for Project Stage - I and/or Project Stage - II Viva-voce examinations, as and when they are scheduled again in that semester; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester(s), as and when they are scheduled, as supplementary candidate.

8.7 Evaluation of Technical Seminar: The student has to enroll and get approval for technical seminar on a specialized topic from the concerned advisor / Mentor in the beginning of VII semester (IV year I semester). The student should collect the information on a specialized topic, prepare a technical report, give seminar presentation on the topic and submit it to the department as notified by the concerned Head of the Department. It shall be evaluated by the departmental evaluation committee consisting of Head of the Department, seminar supervisor and two senior faculty members. The seminar report and the seminar presentation shall be evaluated for 100 marks. There shall be no End Semester Examination for the seminar.

8.8 Evaluation of Mandatory Non-Credit Courses: There shall be only CIE for all mandatory (non-credit) courses, instead of marks or letter grade. ' **Satisfactory'** or "**Unsatisfactory'** shall be indicated and this will not be counted for the computation of SGPA / CGPA. The student has to maintain a minimum of 65% attendance and secure not less than 40% in the CIE and then only the student is declared as **pass** and will be qualified for the award of the degree.

8.9 MOOCs Courses through SWAYAM Portal: The approved list of SWAYAM courses shall be notified and made available at the beginning of the semester. The students are given option to choose Professional Electives / Open Electives in the curriculum offered by the institute or from the notified list. The maximum number of transferable credits through SWAYAM Courses are capped at 18 (06 Courses).

9. GRADING PROCEDURE

9.1 Grades will be awarded to indicate the performance of the student in each theory subject, lab / practical's, design/drawing practice, Summer Internship, Technical Seminar and Project-I & Project-II based on the percentage of marks obtained in Continuous Internal Evaluation plus End Semester Examination, both taken together, as specified in item 8 above, a corresponding letter grade shall be given.

9.2 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
90% and above (≥ 90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (≥ 80% , < 90%)	A^+ (Excellent)	9
Below 80% but not less than 70% (≥ 70% , < 80%)	A (Very Good)	8
Below 70% but not less than 60% (≥ 60% , < 70%)	B^+ (Good)	7
Below 60% but not less than 50% (≥ 50% , < 60%)	B (above Average)	6
Below 50% but not less than 40% (≥ 40% , < 50%)	C (Average)	5
Below 40% (< 40%)	F (Fail)	0
Absent	AB	0

9.3 A student obtaining **F** grade or **AB** grade in any subject shall be considered **'failed'** in that subject and will be required to reappear in ' **Supplementary Exam**' in the End Semester Examination (ESE), as and when offered. In such cases, Continuous Internal Examination (CIE) in those subject(s) will remain same as those obtained earlier.

9.4 A letter grade does not imply any specific % of marks.

9.5 In general, a student shall not be permitted to repeat any subject/course (s) only for the sake of '**grade improvement**' or 'SGPA / CGPA improvement'. However, student has to repeat all the subjects / courses pertaining to that semester, if detained.

9.6 A student earns grade point (GP) in each subject / course, on the basis of the letter grade obtained 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

9.7 The student passes the subject / course only when GP ≥ 5 (**C** grade or above).

9.8 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

$$\textbf{SGPA } (S_i) = \sum (C_i \text{ X } G_i) / \sum C_i$$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative

performance of a student in 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, I semester onwards, at the end of each semester, as per the formula:

$$\mathbf{CGPA = \sum (C_j X S_i) / \sum C_j}$$

where S_i is the SGPA of the j^{th} semester and C_j is the total number of credits in that semester.

Illustration of calculation of SGPA					Illustration of calculation of CGPA			
Course /Subject	Credits	Letter Grade	Grade Points	Credit Points	Sem.	Credits	SGPA	Creditsx SGPA
Course 1	4	A	8	4 x 8 = 32	Sem I	19	7	19 x 7= 133
Course 2	3	O	10	3 x 10 = 30	Sem II	19	6	19 x 6= 114
Course 3	3	C	5	3 x 5 = 15	Sem III	21	6.5	21 x 6.5 =136.5
Course 4	3	B	6	3 x 6 = 18	Sem IV	21	6	21 x 6 = 126
Course 5	1.5	A^+	9	1.5x9 = 13.5	Sem V	21	7.5	21 x 7.5 =180
Course 6	1.5	A	8	1.5x8 = 12	Sem VI	21	8	21 x 8 = 157.5
Course 7	1.5	B^+	7	1.5x7 = 10.5	Sem VII	21	8.5	21 x 8.5 =178.5
Course 8	1.5	A^+	9	1.5x9 = 13.5	Sem VIII	17	8	17 x 8 = 136
Total	**19**		**62**	**144.5**	**Total**	**160**		**1161.5**
SGPA = 144.5/19 = 7.60					**CGPA = 1161.5/160 = 7.26**			

9.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off**' values of the CGPAs will be used.

9.11 For calculations listed in Item 9.6–9.9, 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 cou rses will not be taken into consideration.

10 PASSING STANDARDS

10.1 A student shall be declared '**successful'** or '**passed**' in a semester, if student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); and a student shall be declared '**successful**' or '**passed**' in the entire under graduate programme, only when a student gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of 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 DECLARATION OF RESULTS

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 – 9.9.

11.2 For Final percentage of marks equivalent to the computed final CGPA, the following formula may be used:

Percentage of Marks = (final CGPA – 0.5) x 10

12 AWARD OF DEGREE

12.1 After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. degree the student shall be placed in one of the following four classes based on CGPA:

Class Awarded	Grade to be Secured	Remarks

First Class with Distinction	≥ 8 CGPA	From the aggregate marks secured from 160 Credits for Regular Students and 120 Credits for Lateral Entry Students.
First Class	≥ 6.5 to < 8 CGPA	
Second Class	≥ 5.5 to < 6.5 CGPA	
Pass Class	≥ 5.00 to < 5.5 CGPA	
FAIL	CGPA < 5	

12.2 First class with distinction will be awarded to those students who clear all the subjects during his / her regular course of study by fulfilling the following conditions:

(i) Should have passed all the subjects/courses within the first 4 academic years (or 8 sequential semesters) for B.Tech. (Regular) and first 3 academic years (or 6 sequential semesters) for B.Tech. (LES) from the date of commencement of first year first semester for B.Tech. (Regular) and II year I semester for B.Tech. (LES).

(ii) Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters (6 sequential semesters for LES), starting from I year I semester (starting from II year I semester for LES) onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in '**first class with distinction'**.

A Student not fulfilling any of the above condition and having final CGPA ≥ 8.00 shall be placed in "First Class".

12.3 **B. Tech (Honors):** The student who accrue 20 credits from NPTEL in addition to their regular course work, will be awarded with Honors Degree.

12.4 **Award of Medals:** Students fulfilling the conditions listed under item 12.2 alone will be eligible for award of '**College Ranks**' and '**Medals**'.

12.5 **Graduation Day:** The College shall have its own Annual Graduation Day for the award of Degrees issued by the University.

12.6 **Transcripts:** After successful completion of prerequisite credits for the award of degree a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

13 WITHHOLDING OF RESULTS

If the student has not paid the fees to the Institute at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result o f the student may be withheld, and the student 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 SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for odd semester subjects will be conducted along with even semester regular examinations and vice versa.

15. TRANSITORY REGULATIONS

a) A 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 a fter 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 maybe) as and when theyare offered (within the time-frame of 8 years fromthedate of commencement of student's first yearfirst semester).

b) A student who has failed in any subject under any regulation has to pass those subjects in the respective regulations.

c) The maximum credits that a student acquires for the award of degree, shall be the sumof the total number of credits secured in all the regulations of his/her study including R19 Regulations. The performance evaluation of the student will be done as per the rules and regulations applicable at the time of admission(s) regarding award of grade and/or class as the case may be.

d) If a student readmitted to R19 Regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R19 Regulations will be substituted by another subject to be suggested by the CMRTC Academic Council.

e) **Promotion Rule:** Where the credits allotted to a semester/year under the regulations studied in are different from that under R19 regulations for the corresponding semester/year, the promotion rules of R19 vide section 7.3 shall be applied after normalization. Normalization is done by scaling down or up the number of credits of a semester/year under the previous regulations to equal the number of credits of the corresponding semester/year under R19 regulations and revising the secured credits also in the same proportion.

16 STUDENT TRANSFERS

There shall be no transfers from other colleges / streams.

17 RULES OF DISCIPLINE

17.1 Any attempt by any student to influence the teachers, examiners, faculty members and staff of Controller of Examination office for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice case and the student can be debarred from the college.

17.2 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, student is awarded zero marks in that subject(s).

17.3 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Malpractice Prevention Committee is final.

18. MALPRACTICE

18.1 **Malpractice Prevention Committee:** The committee shall examine the student's malpractice and indiscipline cases occurred, while conducting the examinations and recommend appropriate punishment to the Academic Council after taking explanation from the student and concerned invigilator as per the malpractice rules mentioned below. The committee consists of

a) Controller of Examinations - Chairman
b) Addl. Controller of Examinations.- Convener
c) Subject Expert - Member
d) Head of the Department of which the student belongs to - Member
e) The Invigilator concerned - Member

18.2 Malpractice Rules: Disciplinary Action for Improper Conduct in Examinations

S. No.	Nature of Malpractices / Improper Conduct	Punishment
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (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.
1(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in 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 is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of 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 shall be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from 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 practical's 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 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 is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet,	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

	during or after the examination.	be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all 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 examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Controller of examinations / 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 addl. Controller of examinations or any person on duty in or outside the examination hall of 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 addl. Controller of examinations, 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 result 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 to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	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/year. 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 is registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of 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/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess 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/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges 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/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to 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/year.
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/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Chief Superintendent for further action to award suitable punishment.	

19. SCOPE

i) Wherever the words 'he, him, his' occur in the regulations, they shall include 'she, her'.

ii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.

iii) The above mentioned rules and regulations are applicable in general to both B.Tech. (Regular) and B.Tech. (LES), unless and otherwise specific.

iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee is final.

20. REVISION AND AMENDMENTS TO REGULATIONS

The Academic Council may revise 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 Academic Council.

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B.Tech. I Year Syllabus

Common for CSE, CSE (AI & ML) & IT

I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20MA101BS	Algebra and Calculus	3	1	0	4
2	20CH102BS	Engineering Chemistry	3	1	0	4
3	20CS103ES	Programming for problem solving	3	1	0	4
4	20EN104HS	English	2	0	0	2
5	20ME105ES	Engineering Workshop	0	0	3	1.5
6	20CH106BS	Engineering Chemistry Lab	0	0	3	1.5
7	20EN107HS	English Language and Communication Skills Lab	0	0	3	1.5
8	20CS108ES	Programming for Problem Solving Lab	0	0	3	1.5
		Induction Programme				
Total Credits			**11**	**3**	**12**	**20**

II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	20MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	20AP202BS	Applied Physics	3	1	0	4
3	20EC203ES	Basic Electronics & Electrical Engineering	3	1	0	4
4	20ME204ES	Engineering Graphics	2	0	4	4
5	20AP205BS	Applied Physics Lab	0	0	3	1.5
6	20EC206ES	Basic Electrical &Electronics Engineering Lab	0	0	3	1.5
7	20CS207ES	Basic Elements of Engineering Technology	0	0	2	1
8	20MC208ES	Environmental Science	3	0	0	0
Total Credits			**14**	**3**	**12**	**20**

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B. Tech. II Year Syllabus

Computer Science and Engineering

III SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20MA301BS	Statistical and Numerical Methods	3	1	0	4
2	20CS302PC	Data Structures using C	3	0	0	3
3	20CS303PC	OOPS Through Java	3	0	0	3
4	20CS304PC	Theory of Computation	3	0	0	3
5	20EC305PC	Analog and Digital Electronics	3	0	0	3
6	20CS306PC	OOPS Through Java Lab	0	0	3	1.5
7	20CS307PC	Data Structure using C Lab	0	0	3	1.5
8	20EC308PC	Analog and Digital Electronics Lab	0	0	2	1
9	20MC309GS	Gender Sensitization Lab	3	0	0	0
		Total	**18**	**1**	**8**	**20**

IV SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	20CS401PC	Data Base Management Systems	3	1	0	4
2	20CS402PC	Programming with Python	3	0	0	3
3	20CS403PC	Design Analysis & Algorithms	3	0	0	3
4	20CS404PC	Operating Systems	3	0	0	3
5	20CS405PC	Computer Organization	3	0	0	3
6	20CS406PC	Python Lab	0	0	3	1.5
7	20CS407PC	DBMS Lab	0	0	3	1.5
8	20CS408PC	OS Lab	0	0	2	1
9	20MC409CI	Constitution of India	3	0	0	0
		Total	**18**	**1**	**8**	**20**

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B. Tech. III Year Syllabus

Computer Science and Engineering

V SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20CS501PC	Software Engineering	3	0	0	3
2	20CS502PC	Computer Networks	3	0	0	3
3	20CS503PC	Web Technologies	3	1	0	4
4		Professional Elective-I	3	0	0	3
5		Professional Elective -II	3	0	0	3
6	20CS504PC	Software Engineering Lab	0	0	3	1.5
7	20CS505PC	Computer Networks & Web Technologies Lab	0	0	3	1.5
8	20EN507HS	Advanced Communication Skills Lab	0	0	2	1
9	20MC509IP	Intellectual Property Rights	3	0	0	0
		Total Credits	**18**	**1**	**8**	**20**

VI SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20CS601PC	Machine Learning	3	1	0	4
2	20CS602PC	Compiler Design	3	0	0	3
3	20MB603PC	Business Economics & Financial Analysis	3	0	0	3
4		Professional Elective – III	3	0	0	3
5		Open Elective-I	3	0	0	3
6	20CS604PC	Machine Learning Lab	0	0	3	1.5
7	20CS605PC	Compiler Design Lab	0	0	2	1
8		Professional Elective-III Lab	0	0	3	1.5
9	20MC608ES	Environmental Science	3	0	0	0
		Total Credits	**18**	**1**	**8**	**20**

***MC - Environmental Science – Should be Registered by Lateral Entry Students Only.**

Professional Elective-I

20CS511PE	Distributed Systems
20CS512PE	Object Oriented Analysis and Design
20CS513PE	Data Analytics
20CS514PE	Image Processing
20CS515PE	Principles of Programming Languages

Professional Elective - II

20CS521PE	Computer Graphics
20CS522PE	Advanced Operating Systems
20CS523PE	Informational Retrieval Systems
20CS524PE	Distributed Databases
20CS525PE	Natural Language Processing

Professional Elective - III

20CS631PE	Big Data Analytics
20CS632PE	Network Programming
20CS633PE	Scripting Languages
20CS634PE	Mobile Application Development
20CS635PE	Software Testing Methodologies

 # Courses in PE - III and PE - III Lab must be in 1-1 correspondence.

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B.Tech. IV Year Syllabus (w. e. f. A.Y. 2021-22)

Computer Science and Engineering

VII SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20MB701BS	Organizational Behaviour	2	0	0	2
2	20CS702PC	Data Mining	3	0	0	3
3	20CS74xPE	Professional Elective – IV	3	0	0	3
4	20CS75xPE	Professional Elective – V	3	0	0	3
5		Open Elective – II	3	0	0	3
6	20CS703PC	Data Mining Lab			2	1
7	20CS704PC	Industry Oriented Mini Project				2
8	20CS705PC	Seminar			2	1
9	20CS706PC	Project Stage – I			4	2
		Total Credits	**14**	**0**	**8**	**20**

VIII SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20CS801PC	Cryptography and Network Security	3	1	0	4
2	20CS86xPE	Professional Elective –VI	3	0	0	3
3		Open Elective – III	3	0	0	3
4	20CS802PC	Project Stage – II			20	10
		Total Credits	**10**	**0**	**20**	**20**

Professional Elective-IV

20CS741PE	Cloud Computing
20CS742PE	Soft Computing
20CS743PE	Mobile Computing
20CS744PE	Artificial Intelligence
20CS745PE	Ad-hoc Sensor Networks

Professional Elective - V

20CS751PE	Real Time Systems
20CS752PE	Internet of Things
20CS753PE	Software Process and Project Management
20CS754PE	Design Patterns
20CS755PE	Advanced Algorithms

Professional Elective - VI

20CS861PE	Human Computer Interaction
20CS862PE	Cyber Forensics
20CS863PE	Deep Learning
20CS864PE	Ethical Hacking
20CS865PE	Database Security

20MA101BS: Algebra and Calculus

B. Tech. I SEM	L	T	P	C
	3	1	0	4

Course Objectives: To learn

1. Types of matrices and their properties, rank of the matrix, consistency and solving the system of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the Quadratic form to Canonical form.
3. Concept of Sequences and nature of the series.
4. Geometrical approach to the mean value theorems and their application to the mathematical problems and evaluation of improper integrals using Beta and Gamma functions.
5. Partial differentiation, concept of total derivative, finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Analyze the nature of convergence of sequence and series.
4. Solve problems involving mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
5. Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: Matrices **10L**

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; Orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss -elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors **10L**

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Sequences & Series **10L**

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's n^{th} root test.

Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus **12L**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem(without proof) with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem(without proof), Taylor's series of single variable.Definition of improper integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications) **8L**

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative;

Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publications, Reprint, 2008.
- Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi,2010.
- Engineering Mathematics – I,T.K.V.Iyengar,B. Krishna Gandhi &Others, Edition S.Chand 2013.

20CH102BS: Engineering Chemistry

B. Tech. I SEM	L	T	P	C
	3	1	0	4

Course Objectives:

1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
3. To acquire the knowledge of electro chemistry, corrosion and water treatment which are essential for the engineers and in industry.
4. To acquire the knowledge about electronic, infra red and NMR spectra.
5. To impart the knowledge of stereo chemistry and synthetic aspects useful for understanding reaction pathways.

Course Outcomes:

The basic concepts included in this course will help the student to gain:

1. The knowledge of atomic, molecular and complex compound structures.
2. The required skills to get clear concepts on hard water, hardness and different purification methods of water.
3. The required principles and concepts of electro chemistry, corrosion and in understanding the problem of water and its treatments.
4. The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.
5. The knowledge of electronic, infrared and NMR spectra.

UNIT-I: **10L**

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals

Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2, O_2^-, CO, NO and F_2 molecules. π-molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT–Crystal Field Splitting of transition metal ion d-orbitals in Tetrahedral, Octahedral and square planar geometries.

UNIT-II: **8L**

Water Chemistry: (08 Hours)

Introduction-hardness of water-Causes of hardness-Types of hardness: temporary and permanent-expression and units of hardness-Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water–Disinfectionof water by chlorination and ozonization. Boiler feed water and its treatment-Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water-Ion exchange process. Desalination of water-Reverse osmosis. Numerical problems.

UNIT –III: **12L**

Electrochemistry and corrosion:

Electrochemistry: Electrochemical cells-electrode potential, standard electrode potential, types of electrodes-calomel, Quinhydrone and glass electrode. Nernst equation- Determination of pH of a solution by using glass electrode. Electrochemical series and its applications. Numerical problems.

Batteries: Primary (Lithium cell) and secondary batteries (Lead-acid storage battery and Lithium ion battery).

Corrosion: Causes and effects of corrosion-theories of corrosion: chemical and electrochemical corrosion-mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods-Cathodic protection-Sacrificial anodic and impressed current cathodic protection. Surface coatings-metallic coating methods: Hot dipping, Electroplating and Electroless plating of Nickel.

UNIT – IV: **10L**

Stereochemistry, Reaction Mechanism and synthesis of drug molecules.

Stereochemistry: Isomerism: structural and stereo isomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and absolute configuration. Conformational analysis of n-butane.

Reaction Mechanism: Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN^1, SN^2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard addition of carbonyl compounds. Elimination reactions: Dehydrohalogenation of alkylhalides-Saytzeff's rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$.

Drug molecules: Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT-V: **10L**

Spectroscopic techniques and applications.

Introduction to spectroscopy, electromagnetic spectrum**:** Principles of electronic magnatic spectroscopy spectroscopy-Lambert –Beer's Law, selection rules: Woodward–Fieser rule. Chromophore, auxochrome and various shifts. Applications of electronic spectroscopy. Principle and selection rules of vibrational and rotational spectroscopy. Applications of vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift and splitting pattern of NMR signals. Applications of NMR: Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Engineering Chemistry by P. C Jain and M. Jain, Dhanpat Rai Publications, New Delhi, 16th Edition.
2. Text book of Engineering chemistry by Jaya shree Anireddy, Wiley Publications.
3. Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakroborty, Cengage Publications, New Delhi-2018.
4. A Textbook of Engineering Chemistry by Dr. Bharathi Kumari Yalamanchili, VGS Techno Series (R18 Syllabus)
5. A Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publications, New Delhi.

REFERENCES:

1. Engineering Chemistry by S. S. Dara, S. Chand & Company Ltd, New Delhi.
2. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, New Delhi.
3. Engineering Chemistry by B. Sivasankar, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

20CS103ES: Programming for Problem Solving

B. Tech. I SEM	L	T	P	C
	3	1	0	4

Course Objectives:

1. To learn the fundamentals of computers, algorithms and flowcharts.
2. To learn how arrays, pointer, structure and union are used.
3. To learn preprocess command and implement file in c
4. To learn the concepts code reusability using Functions.
5. To learn various searching and sorting techniques using Arrays

Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems.
2. To understand use arrays, pointers, strings and structures to write C programs.
3. To understand the files using C programs.
4. To decompose a problem into functions and to develop modular reusable code.
5. To understand the Searching and sorting problems.

UNIT - 1: Introduction to Programming **12L**

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators.

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers **10L**

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation), Enumeration data type.

UNIT - III: Pre processor and File handling in C **9L**

Pre processor: Commonly used Pre processor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending

data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT - IV: Function and Dynamic Memory Allocation 9L

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Introduction to Algorithms: 10L

Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms),

Basic concept of order of complexity through the example programs

TEXT BOOKS:

1. Byron Gottfried, Schaum'sOutline of Programming with C,McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,Prentice Hall of India
2. R.G. Dromey, How to solve it byComputer, Pearson (16thImpression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4thEdition

20EN104HS: English

B. Tech. I SEM	L	T	P	C
	2	0	0	2

Course Objectives:

The course will help students to-

1. Apply their knowledge of English grammar and vocabulary in a variety of written compositions.
2. Examine a given text accurately to achieve optimum comprehension.
3. Develop study skills and techniques.
4. Analyze the content of other academic subjects critically.
5. Express cognitive and affective ideas and experiences clearly.

Course Outcomes:

Students should be able to-

1. Generate ideas and create effective sentence structures in spoken and written forms.
2. Comprehend passages and texts critically and respond appropriately.
3. Select specific approaches to study and retain information.
4. Interpret technical content using theoretical and practical components of English language.
5. Communicate effectively in formal and informal contexts.

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the enhancement of skills in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development and also on personality development fostering ideas and practice of language skills and exhibiting the right values and ethics in various contexts and cultures.

Learning Objectives: The course will help to

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop Study Skills and Communication Skills in formal and informal situations.
- Integrate Value Education and Ethics.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently and assertively in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

UNIT –I: 8L

'Mokshagundam Visvesvaraya' from the prescribed text book by JNTUH 'Epitome of Wisdom' - Maruthi Publications.

Vocabulary Building: The Concept of Word Formation -The Use of Prefixes and Suffixes.
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures - Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II: 8L

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun - Pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension.
Writing: Format of a Formal Letter - **Writing Formal Letters-** Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III: 9L

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary- Homonyms, Homophones, One-word substitutes.
Grammar- Misplaced Modifiers and Tenses.
Reading-Reading poem 'Stopping by Woods on a Snowy Evening' by Robert Frost.
Writing- Note-making, Information Transfer.

UNIT –IV: 8L

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations and Acronyms in English.
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading.
Writing: Essay Writing-Précis Writing.

UNIT –V: 10L

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report - Categories of Report - Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

PRESCRIBED TEXTBOOK:

Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCES:

1. Epitome of Wisdom – Maruthi Publications
2. English Grammar by David Green
3. Swan, M.(2016). Practical English Usage. Oxford University Press.
4. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
5. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
6. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
7. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
8. Exercises in Spoken English. Parts I–III. CIEFL, Hyderabad. Oxford University Press.

20ME105ES: Engineering Workshop

B. Tech. I SEM	L	T	P	C
	0	0	3	1.5

Course Objective:

Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops. This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing. Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.

Course Outcomes: On completion of the course, students will be able to

1. Create the different patterns with desired shape and size byusing wood.
2. Align and assemble different components to create a product by fitting operations.
3. Fabricate the given material to desired product in a particular pattern by tin smithy.
4. Explain the basic principles of electrical systems in day-to-day applications.
5. Mould the component to desire pattern and shape by black smithy.
6. Create the object by casting process using molten metal.
7. Assemble the components with permanent joint by welding process.
8. Describe the process, transfer of fluid or gases from one place to another place by connecting set of pipes with different requirements in plumbing process

I. (Two experiments each from any six trades of the following)

1. Carpentry
2. Fitting
3. Tin-smithy
4. House-wiring
5. Foundry
6. Plumbing
7. Welding
8. Black smithy

II. Trades for Demonstration and Exposure:

1. Power tools
2. Machine Tools- Operations on Lathe.

Course Outcomes: On completion of the course, students will be able to

1. Create the different patterns with desired shape and size byusing wood.
2. Align and assemble different components to create a product by fitting operations.
3. Fabricate the given material to desired product in a particular pattern bytin smithy.
4. Explain the basic principles of electrical systems in day-to-day applications.
5. Mould the component to desire pattern and shape by black smithy.
6. Create the object by casting process using molten metal.
7. Assemble the components with permanent joint by welding process.
8. Describe the process, transfer of fluid or gases from one place to another place by connecting set of pipes with different requirements in plumbing process

TEXT BOOK:

1. P Kannaiah and K L Narayana, Workshop Manual, Scitech publishers, Second Edition.

20CH106BS: Engineering Chemistry Lab

B. Tech. I SEM	L	T	P	C
	0	0	3	1.5

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as a function of time.
3. The measurement of physical properties like surface tension and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.
5. To estimate amount of compound by instrumental titration methods like conductometry, potentiometry and colorimetry.

Course Outcomes: The experiments will make the student gain skills on:

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration 鈥 time relationships.
3. Determination of physical properties like surface tension and viscosity.
4. Calculation of Rf values of some organic molecules by TLC technique.
5. Estimation of amount by conductometry, potentiometry and colorimetry.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Estimation of HCl by Conductometric titrations.
4. Estimation of Acetic acid by Conductometric titrations.
5. Estimation of HCl by Potentiometric titrations.
6. Estimation of Fe2+ by Potentiometry using KMnO4.
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.
8. Synthesis of Aspirin.
9. Thin layer chromatography calculation of Rf values. Ex; ortho and para-nitro phenols.
10. Determination of acid value of coconut oil.
11. Estimation of ferrous iron in cement by colorimetric method.
12. Determination of viscosity of given solvent by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmo meter.

Note: Any 12 experiments are to be performed References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi).
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi).
3. Vogel's text book of practical organic chemistry 5^{th} edition.
4. Text book on experiments and calculations in engineering chemistry–S.S. Dara.

20EN107HS: English Language and Communication Skills Lab

B. Tech. I SEM

L	T	P	C
0	0	3	1.5

The Language Lab focuses on the production and articulation of sounds of the English language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

The course will help students to-

1. Use computer-assisted multi-media instruction enabling individualized and independent language learning.
2. Articulate the nuances of English speech sounds distinctly.
3. Modify their accent aiming for intelligibility of speech.
4. Avoid mother tongue interference in their speech.
5. Present a topic individually and in a group in various formal situations.

Course Outcomes:

Students will be able to-

1. Imitate native accent through audio- visual experience and practice.
2. Pronounce English sounds according to standard pronunciation (RP of England).
3. Speak fluently and clearly.
4. Neutralize their accent thus refining their speech.
5. Participate in discussions and presentations effectively and confidently.

Learning Outcomes: Students will be able to attain

- Better understanding of nuances of English language through audio- visual experience and group activities.
- Neutralization of accent for intelligibility.
- Speaking skills with clarity and confidence which in turn enhances their employability skills.

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Listening Skills

Objectives:

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

   • Listening for general content
   • Listening to fill up information
   • Intensive listening
   • Listening for specific information

Speaking Skills

Objectives:

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   - Oral practice: Just A Minute (JAM) Sessions
   - Role play – Individual/Group activities
   - Group discussions and Mock interviews

Exercise – I

CALL Lab:

Understand: Listening Skill-Its Importance- Purpose-Process-Types-Barriers of Listening.

***Practice*:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Greetings - Introducing Oneself and Others - Taking Leave.

Exercise – II

CALL Lab:

Understand: Minimal Pairs- Consonant Clusters- Past Tense Markers and Plural Markers.

Practice: Differences in British and American Pronunciation.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play (face-to-face & telephonic) - Expressions in Various Situations.

Exercise – III

CALL Lab:

Understand: Structure of Syllables – Word Stress - Weak Forms and Strong Forms in Context – Rhythm

Practice: Basic Rules of Word Accent – Stress Shift.

ICS Lab:

Understand: Exposure to structured talks - How to make Formal Presentations.

Practice: Power Point Presentations.

Exercise – IV

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Rising Tones and Falling Tones- Neutralization of accent.

ICS Lab:

Understand: Importance of Team work as a team leader and a team player

Practice: Group Discussion

Exercise - V

CALL Lab:

Understand: Listening for general & specific details.

Practice: Listening Comprehension Tests.

ICS Lab:
Understand*:* Interview Skills.
Practice: Mock Interviews

1. **Minimum Requirement of infrastructural facilities for ELCS Lab:**

- **Computer Assisted Language Learning (CALL) Lab:** The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

- Computer network with LAN facility (minimum 30 systems with multimedia) with the following specifications:
  i) Computers with Suitable Configuration
  ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

- The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, an LCD and a Projector.

20CS108ES: Programming For Problem Solving Lab

B. Tech. I SEM	L	T	P	C
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[Note:The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:
CodeLite: https://codelite.org/ Code::Blocks:
http://www.codeblocks.org/ DevCpp :
http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

a. Write a program for fiend the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
e. 5 x 1 = 5
f. 5 x 2 = 10

g. 5 x 3 = 15

h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

c. Write a program that finds if a given number is a prime number

d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

g. Write a C program to find the roots of a Quadratic equation.

h. Write a C program to calculate the following, where x is a fractional value.

i. 1-x/2 +x^2/4-x^3/6

j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+ ..... +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.

c. Write a C program that uses functions to perform the following:

d. Addition of Two Matrices

e. ii. Multiplication of Two Matrices

f. iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

g. Write C programs that use both recursive and non-recursive functions

h. To find the factorial of a given integer.

i. ii. To find the GCD (greatest common divisor) of two given integers.

j. iii. To find x^n

k. Write a program for reading elements using pointer into array and display the values using array.

l. Write a program for display values reverse order from array using pointer.

m. Write a program through pointer variable to sum of n elements from array.

Files:

a. Write a C program to display the contents of a file to standard output device.

b. b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

d. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back.

e. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string in to a given main string from a given position.
e. ii. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * * *
                                 4 4 4 4    * *
                                            *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given List of integers using linear search method.
b. Write a C program that uses non recursive function to search for a Key value in a given Sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of Integers in ascending order.
d. Write a C program that sorts the given array of integers using selection sort in descending order.
e. Write a C program that sorts the given array of integers using insertion sort in ascending order.
f. Write a C program that sorts a given array of names.

Suggested Reference Books for solving the problems:

i. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill
ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
iv. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
v. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vi. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.

20MA201BS: Ordinary Differential Equations and Vector Calculus

B. Tech. II SEM

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Applications of first order ordinarydifferential equations (Orthogonal trajectories, Newton's law
- of cooling, Natural growth and Decay)
- Evaluation of surface areas and volumes of revolution of curves.
- The physical quantities involved in engineering field related to the vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface and
- Volume integrals.

Course Outcomes: After learning the contents of this paper the student must be able to

- Identify whether the given differential equation of first order is exact or not.
- Solve higher order differential equation and apply the concept of differential equation to real World problems.
- Evaluate the multiple integrals and apply the concept to find area and volumes of revolution of curves.
- Evaluate Gradient, Divergence and Curl of vector differential operator.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I: First Order Differential Equations and Applications **12L**

Formation of Differential Equation, Differential Equations of first order and first degree: Variable Separable, Homogeneous Differential Equations, Exact Differential Equation-Reducible to exact, Linear and Bernoulli's equations.

Applications**:** Orthogonal trajectories, Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Higher Order Differential Equations **10L**

Linear Differential Equations of Second and Higher Order with constant coefficients: Non-Homogeneous terms of the type f(x) =e^{ax}, sinax, cosax, polynomial in x, $e^{ax}(x)$ and x(x); Method of variation of parameters; Cauchy Homogeneous Linear equation .

UNIT-III: Multivariable Calculus (Integration) **10L**

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates).

UNIT-IV: Vector Differentiation **8L**

Vector Differentiation**:** Scalar and vector point functions, Gradient, Divergence, and Curl. Directional derivatives, tangent plane and normal line, vector identities scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration **10L**

Vector Integration: Line Integral, Work done by force, surface and volume integrals.

Vector integral theorems: Green's, Stoke's and Gauss divergence theorems (without proof) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42 nd Edition, 2012
2. R.K. Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, 4th Ed., Narosa Publishing House, New Delhi,2014.
3. T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics.

REFERENCES:

1. E. Kreyszig, Advanced Engineering Mathematics, 9^{th} Ed Wiley,2012.
2. B.V. Ramana , Engineering Mathematics, 4th Ed., Tata McGraw Hill, New Delhi,2009.
3. A textbook of Engineering Mathematics, Ninth Edition by N. P. Bali, Dr Manish Goyal.

20AP202BS: Applied Physics

B. Tech. II SEM	L	T	P	C
	3	1	0	4

Course Objectives:

1. Quantum mechanics is one of the two foundational theories on which modern physics rests. The concept of wave function developed by Schrödinger and its formulation one-dimensional box are reinforced through relatively simple problems with analytic solutions.
2. The basics of semiconductors, energy bands formation, transport properties and generation recombination phenomena; Principle of operation of diodes and transistors including p-n junctions, Zener diode and BJTs provides background for subsequent courses in electronics.
3. Wave characteristics are those associated with interference and diffraction. An accurate technique for determining how and where waves propagate is given by Huygens's principle. Cosine law for thin film interference, Newtons ring's experiment and interferometer are discussed. The concept of Diffraction and resolving power of grating are explained.
4. LASER explains the basic mechanisms involved in the interaction between the laser medium and the light source. To expose on different types of laser, according to their amplifying medium and its applications. Optical fibre exposes students with the principle of optical fibre and basics of signal propagation through optical fibres and its applications.
5. Magnetic, dielectric behaviour of various materials are exposed to students to apply in industry and engineering.

Course Outcomes:

1. The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
2. The knowledge of fundamentals of Semiconductor physics, will enable the students to apply to various systems like pn junction diodes, transistors, communication and so on.
3. The students can gain knowledge on the optical phenomena like Interference and diffraction.
4. LASER explains the basic mechanisms involved in the interaction between the laser medium and the light source. Students would be able to learn Optical fibre principle and its applications as new materials for various engineering applications.
5. The course also helps the students to be exposed to the magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics **10L**

Introduction to quantum physics, Black body radiation, Planck's law, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics **10L**

Introduction to semiconductors, calculation of intrinsic carrier concentration and extrinsic carrier concentration, Dependence of Fermi level on carrier concentration and temperature, Carrier transport: diffusion and drift currents, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction transistor(BJT): construction and operation.

UNIT-III: Wave Optics **10L**

Introduction, Huygen's principle, Superposition of waves, Interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Interference in thin films by reflection-Cosine law, Newton's rings, Michelson's interferometer, Frunhofer diffraction due to single slit and double slit, Diffraction grating- resolving power.

UNIT-IV: Lasers and Fibre Optics **8L**

Lasers: Introduction, Characteristics of Lasers, Einstein's coefficients, absorption, spontaneous emission, stimulated emission, population inversion, Pumping, lasing action, Types of Lasers: Ruby laser, He-Ne laser, semiconductor laser, Applications of laser.

Fibre Optics: Introduction, working principle of optical fibre, construction of optical fibre, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, optical fibres in communication system.

UNIT-V: Dielectric and Magnetic Properties of Materials **12L**

Dielectric Properties: Introduction to dielectrics, Polarisation, Permittivity and Dielectric constant, classification of polarizabilities, calculation of polarizabilities: electronic polarizability, ionic polarizability, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics, applications of dielectric materials.

Magnetic Properties: Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, soft and hard magnetic materials, Applications of magnetic materials.

TEXT BOOKS

1. Applied Physics, B K Pandey, S. Chaturvedi, T Vijaya Krishna, T Madhu mohan, Cengage publisher

2. Engineering Physics, M K Harbola, Cengage publisher

REFERENCE BOOKS:

1. Engineering Physics, B.K.Pandey, S. Chaturvedi, Cengage Learning

2. Engineering Physics by Dr M N Avadhanulu, S-Chand publications

20EC203ES: Basic Electrical & Electronics Engineering

B. Tech. II SEM	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Course Objective:

1. To introduce the concepts of electrical circuits and its components.
2. To understand DC circuits and AC Circutes.
3. To study and understand the different types of electrical machines and various electrical installations.
4. To introduce the concepts of diodes & transistors.
5. To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

1. To analyze and solve the basic Electrical circuits using different network reduction techniques.
2. To understand the components of low Voltage Electrical Installations.
3. To study the working principles of Electrical Machines.
4. To identify and characterize diodes and their applications.
5. To identify and characterize of transistors and their applications.

UNIT – I **10L**

D.C. CIRCUITS: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. CIRCUITS: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits RL, RC, RLC series combination. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT – II **10L**

TRANSFORMERS: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, O.C. and S.C. Tests, Three-phase transformer connections.

ELECTRICAL INSTALLATIONS: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

UNIT – III **10L**

ELECTRICAL MACHINES: Construction and working principle of DC generators, types, emf equation, working principle of DC motors, Torque equation and Speed control of DC shunt motors, Construction and working principle of Three-phase Induction motor, Torque- slip Characteristics

UNIT – IV **08L**

P-N JUNCTION AND ZENER DIODE: Principle of Operation Diode equation, Volt-Ampere characteristics, Static and dynamic resistances, Diode Capacitance-Diffusion and Transition capacitance, a Zener diode characteristics and applications.

RECTIFIERS: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Simple problems.

UNIT – V **10L**

BIPOLAR JUNCTION TRANSISTOR (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations. SCR-Construction, Operation and V-I

characteristic.

TEXTBOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education
3. Principles of Electrical Engineering and Electronics – V.K. Mehta, Rohit Mehta, S.Chand Publications
4. Electronic Devices and circuits – S. Salivahanan, N.Suresh Kumar, McGraw Hill

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
6. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
7. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

20ME204ES: Engineering Graphics

B. Tech. II SEM	L	T	P	C
	2	0	4	4

Course objectives:

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solid.
- To draw surfaces development of solid and prisms.
- To draw isometric views of solids and basic concept of CAD software

Course Outcomes:

After successful completion of this course, the students should be able to

- understand the conventions and the methods of drawing engineering curves and scales.[Unit-I]
- understand and draw the projections of points, lines and planes in different types of projections. [Unit-II]
- understand and draw projections of solids and sectional views of solid (prisms),Auxiliary views. [Unit-III]
- understand and sketch the development of surfaces to Right Regular Solids-prism, intersection of Solids.[Unit-IV]
- prepare 2D & 3D drawings of solids and their transformations .isometric views of lines, plane figures and conversion of Isometric views to Ortho graphic views, Introduction of CAD software.[Unit-V]

Prerequisites: Knowledge of simple geometrical theorems and constructional procedure.

Course leaning outcomes:

After successful completion of the course, students will be able to,

1. Determine the location of the location and orientation of point, line, and plane with respect to reference planes to draw their projection.
2. Develop the project of various types of solids in various conditions.
3. Develop section views and true shape section of various types of solids.
4. Identifythe need of development of lateral surfaces and the same in engineering drawing.
5. Develop orthographic views of an object to convert pictorial view into two-dimension (2D) view.
6. Develop isometric view to convert two dimension (2D) view to pictorial view.

UNIT- I

INTRODUCTION TO ENGINEERING DRAWING: 10L

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Involute. Scales – Plain, Diagonal and Vernier Scales. Introduction to CAD Software commands and practice.

UNIT - II

ORTHOGRAPHIC PROJECTIONS: 10L

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT –III 10L

Projections of Regular Solids – Auxiliary Views.

UNIT- IV

Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT –V **10L**

ISOMETRIC PROJECTIONS:

Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions –
Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.Conversion of Isometric Views to Orthographic Views and Vice-versa

Note: - The End Semester Examination will be conducted by using Auto Cad Software.

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

20AP205BS: Applied Physics Lab

B. Tech. II SEM	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Course objectives

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Course Outcomes

At the end of the course, the student will be able to

1. Apply the various procedures and techniques for the experiments.
2. Use the different measuring devices and meters to record the data with precision.
3. Apply the mathematical concepts/equations to obtain quantitative results.
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

List of Experiments:

1. Torsional pendulum:

   To determine the rigidity modulus of the material of the given wire using torsional pendulum.

2. Newton's rings:

   To determine the radius of curvature of the lens by forming Newton's rings.

3. Dispersive power:

   To determine the dispersive power of prism by using spectrometer.

4. LCR Circuit:

   To determine quality factor and the resonant frequency of LCR circuit.

5. a. To studythe V-I characteristics of LASER sources.

   b. Plot V-I characteristics of light emitting diode.

6. Optical fibre:

   a. To determine the bending losses of Optical fibres

   b. To determine the Numerical aperture of a given fibre.

7. R-C Circuit:

   To determine the time constant of R-C circuit.

8. Solar Cell:

   To study the V-I Characteristics of solar cell.

9. Stewart – Gee's experiment:

   Determination of magnetic field along the axis of a current carrying coil.

10. Energy gap of P-N junction diode:

    To determine the energy gap of a semiconductor diode.

Note: Minimum 8 experiments are to be performed

20EC206ES: Basic Electrical & Electronics Engineering Lab

B. Tech. II SEM	L	T	P	C
	0	0	3	1.5

COURSE OBJECTIVES:

1. To analyze a given network by applying network reduction techniques.
2. To expose the students to the operation of DC motors and transformers.
3. To expose the students to the operation of three phase induction motors and alternators.
4. To study basic electronic components.
5. Analyze the characteristics of different electronic devices such as diodes and transistors.

COURSE OUTCOMES

After successfully studying this course, students will:

1. Able to solve the different networks using the concept of circuit laws.
2. Able to characterize the performance of DC Motors and single phase transformer.
3. Able to characterize the performance of three phase induction motors and alternators.
4. Able to understand the characteristics of different electronic devices such as diodes and transistors.
5. Able to understand the half wave and full wave rectifiers with and without filters.

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL and KVL.
2. Verification of Ohms Law.
3. Three-phase transformer: Verification of Relationship between voltages and currents.(Star –Star, Star – Delta, Delta – star, Delta - Delta)
4. Load Test on Single-phase transformer.
5. Brake test on DC shunt motor.
6. OC and SC tests on Single-phase transformer.
7. Brake test on 3-phase Induction motor.
8. No Load Characteristics of 3 phase Alternator.

SECTION B: ELECTRONICS ENGINEERING:

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies
2. PN Junction Diode Characteristics (Forward bias, Reverse bias)
3. Zener Diode Characteristics
4. Studyof CRO.
5. Transistor CE Characteristics
6. Rectifier without Filters (Full wave & Half wave)
7. Rectifier with Filters (Full wave & half wave).

Note: Total 10 experiments are to be conducted.
(Five experiments from PART-A, Five experiments from PART-B)

20CS207ES: Basic Elements of Engineering Technology

B.Tech. II SEM

L	T	P	C
0	0	2	1

Objectives:

- Exploring different engineering technologies and their applications.
- Student should be able to understand IT Networking, Protocols and Computations.
- Understanding the principle of IoT and its architecture.
- Knowledge towards Assembling and testing of robots.
- Understanding functionality of 3D printers and their application.
- Developing team work and insight towards different disciplines of Engineering.

Module I: Network & Computing

PC Hardware: Identify the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral, disassemble and assemble the PC back to working condition. Install MS Windows / Linux on the personal Computer / Laptop and dual boot configuration.

Connectivity Boot Camp: Connecting to their Local Area Network and access the Internet. Configuration of the TCP/IP setting, access the websites and email.

Web Browsers, Surfing the Web: Customize web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Module II: Internet of Things

Overview of IoT and Architecture: Brief History, evolution of IoT, Architecture, trends in the Adoption of IoT, Societal Benefits of IoT, Risks, Privacy, Security, Embedded Systems Components, Micro-controller Architecture and Properties and Installing and Setting up the Arduino and Raspberry Pi (RPi) development environment. Build Simple IoT Applications by using Arduino or RPi.

Module III: Robotics

Introduction, Different types of robots, Components of a Robot, Working principle of robots, Applications of robots in various fields, Innovation challenges, Scope of robotics research & its current trends, assembling and testing of Robot.

Module IV: 3D Printing

Introduction, Product Design & Development, 3D Scanning & Printing using different types of materials. Components of 3D Printer, Applications of 3D printed products in various fields, Hands on Experience on 3D printing Machines.

Module V: Case Studies

Students has to submit a report by doing a study on various Engineering applications related to Manufacturing, Retail, Automotive, Logistics, Healthcare, Entertainment and E-Governance.

REFERENCE BOOKS:

1. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
2. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
3. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
4. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
5. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.
6. Deb S R.and DebS., ―Robotics Technology and Flexible Automation‖, Tata McGraw Hill Education Pvt. Ltd, 2010.
7. Mikell P Groover, ―Automation, Production Systems, and computer integrated Manufacturing‖, Prentice Hall, 2001.
8. Chee Kai Chua, Kah Fai Leong, 3D Printing and Additive Manufacturing: Principles and Applications: Fourth Edition of Rapid Prototyping.
9. Andreas Gebhardt, Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing

20MC208ES: Environmental Science

B.Tech. II SEM

L	T	P	C
3	0	0	0

Course objectives:

The students should be able to understand

1. Ecosystem responses to environmental change it will be used to communicate central Eco-system characteristics to a wider community. The main objectives of natural resources is to better understand the roll of resources in economy older to develop more sustainable methods of mapping those resources to ensure their ability to future generation.
2. The main objectives of natural resources is to better understand the roll of resources in economy older to develop more sustainable methods of mapping those resources to ensure their ability to future generation.
3. Bio-diversity is the degree of variation of life resources forms within a given species. it describes organisms in the natural environment, which provided the eco-system service that form our natural capital.
4. Control of pollution at source the maximum extent possible with due regard to technology achievement and economic viability as well as sensitive of the receiving environment.
5. Ensure it environmental factors are consider in the decision making process and adverse environmental impacts or identified, avoided and minimized. Enforce environmental registration for which the council is responsible.

Course outcomes:

The students should be able to

1. A student will be able to understand the basics of biotic and abiotic things present in the environment and their effects on environment.
2. A student will be able to understand the basics of natural resources and impacts of things present in the environment and their effects.
3. A student will be able to understand the varieties of life forms and conservation techniques.
4. A student will be able to understand the effects of technological, scientific development on environment.
5. A student will be able to assess the impacts on environment and strategic management of environment as stipulated by the local legislative rules, regulations and concepts of sustainable growth related to human life.

UNIT-I: **10L**

Ecosystems:

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II: **5L**

Natural Resources: Classification of Resources:

Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III: **7L**

Biodiversity And Biotic Resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV: **13L**

Environmental Pollution and Control Technologies:

Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC - GOI Initiatives.

UNIT-V: **7L**

Environmental Policy, Legislation & EIA:

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.

4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

20MA301BS: Statistical and Numerical Methods

B. Tech III SEM **L T P C**

3 1 0 4

Course Objectives:

1. Random variables that describe randomness or uncertainty in a certain realistic situation.
2. Sampling distribution of the mean, variance, point estimation and interval estimation.
3. Non-parametric tests such as the Chi-Square test for independence as well as Goodness of fit provide the learner with the opportunity to expand their knowledge and skills of the statistical concepts and a personal development experience towards the needs of statistical data analysis.
4. Various methods to find roots of an equation and to fit the desired curve by the method of least squares for given data
5. Solving ordinary differential equations and integrals using numerical techniques

Course Outcomes:

1. Understand the theory of probability.
2. Testing of hypothesis and making inferences using sampling theory.
3. Apply the probability and its distributions to the data.
4. Apply the test of hypothesis for algebraic equations.
5. Apply the test of hypothesis for differential equations.

UNIT-I **10L**

Probability, Random variables and Distributions:

Random variables, Discrete random variable, Continuous random variable, Probability distribution function, Probability density function, Expectation.

Binomial, Poisson distributions and Continuous distribution: Normal distributions.

UNIT–II **10L**

Sampling Theory and Test of hypothesis:

Sampling Theory: Introduction, Population and samples, Sampling distribution of means and variances, Point estimation, Maximum error of estimate, Interval estimation.

Test of Hypothesis For Large Samples : Introduction, Hypothesis, Null and Alternative Hypothesis, Type I and Type II errors, Level of significance, One tail and two-tail tests, Tests concerning one mean and proportion, two means-proportions and their differences.

UNIT–III **10L**

Test of Hypothesis For small Samples:

Test concerning small samples- t– Test, F-Test and χ^2- Test for goodness of fit and independence of attribute.

UNIT-IV **10L**

Numerical Methods-I

Finding roots of Algebraic and transcendental Equations: Introduction, Bisection Method, Method of False position, Iteration methods: fixed point iteration and Newton Raphson methods. **Curve Fitting**: Fitting a linear, second degree, exponential, power curve by method of least squares.

UNIT-V **8L**

Numerical Methods-II

Numerical Integration and Solution of Ordinary Differential equations

Trapezoidal rule-Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Runge- Kutta method (second and fourth order).

TEXT BOOKS:

1. Probability and statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E.Freund, New Delhi, Prentice Hall.
2. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning.
3. Numerical Methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar and R.K.Jain, New Age International Publishers.

REFERENCES:

1. Fundamentals Of Mathematical Statistics by S.C.Guptha & V.K.Kapoor, S.Chand.
2. Introductory Methods of Numerical Analysis by S.S.Satry, PHI Learning Pvt. Ltd.
3. Mathematics for engineers and scientists by Alan Jeffery, 6 edition ,CRC press.

20CS302PC: Data Structures using C

B. Tech. III SEM

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Programming for Problem Solving".

Course Objectives:

1. Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables.
3. Discussion of search trees.
4. Understand the sorting algorithms.
5. Introduces pattern matching algorithms

Course Outcomes:

1. Exploring basic data structures.
2. Understand the hash table representation.
3. Implement searching for trees.
4. Apply sorting on the information.
5. Design pattern matching on a problem.

UNIT–I **10L**

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on the linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT–II **6L**

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT–III **8L**

Search Trees: Binary Search Trees, Definition, Implementation, Operations-Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations– Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT–IV **8L**

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT–V **8L**

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer – Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXTBOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.

2. Data Structures using C– .S.Tanenbaum, Y.Langsam, and M. J. Augenstein, *PHI/Pearson Education*.

REFERENCE BOOKS:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.

20CS303PC: OOPS Through Java

	L	T	P	C
B. Tech. III SEM	**3**	**0**	**0**	**3**

Course Objectives:

1. To introduce the object-oriented programming concepts.
2. To introduce the implementation of packages and interfaces
3. To introduce the concepts of exception handling and multithreading.
4. To introduce the concepts of collection framework.
5. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

1. Solve real world problems using OOP techniques.
2. Apply the packages and interfaces, streams in I/O.
3. Able to develop exceptions, multithreaded applications with synchronization.
4. Develop the application using collection framework.
5. Design GUI based applications using applets and swings.

UNIT–I **10L**

Object-Oriented Thinking-Away of viewing world–Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies-Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT–II **8L**

Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces-defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io)–The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT–III **6L**

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multi threading- Differences between thread-based multitasking and process-based multi tasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT–IV **6L**

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hash table ,Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

UNIT–V **10L**

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls – Jlabel and Image Icon, JTextField.

The Swing Buttons- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley &sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. RadhaKrishna,UniversityPress.
4. Programming in Java, S.Malhotra, S.Chudhary, 2nd edition, Oxford Univ.Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

20CS304PC: Theory of Computation

B. Tech. III SEM

L	T	P	C
3	0	0	3

Course Objectives:

1. Understand deterministic and non-deterministic machines.
2. To introduce the fundamental concepts of formal languages with regular expressions.
3. Understand the grammars and automata theory languages.
4. To introduce the normal forms of grammar.
5. To understand the differences between decidability and un-decidability.

Course Outcomes:

1. Recognizing abstract missions and their languages.
2. Design the finite state mechanics using regular expressions.
3. Design context-free grammar for formal languages.
4. Applynormalization to the context-free grammar.
5. Distinguish between decidability and un-decidability problems.

UNIT–I **10L**

Introduction to Finite Automata, Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory–Alphabets, Strings, Languages, Problems, Deterministic Finite Automata, Nondeterministic Finite Automata, an application: Text Search, Finite Automata with Epsilon-Transitions.

UNIT–II **8L**

Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Properties of Regular Languages- Pumping Lemma for Regular Languages, Applications of the Pumping Lemma, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT–III **8L**

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Left most and Right most Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

UNIT–IV **8L**

Normal Forms for Context-Free Grammars, the Pumping Lemma for Context-Free Languages, Closure Properties of Context-Free Languages. Decision Properties of CFL's - Complexity of Converting among CFG's and PDA's, Running time of conversions to Chomsky Normal Form.

Introduction to Turing Machines-Problems That Computers Cannot Solve, The Turing Machine, Extensions to the basic Turing machine.

UNIT–V **6L**

Undecidability: A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Post's Correspondence Problem, Other Undecidable Problems, Intractable Problems**:** The Classes P and NP, An NP-Complete Problem and NP-Hard.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.

REFERENCE BOOKS:

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R,Pearson.
5. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition,PHI.

20EC305PC: Analog and Digital Electronics

B. Tech. III SEM

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce components such as diodes, SCR and FETs.
2. To give an understanding of various types of amplifier circuits
3. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
4. To understand the concepts of combinational logic circuits
5. To understand the concepts of sequential circuits.

Course Outcomes:

1. Understand the utilization of components.
2. Analyze small signal amplifier circuits.
3. Learn Postulates of Boolean algebra to the digital circuit functions.
4. Design and analyze combinational circuits.
5. Know about the sequential circuits.

UNIT – I

Special Purpose Devices (Qualitative Analysis): Volt Ampere Characteristics of Tunnel diodes, Photo diode, LED, Varactor Diode, UJT. Diode Clippers-Types of Clippers, Clipping circuits, Clipping at two independent levels, Diode Clamper, Types of Clampers, Clamping Operation, Clamping Circuit Theorem.

Unit-II:

Field Effect Transistor (FET): JFET-Construction, Principle of Operation, Volt- Ampere Characteristics, Pinch-Off Voltage, Theoretical operation of CS Amplifier. MOSFET-Construction, Principle of Operation, Characteristics in Enhancement and Depletion mode. Comparison of JFET and MOSFET

UNIT - III

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT - IV

Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - V

Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

TEXTBOOKS:

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, *Tata McGraw-Hill Education*, India,2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, *Pearson,* 2011.

REFERENCE BOOKS:

1. Electronic Devices and Circuits, JimmyJ Cathey, *Schaum's outline series*,1988.
2. Digital Principles, 3/e, Roger L. Tokheim, *Schaum'soutlineseries*,1994.

20CS306PC: OOPS Through Java Lab

B. Tech. III SEM

L	T	P	C
0	0	3	1.5

Course Objectives:

1. To impart hands on experience with java programming.
2. To write GUI programs using swing controls in Java.

Course Outcomes:

1. Write programs for solving real-world problems using java collection framework.
2. Able to write GUI programs using swing controls in Java.

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

LIST OF EXPERIMENTS:

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
3. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.
4. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order
5. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.
6. Write a Java program to list all the files in a directory including the files present in all its subdirectories.
7. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
8. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

9. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.
10. a) Develop an applet in Java that displays a simple message.
    b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named
11. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.
12. Write a Java program that simulates a traffic light. The program lets the users elect one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.
13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
14. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in are cord are separated by at ab(\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
15. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

REFERENCE BOOKS

1. Java for Programmers, P. J. Deitel and H.M.Deitel, 10th Edition *Pearson* education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

20CS307PC: Data Structure using C Lab

B. Tech. III SEM

L	T	P	C
0	0	3	1.5

Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

1. Understanding of data structures such as stacks and queues.
2. Introduces searching and sorting algorithms.

Course Outcomes:

1. Develop c programs for basic data structures.
2. Implement sorting and searching algorithms.

LIST OF EXPERIMENTS

1. Write a program that uses functions to perform the following operations on singly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal

2. Write a program that uses functions to perform the following operations on doubly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal

3. Write a program that uses functions to perform the following operations on circular linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal

4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers

5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers

6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort iii) Insertion sort

7. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search

8. Write a program to implement the tree traversal methods.

9. Write a program to implement the graph traversal methods.

TEXTBOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J.Augenstein, *PHI/Pearson Education*.

REFERENCE:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage *Learning*.

20EC308PC: Analog and Digital Electronics Lab

B.Tech. IIISEM

L	T	P	C
0	0	2	1

Course Objectives

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes:

1. Postulates of Boolean algebra and to digital circuit functions.
2. Analyze combinational and sequential circuits.

List of Experiments

1. Volt-Ampere characteristics of UJT
2. Diode – Clippers
3. Diode - Clampers
4. Input and Output characteristics of FET in CS configuration
5. Common Source JFET Amplifier
6. Realization of Boolean Expressions using Gates
7. Design and realization of logic gates using universal gates
8. generation of clock using NAND / NOR gates
9. Design a 4 – bit Adder / Subtractor
10. Design and realization of 8x1 MUX using 2x1 MUX
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc.

20MC309GS: Gender Sensitization Lab

B. Tech. III SEM

L	T	P	C
3	0	0	0

Course Objectives:

1. To provide acritical perspective on the socialization of men and women.
2. To help students reflect critically on gender violence.

Course Outcomes:

1. Men and women students and professionals will be better equipped to work and live together as equals.
2. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the empower students to understand and respond to gender violence.

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.

UNIT - II
GENDER AND BIOLOGY:
Missing 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.

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. Additional Reading: Wages and Conditions of Work.

UNIT-IV

ISSUES OF VIOLENCE

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. Additional Reading: New Forums for Justice. Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11) Blaming the Victim- "I Fought for my Life…."-Additional Reading: The Caste Face of Violence.

UNIT - V

GENDER: CO - EXISTENCE

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. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOK

All the five Units in the Textbook**, "*Towards a World of Equals: A Bilingual Textbook on Gender"*** written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, DeepaSreenivas and Susie Tharu and published by **Telugu Akademi, Hyderabad**, Telangana State in the year **2015**.

Note: Since it is an 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 from engineering departments.

REFERENCE BOOKS:

1. Menon, Nivedit a.Seeing like a Feminist. NewDelhi: Zubaan-PenguinBooks,2012
2. Abdulali Sohaila. "*I Fought For My Life…and Won*."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

20CS401PC: Database Management Systems

B. Tech IVSEM

L	T	P	C
3	1	0	4

Course Objectives:

1. Understand the basic concepts and the applications of database systems.
2. Introducing relational databases.
3. Basics of SQL and construct queries using SQL.
4. Topics include transaction control and concurrency control.
5. Understand storage structures and access techniques.

Course Outcomes:

1. Design the logical design concepts of the database.
2. Design the physical model of a database and its operations.
3. The use of SQL for managing databases.
4. Implement transaction processing and concurrency control.
5. Understand the techniques of database storage access.

UNIT–I **10L**

Database System Applications: A Historical Perspective, File Systems versus a DBMS**,** the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS **Introduction to Database Design**: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT–II **8L**

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra**,** Tuple relational Calculus, Domain relational calculus.

UNIT–III **10L**

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT–IV **10L**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation-Based Protocols, Multiple Granularity, Recovery and Atomicity, Log– Based Recovery, Recovery with Concurrent Transactions.

UNIT–V **10L**

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

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc GrawHill*
3rd Edition
2. Database System Concepts, Silberschatz, Korth, *McGrawhill*, Vedition.

REFERENCES:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Corone l7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The XTeam, S. Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

20CS402PC: Programming with Python

B. Tech. IV SEM

L	T	P	C
3	0	0	3

Course Objectives:

1. Learn Syntax and Semantics in Python.
2. Explore the arrays and strings in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Handle Files, Modules and exceptions in Python.
5. Implement Object Oriented Programming concepts in Python.

Course Outcomes:

1. Examine Python syntax and semantics, flow control.
2. Demonstrate proficiency in handling Strings and arrays.
3. Apply Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Conduct experiments on file handling, exception handling, and modules.
5. Interpret the concepts of Object-Oriented Programming as used in Python.

UNIT–I **8L**

Introduction to Python: History, Features, Applications, First Python Program, Variables, Data Types, Numbers, Operators, Input and Output statements.

Control Statements: Conditional Statements, A Word on Indentation, Looping Statements, the else Suite, break, continue, pass, assert, return.

UNIT–II **6L**

Arrays in Python: Arrays, Types of Arrays, Working with Arrays using numpy, Creating Arrays, Operations on Arrays, Attributes of an Array, The reshape() Method, The flatten() Method, Matrices in numpy, Matrix Addition and Multiplication.

Strings and Characters: Creating Strings, Operations on Strings, Working with Characters, Sorting Strings, Searching Strings.

UNIT–III **8L**

Functions in Python: Defining a Function, Calling a Function, Parameters, Recursive Functions.

List: Creating Lists using range() Function, Operations on Lists, Methods to Process List, Sorting the List Elements.

Tuple: Creating Tuples, Accessing the Tuple Elements, Operations on Tuple, Functions to Process Tuples.

Dictionaries: Operations on Dictionaries, Dictionary Methods, Sorting the Elements of a Dictionary using Lambdas, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions.

UNIT–IV **10L**

Files in Python: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules.

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,

*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules.

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

UNIT–V **8L**

OOPS using Python: Classes and Objects, Inheritance and Polymorphism, Abstract Classes and Interfaces.

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

TEXTBOOK

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Core Python Programming, R. Nageswara Rao, DreamTechPress.

20CS403PC: Design Analysis & Algorithms

	L	T	P	C
B. Tech. IV SEM	**3**	**0**	**0**	**3**

Course Objectives

1. Analyze performance of algorithms.
2. Choose the divide and conquer, greedy algorithms design method for a specified application.
3. Understand how the choice of data structures and algorithm design methods impacts the performance of programs using dynamic programming strategies.
4. To solve problems using algorithm design methods such as backtracking and branch and bound.
5. To introduce P and NP classes.

Course Outcomes:

1. Analyzing the algorithm with space and time.
2. Design the algorithm using the divide and conquer greedy approach.
3. Applydynamic programming strategy.
4. Applythe backtracking technique and branch and bound.
5. Construct the algorithm using the non-deterministic algorithm.

UNIT–I **10L**

Introduction- Algorithm definition, Algorithm Specification, Pseudo code for expressing Algorithms, Asymptotic Notations, Performance Analysis-Space complexity, Time complexity. Disjoint set operations, union and find algorithms, AND/OR graphs, Spanning trees, Connected Components and Bi-connected components.

UNIT–II **8L**

Divide and conquer- General method, applications - Binary search, Merge sort, Quick sort, Strassen's Matrix Multiplication.

Greedy method- General method, applications- Knapsack problem, Job equencing with deadlines, Minimum cost spanning trees, Single source shortest path problem.

UNIT–III **8L**

Dynamic Programming- General Method, applications-0/1 knapsack problem, All pairs shortest path problem, Optimal binary search trees, Travelling sales person problem, Chained matrix multiplication, Reliability design.

UNIT–IV **8L**

Backtracking-General method, applications- The 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound- General Method, applications-0/1 Knapsack problem, Travelling sales person problem.

UNIT–V **6L**

NP-Hard and NP-Complete problems- Basic concepts, Non-deterministic algorithms, NP - Hard and NP- Complete classes, Cook's theorem.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni and S. Raja sekharan, Universities Press.
2. Design and Analysis of Algorithms, P.H.Dave, H.B.Dave, 2nd edition, Pearson Education.

REFERENCE BOOKS

1. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and R. Tomassia, John Wiley and sons.
2. Design and Analysis of Algorithms, S. Sridhar, Oxford Univ. Press
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education.
4. Foundations of Algorithms,, R. Neapolitan and K. Naimipour, 4th edition, Jones and Bartlett Student edition.
5. Introduction to Algorithms,3rd Edition, T. H. Cormen, C. E.Leiserson, R. L. Rivest, and Stein,PHI.

20CS404PC: Operating Systems

	L	T	P	C
B. Tech. IV SEM	**3**	**0**	**0**	**3**

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization".

Course Objectives:

1. Introduce the OS concepts and their services.
2. Describe the process and its scheduling algorithms.
3. Understand the process communication and management systems.
4. Design the memory management systems.
5. Understand the file system and its operations.

Course Outcomes:

1. Illustrate the operating system concepts.
2. The role of computing in CPU scheduling and its management.
3. Resolve user problems in the standard environment.
4. Learn the data storage and retrieval.
5. Design files system interphase and operations.

UNIT–I **8L**

Operating System- Introduction, Structures- Simple Batch, Multi programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

UNIT–II **8L**

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec

UNIT–III **10L**

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock **Process Management and Synchronization** - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Inter process Communication Mechanisms:** IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT–IV **8L**

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT–V **6L**

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W. R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

20CS405PC: Computer Organization

B. Tech. IV SEM

L	T	P	C
3	0	0	3

Prerequisite:

1. A Course on "Digital Logic Design and Microprocessors".

Course Objectives:

1. Introduce principles of computer organization and the basic architectural concepts.
2. Explore the basic organization, design, and programming of a simple digital computer.
3. Introduces simple register transfer language to specify various computer operations.
4. Describing memory organization and I/O systems.
5. Topics include pipelining and vector processing.

Course Outcomes:

1. Identity of computer organization architecture.
2. Understand the basics of instruction sets and their functionality.
3. Evaluate arithmetical operations byusing data.
4. Demonstrate the functional units of the computer.
5. Design a pipeline for consistent execution of instructions.

UNIT–I **10L**

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

UNIT–II **8L**

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT–III **8L**

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations.

UNIT–IV **6L**

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

UNIT–V **8L**

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Cache Coherence.

TEXT BOOK:

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCES:

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture–William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization–AndrewS.Tanenbaum,4th Edition, PHI/Pearson.

20CS406PC: Python Lab

B. Tech IV SEM

L	T	P	C
0	0	3	1.5

Prerequisites: Students should install Python on the Linux platform.

Course Objectives:

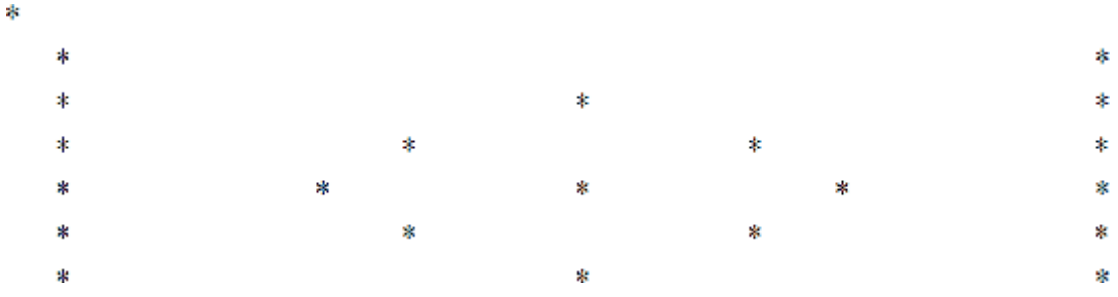
1. To be able to introduce core programming basics and program design with functions using Python programming language.
2. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.

Course Outcomes:

1. Ability to explore python especially the object-oriented concepts, and the built-in objects of Python.
2. Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations

List of Programs:

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST2017"
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 = f-32/9]
10. Write a Python program to construct the following pattern, using a nested for loop



11. Write a Python script that prints prime numbers less than20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow (x,n)
20. Write a Python class to reverse a string word by word.

TEXTBOOK:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Core Python Programming, R. Nageswara Rao, DreamTech Press.

20CS407PC: DBMS Lab

B. Tech. IV SEM

L	T	P	C
0	0	3	1.5

Prerequisites: Students should install My Sql.

Course Objectives:

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

Course Outcomes:

1. Design the database schema using SQL commands.
2. Apply procedures cursors and triggers using SQL.

LIST OF EXPERIMENTS:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUPBY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata McGraw Hill, 3rdEdition
2. Database System Concepts, Silberschatz, Korth, McGrawHill, Vedition.

REFERENCES BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The XTeam, S.Shah and V.Shah, *SPD.*
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI.*
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

20CS408PC: OS Lab (Using UNIX/LINUX)

B. Tech. IV SEM

L	T	P	C
0	0	2	1

Prerequisites:

- A course on "Programming for Problem Solving".
- A course on "Computer Organization".

Course Objectives:

1. Understanding of the design aspects of operating system concepts through simulation.
2. Introduce basic Unix commands, system call interface for process management, inter-process communication and I/O in Unix

Course Outcomes:

1. Implement C programs using LINUX system calls.
2. Simulate operating system concepts like scheduling memory management, deadlock management and file management.

LIST OF EXPERIMENTS:

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d)priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
   a) Paging b) Segmentation

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, *Pearson* education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

20MC409CI: Constitution of India

	L	T	P	C
B. Tech. IV SEM	**3**	**0**	**0**	**0**

Course Objectives:

1. Introducing the Indian constitution and its evolution.
2. Know the structure and preparation of constitution.
3. To analyze the fundamental rights of the constitution.
4. Describing the political scenario and issues in the constitution framework.
5. Discussion of relations with other countries.

Course Outcomes:

1. Understand the emergence and evolution of Indian Constitution.
2. Understand the structure and composition of Indian Constitution
3. Analyze federalism in the Indian context.
4. Understand the Indian Political scenario amidst the emerging challenges.
5. Evaluate Indian foreign relations under cold war and post-cold war era.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism"–an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. TheDirectivePrinciplesofStatePolicy–Itsimportanceandimplementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21.

20CS501PC: SOFTWARE ENGINEERING

B. Tech V SEM. **L T P C**
3 0 0 3

Course Objectives

1. Understanding the end-use requirements.
2. Build system models based on the requirements.
3. Design architectural process.
4. Strategic approach for testing methodologies.
5. Understanding software quality management.

Course Outcomes

1. Abilityto translate end-user requirements into the system.
2. Identifyand apply the process model based on software requirements.
3. Abilityto build the design of a systematic models.
4. Construct testing strategies and generate a report.
5. Quantify the metrics for process and products.

UNIT - I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioral models, data models, object models, structured methods.

UNIT - III

Design Engineering: The design process and design quality, design concepts, the design model. **Creating an architectural design:** software architecture**,** data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach-Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCES:

1. Software Engineering, an Engineering approach-James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

20CS502PC: COMPUTER NETWORKS

B. Tech V SEM **L T P C**
3 0 0 3

Prerequisites

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

Course Objectives

1. Understanding the fundamental concepts of computer networks.
2. Exploring the functionalities of layered models.
3. Design the rooting algorithm in a network.
4. Abilityto know services of transpose layer.
5. Explore the knowledge of computer networks applications.

Course Outcomes

1. Gain the knowledge of the basic computer network technology.
2. To know the functionalities of each layer in the OSI and TCP/IP reference model.
3. Implementation of sub netting and routing mechanisms.
4. Describe the essential transport protocols.
5. Understanding the applications of computer networks.

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT - II

Data link layer: Design issues, framing, Error detection and correction.

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, the Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

Application Layer: Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

20CS503PC: WEB TECHNOLOGIES

B. Tech V SEM. **L T P C**
3 1 0 4

Prerequisites

1. A course on "Java Programming"
2. A course on "Data Base Management System"

Course Objectives:

1. To introduce PHP language for server-side scripting.
2. To introduce XML and processing of XML Data with Java.
3. To introduce Server-side programming with Java Servlets.
4. Understand the JSP.
5. To introduce Client-side scripting with JavaScript and AJAX.

Course Outcomes

1. Apply server-side scripting with PHP language.
2. Understand XML and how to parse and use XML Data with Java.
3. To introduce Server-side programming with Java Servlets.
4. Implement JSP pages using Cookies and Session tracking.
5. Design client-side scripting, validation of forms and AJAX programming.

UNIT- I

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

UNIT- II

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

UNIT - III

Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

UNIT - IV

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

UNIT - V

Client-side Scripting: Introduction to JavaScript, JavaScript language – declaring variables, scope of variables, functions. Event handlers (onclick, on submit etc.), Document Object Model, Form validation.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS

1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dream tech
2. Java Server Pages —Hans Bergsten, SPDO'Reilly,
3. Java Script, D.Flanagan
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming World Wide Web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

20CS511PE: DISTRIBUTED SYSTEMS (Professional Elective - I)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Operating Systems"
2. A course on "Computer Organization &Architecture"

Course Objectives

1. Understand the concepts of Distributed systems.
2. Introduces the communication process.
3. Explore the concepts of peer-to-peer system processes.
4. Understand the concepts of concurrent control systems.
5. Understand the replica system.

Course Outcomes

1. Abilityto understand Security issues.
2. Understanding Distributed shared memory.
3. Understand Transactions and Concurrency control.
4. Abilityto design distributed systems for basic level applications.

UNIT - I

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Inter process Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT - II

Operating System Support: Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating System architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT - III

Peer to Peer Systems: Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies - Pastry, Tapestry, Application case studies - Squirrel, Ocean Store.

Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT - IV

Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT - V

Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

Distributed shared memory, Design and Implementation issues, Consistency models.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall/CRC, Taylor & Francis Group,2010.

REFERENCE BOOKS:

1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

20CS512PE: OBJECT ORIENTED ANALYSIS AND DESIGN
(PROFESSIONAL ELECTIVE – I)

B. Tech V SEM. **L T P C**
3 0 0 3

Course Objectives:

1. Describe the activities in the different phases of the object-oriented development lifecycle.
2. Understand the concepts of object-oriented model with the E-R and EER models.
3. Model a real-world application by using UML diagram.
4. Design architectural modelling.
5. Describing an application of UML.

Course Outcomes:

1. The importance of modelling in UML.
2. Compare and contrast the object-oriented model with the E-R and EER models.
3. Design use case diagram.
4. Design an application using deployment diagram.
5. Apply UML diagrams to build library application.

UNIT - I

Introduction to UML: Importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT - II

Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.
Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

UNIT - III

Basic Behavioural Modelling-I: Interactions, Interaction diagrams.
Basic Behavioural Modelling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT - IV

Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT - V

Patterns and Frameworks, Artefact Diagrams, Case Study: The Unified Library application

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education 2nd Edition.
2. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

REFERENCE BOOKS:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech IndiaPvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TMH.
5. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.
6. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.
7. UML and C++, R. C. Lee, and W. M. Tepfenhart, PHI.
8. Object Oriented Analysis, Design and Implementation, B. Dathan, S. Ramnath, Universities Press.
9. OO Design with UML and Java, K. Barclay, J. Savage, Elsevier.
10. Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reill

20CS513PE: DATA ANALYTICS (Professional Elective - I)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Database Management Systems".
2. Knowledge of Probability and Statistics.

Course Objectives:

1. Understanding the Data pre-processing mechanisms.
2. Explore the fundamental concepts of data analytics.
3. Explore the basic building models for classification.
4. Analyze supervised and unsupervised models.
5. Understand the visualization techniques.

Course Outcomes:

1. Understand various Data Sources and Pre-processing mechanisms.
2. Depict data analysis/statistical analysis.
3. Design Data Architecture.
4. Understand the impact of data analytics for business decisions and strategy.
5. Design standard data visualization and formal inference procedures.

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling

UNIT - III

Regression: Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building–Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley,2006.
2. Data Mining Analysis and Concepts, M. Zaki and W.Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

20CS514PE: IMAGE PROCESSING (Professional Elective - I)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. Knowledge of Digital Signal Processing.
2. A course on "Computational Mathematics".
3. A course on "Computer Oriented Statistical Methods".

Course Objectives

1. Understand the concepts of Digital Image Processing.
2. Knowledge on image enhancement techniques.
3. Knowledge on image restoration models.
4. Knowledge on image segmentation models.
5. Knowledge on image compression techniques.

Course Outcomes

1. Understanding the basic concepts of Image processing.
2. Design image enhancement mechanisms.
3. Apply image restoration models.
4. Implement image segmentation methods.
5. Design image compression techniques.

UNIT - I

Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion, Sampling and Quantization, Relationship between Pixels, Imaging Geometry, 2D Transformations - DFT, DCT, KLT and SVD.

UNIT - II

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT - III

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT - V

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:

1. Digital Image Processing: **R.C. Gonzalez & R. E. Woods**, Addison Wesley/ Pearson Education, 2nd Ed, 2004.

REFERENCES:

1. Fundamentals of Digital Image Processing: **A. K. Jain**, PHI.

20CS515PE: PRINCIPLES OF PROGRAMMING LANGUAGES
(Professional Elective - I)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Mathematical Foundations of Computer Science"
2. A course on "Computer Programming and Data Structures"

Course Objectives

1. Introduce important paradigms of programming languages.
2. Understanding of high-level language design.
3. Describing the programming paradigms using subprograms, blocks, and abstract data types.
4. Understanding the concurrency control in a programming language.
5. Design the functional, logic programming and scripting languages.

Course Outcomes

1. Understanding the syntax and semantics of a formal language.
2. Apply a suitable programming paradigm for a given computing application.
3. Introducing the functional programming.
4. Exploring the concepts of concurrency model.
5. Compare and contrast the features of programming languages.

UNIT - I

Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments

Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT - II

Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence

Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment

Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT - III

Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines

Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

UNIT - IV

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT - V

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book2)

TEXT BOOKS:

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech,2007.

REFERENCES:

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson,2003

20CS521PE: COMPUTER GRAPHICS (Professional Elective - II)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. Knowledge of Mathematical Computation.
2. A course on "Computer Programming and Data Structures"

Course Objectives

1. Fundamental concepts of computer graphics.
2. Explore the knowledge of geometrical transformations.
3. Object representation using surface.
4. Explore the concept of geometrical projections.
5. Knowledge on computer animation.

Course Outcomes

1. To know the mathematics of computer graphics.
2. Design geometrical transformations and viewing functions.
3. Construct 3D object representation using surfaces.
4. Applythe geometric projections for 3D objects.
5. Design an animation using surface detection mechanisms.

UNIT -I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid- point circle and ellipse algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT - II

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

2-Dviewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland – Hodgeman polygon clipping algorithm.

UNIT - III

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

UNIT - IV

D- Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT - V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS:

1. "Computer Graphics *C version*", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCES:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

20CS522PE: ADVANCED OPERATING SYSTEMS
(Professional Elective - II)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Operating Systems".
2. A course on "Computer Organization".

Course Objectives

1. Understand the concepts of distributed operating systems.
2. Design approaches of classification algorithms.
3. Identifythe issues of dead lock detection.
4. Design of multi-processing operating systems.
5. The concepts of process scheduling and memory management.

Course Outcomes

1. Design approaches of advanced operating systems.
2. Formulate the approaches of Distributed operating systems.
3. Design the dead lock detection algorithms.
4. Design multi-processor operating systems.
5. Identify the requirements Distributed File System, scheduling, and Distributed Shared Memory.

UNIT - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives.

Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms,

Non-Token – Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm,

Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT - III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized-Deadlock–Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT - IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures

Multiprocessor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling.

Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

UNIT - V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration

Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOK:

1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition2001

REFERENCES:

1. Distributed Systems: Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, Edition – 2, 2007

20CS523PE: INFORMATION RETRIEVAL SYSTEMS
(Professional Elective - II)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites:

1. A course on "Data Structures".
2. A course on "Data Base Management Systems".

Course Objectives

1. To learn the concepts of IRS.
2. Understand the structure of information.
3. Design document clustering algorithms.
4. Design an Information Retrieval System for web search tasks.
5. Learn visualization technologies for multimedia data retrieval.

Course Outcomes:

1. Understand IR principles large collections of data.
2. Design the data model using statistical approaches.
3. Apply automatic document clustering on IR.
4. Design an Information Retrieval System for web search tasks.
5. Applyvisualization tools for multimedia information retrieval.

UNIT - I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

UNIT - V

Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. May bury, Springer

REFERENCES

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall,1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley &Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

20CS524PE: DISTRIBUTED DATABASES

(Professional Elective - II)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Database Management Systems"

Course Objectives:

1. Introduce basic principles of distributed database systems.
2. Explaining the concepts of query processing and optimization in distributed databases.
3. Understand the transaction management procedure in distributed databases.
4. Know the principles and knowledge of parallel databases.
5. Explore the concepts of object database management systems.

Course Outcomes:

1. Understand the aspects of distributed database systems.
2. Interpret queryprocessing and optimization in distributed databases.
3. Summarize the transaction management process.
4. Know about parallel databases and reliability.
5. Understand the design aspects of the object-oriented database systems.

UNIT - I

Introduction: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture. **Distributed Database Design**: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT - II

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT - III

Transaction Management: Definition, properties of the transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT - IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT - V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOKS:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: “Database Systems: The Complete Book”, Second Edition, Pearson International Edition

20CS525PE: NATURAL LANGUAGE PROCESSING

(Professional Elective - II)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites: Data structures, finite automata and probabilitytheory

Course Objectives

1. Introduce the NLP structure of documents.
2. Understand the experimental methodology for empirical syntax analysis.
3. Describe the parsing structure of NLP systems.
4. Design NLP Algorithms.
5. Use of language modelling techniques.

Course Outcomes

1. Summarize the NLP structure documents.
2. Use of proper experimental methodology for evaluating NLP systems.
3. Construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Implement NLP algorithms.
5. Design different language modelling Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - II

Syntax Analysis: Parsing Natural Language, Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT - III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT - IV

Predicate: Argument Structure, Meaning Representation Systems, Software.

UNIT - V

Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross-lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice–
   Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S.Tiwary

REFERENCE:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

20CS504PC: SOFTWARE ENGINEERING LAB

B. Tech V SEM.

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0	0	3	1.5

Prerequisites

1. A course on "Programming for Problem Solving"

Co-requisite

1. A Course on "Software Engineering"

Course Objectives

1. To have hands-on experience in developing a software project by using various software engineering principles.
2. Develop methods in each of the phases of software development.

Course Outcomes

1. Translate end-user requirements into system and software requirements a high-level design of the system from the software requirements.
2. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.

List of Experiments

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1) Development of problem statement.
2) Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3) Preparation of Software Configuration Management and Risk Management related documents.
4) Studyand usage of any Design phase CASE tool
5) Performing the Design by using any Design phase CASE tools.
6) Develop test cases for unit testing and integration testing
7) Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

TEXT BOOKS:

1. Software Engineering, Apractitioner's Approach-RogerS.Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

20CS505PC: COMPUTER NETWORKS AND WEB TECHNOLOGIES LAB

B. Tech V SEM. **L T P C**
0 0 3 1.5

Course Objectives

1. Understand the working principle of various communication protocols.
2. Analyze the traffic flow and the contents of protocol frames.
3. Explore the concepts of PHP concepts using HTML.
4. Know the XML documents for server side scripting.

Course Outcomes

1. Implement data link layer farming methods
2. Implement routing and congestion issues in network design.
3. Implement PHP concepts in HTML.
4. Implement server side scripting using XML.

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRCCCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. How to run N map scan
10. Operating System Detection using N map

Web Technologies Experiments

1. Write a PHP script to print prime numbers between1-50.
2. PHP script to
   a. Find the length of a string.
   b. Count no of words in a string.
   c. Reverse a string.
   d. Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.

Develop static pages (using Only HTML) of an online book store. The pages should

resemble:_____

www.amazon.com. The website should consist the following pages.

a) Home page
b) Registration and user Login
c) User Profile Page
d) Books catalog
e) Shopping Cart
f) Payment By credit card
g) Order Conformation

6. Validate the Registration, user login, user profile and payment by credit card pages using Java Script.
7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
8. Install TOMCAT web server. Convert the static web pages of assignment 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
9. Redo the previous task using JSP by converting the static web pages of assignment 2 into dynamic web pages. Create a database with user information and books information. The books catalogue
Should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXTBOOKSOKS:

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCES:

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel," Java How to Program", Prentice Hall of India, 8th Edition
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

20EN507HS: ADVANCED COMMUNICATION SKILLS LAB

B. Tech V SEM. **L T P C**
0 0 2 1

Course Objectives

1. Improve the students' fluency in English, through a well-developed vocabulary.
2. Communicate their ideas relevantly and coherently in communication.

Course Outcomes

1. Interpret the vocabulary to improve the fluency in English.
2. Illustrate the ideas to use of communication skills.

INTRODUCTION

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language
   –RolePlayindifferentsituations&DiscourseSkills-usingvisuals-Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations &usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing –

letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCES:

3. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson2007
4. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
5. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
6. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
7. English Vocabulary in Use series, Cambridge University Press 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
10. Job Hunting by Colm Downes, Cambridge University Press2008.
11. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

20MC509IP: INTELLECTUAL PROPERTY RIGHTS

B. Tech V SEM. **L T P C**
3 0 0 0

Course Objectives

1. Explore the knowledge of IPR and agencies.
2. Describe the rules, laws and properties of IPR.

Course Outcomes

1. Interpret the trade marks, copy rights, patents and agencies.
2. Use of rules and properties of IPR for grants.

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing companyltd

20CS601PC: MACHINE LEARNING

B. Tech VI SEM. **LT P C**
3 1 0 4

Prerequisites

1. Data Structures
2. Knowledge on statistical methods

Course Objectives

1. Introducing the concepts of decision learning and machine learning.
2. Understand the decision tree learning and ANN architectures.
3. Learn Machine learning techniques such as Bayesian learning and computational learning.
4. Understand instant based learning theory.
5. Studyanalytical and reinforced learning techniques.

Course Outcomes

1. Understand the concept of computational intelligence.
2. Description of artificial neural networks and their usage.
3. Implement basic machine learning algorithms.
4. Implement instant based learning by set rules.
5. Introduces analysis by reinforcement learning algorithms

UNIT - I

Introduction: Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning: Introduction, decision representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II

Artificial Neural Networks-1: Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2: Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses: Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory: Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning: Introduction, *k*-nearest neighbor algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms: Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules: Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning: Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1: Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2: Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning: Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCES:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

20CS602PC: COMPILER DESIGN

B. Tech VI SEM. **LT P C**
3 0 0 3

Prerequisites

1. A course on "Formal Languages and Automata Theory"
2. A course on "Computer Organization and architecture"
3. A course on "Computer Programming and Data Structures"

Course Objectives:

1. Understand the lexical analyzer and it's importance.
2. Describe the concepts of top-down and bottom-up parsing.
3. Generation of syntax-directed trees and intermediate code.
4. Illustrate the code optimization.
5. Understand the data flow analysis using graphs.

Course Outcomes:

1. Compute tokens and regular expressions for lexical analysis.
2. Implement top-down and bottom-up parsers.
3. Construct intermediate code for procedures.
4. Optimize the code generation.
5. Analyze the data flow.

UNIT - I

Introduction: The structure of a compiler, the science of building a compiler, programming language basics

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT - II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT - III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT - V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCES:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown,O'reilly
2. Compiler Construction, Louden, Thomson.

20MB603PC: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B. Tech VI SEM. **L T P C**
3 0 0 3

Prerequisites: None

Course Objective:

1. Understand the basic Business types, the impact of the Economy Businesses and Firms specifically.
2. Learn the market demand and supply.
3. Analyze the Business from the Financial Perspective.
4. Preparing account statements and balance sheets.
5. Analyze the fund flow and cash flows.

Course Outcome:

1. Understand the various Forms of Business and the impact of economic variables on the Business.
2. Comprehend the demand and supply analysis.
3. Explore the usage of marketing and pricing of a product.
4. Maintaining the financial accounts of a firm or company.
5. Monitoring the accounts through ratios.

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT -IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd.2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd.2012.

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

20CS631PE: BIG DATA ANALYTICS (Professional Elective - III)

B. Tech V SEM. **L T P C**
3 0 0 3

Course Objectives:

1. Understand big data
2. Learn the analytics of Big Data
3. Understand the Map-Reduce fundamentals
4. Illustrating the cloud database using NoSQL.
5. Know the tools for analyzing various types of data.

Course Outcomes:

1. Describing Big Data and its usage.
2. Learn the approaches of big data analytics.
3. Implementation of Map-Reduce framework.
4. Applythe NoSQL databases using the HBase framework.
5. Approaches to implementing text analytics.

UNIT - I

Big Data Analytics: What is big data, History of Data Management; Structuring Big Data; Elements of Big Data; Big Data Analytics; Distributed and Parallel Computing for Big Data Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools;

UNIT - II

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics; Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT - III

Understanding Map Reduce Fundamentals and HBase: The Map Reduce Framework; Techniques to Optimize Map Reduce Jobs; Uses of Map Reduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations- Programming with HBase; Installation, Combining HBase and HDFS;

UNIT - IV

Big Data Technology Landscape and Hadoop: NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFC (Hadoop Distributed File System), HDFC Daemons, read, write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

UNIT - V

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;

Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools;

TEXT BOOKS:

1. Big Data and Analytics, Seema Acharya, Subhasini Chellappan, Wiley publications.
2. Big Data, Black BookTM, DreamTech Press, 2015 Edition.
3. Business Analytics 5e , BY Albright |Winston

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence –Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, Shaku Atre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. YuliVasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

20CS632PE: NETWORK PROGRAMMING (Professional Elective - III)

B. Tech V SEM. **L T P C**
3 0 0 3

Prerequisites:

1. A course on "Computer Networks"
2. A course on "Operating Systems"
3. A course on "Data Structures"

Course Objectives:

1. Understand inter-process and inter-system communication.
2. Understand socket programming in its entirety.
3. Understand the usage of TCP/UDP / Raw sockets.
4. Understand how to build network applications.
5. Understand the raw sockets and remote login approaches.

Course Outcomes:

1. Introducing the concepts of network programming.
2. Write socket API based programs.
3. Design and implement client-server applications using TCP and UDP sockets.
4. Analyze network programs bybroadcasting and multicasting.
5. Understand the raw sockets and remote login approaches.

UNIT - I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

Sockets: Address structures, value: result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT - II

TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host. **Elementary UDP sockets**: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

I/O Multiplexing: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server,

UNIT - III

Socket options: getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

Advanced I/O Functions-Introduction, Socket Timeouts, recv and send Functions, readv and writev Functions, recvmsg and sendmsg Functions, Ancillary Data, How Much Data Is Queued? Sockets and Standard I/O, T/TCP: TCP for Transactions.

UNIT - IV

Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

Daemon Processes and inetd Super server: Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd Function

Broadcasting: Introduction, Broadcast Addresses, Unicast versus Broadcast, dg_cli Function Using Broadcasting, Race Conditions

Multicasting: Introduction, Multicast Addresses, Multicasting versus Broadcasting on A LAN, Multicasting on a WAN, Multicast Socket Options, mcast_join and Related Functions, dg_cli Function Using Multicasting, Receiving MBone Session Announcements, Sending and Receiving, SNTP: Simple Network Time Protocol.

UNIT - V

Raw Sockets: Introduction, Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Trace route Program, An ICMP Message Daemon,

Data link Access: Introduction, BPF: BSD Packet Filter, DLPI: Data Link Provider Interface, Linux: **SOCK_PACKET, libpcap**: Packet Capture Library, Examining the UDP Checksum Field.

Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

TEXT BOOKS:

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education
2. UNIX Network Programming, 1st Edition, - W. Richard Stevens.PHI.

REFERENCES:

1. UNIX Systems Programming using C++ T CHAN,PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

20CS633PE: SCRIPTING LANGUAGES (Professional Elective - III)

B. Tech VI SEM. **L T P C**
3 0 0 3

Prerequisites:

1. A course on "Computer Programming and Data Structures"
2. A course on "Object-Oriented Programming Concepts"

Course Objectives:

1. Understand the web service architecture and applications.
2. Introducing Ruby scripting.
3. Understand the basics of PERL programming.
4. Illustrate the advanced programming in PERL.
5. Learning TCL

Course Outcomes:

1. Comprehend the SOAP architecture and web services.
2. Understand the Ruby scripting language.
3. Applythe basic Perl programming language.
4. Implement the advanced programming in PERL.
5. Apply TCL programming.

UNIT - I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services

RubyTk: Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.

UNIT - III

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT - IV

Advanced Perl: Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT - V

TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk: Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.

20CS634PE: MOBILE APPLICATION DEVELOPMENT (Professional Elective - III)

B. Tech VI SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "JAVA programming"
2. A Course on "DBMS"

Course Objectives

1. Understanding of the fundamentals of Android operating systems.
2. Improve the skills of using Android software development tools.
3. Develop software with reasonable complexity on a mobile platform.
4. Deploy software to mobile devices.
5. Debug programs running on mobile devices.

Course Outcomes

1. Understand the working of Android OS.
2. Apply the concepts of mobile applications on Android.
3. Develop Android user interfaces.
4. Deploy and maintain the Android Applications.
5. Debug programs running on mobile devices.

UNIT - I

Introduction to Android Operating System: Android OS design and Features Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components: Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II

Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts

User Interface (UI) Components: Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling: Handling clicks or changes of various UI components

Fragments: Creating fragments Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III

Intents and Broadcasts: Intent–Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers: Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications: Creating and Displaying notifications, Displaying Toasts

UNIT - IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V

Database: Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox),2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

20CS635PE: SOFTWARE TESTING METHODOLOGIES (Professional Elective - III)

B. Tech VI SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Software Engineering"
2. A course on "Computer Networks"
3. A course on "Operating Systems"

Course Objectives

1. Introduce the concepts in software testing such as testing process, criteria, strategies, and methodologies.
2. Understand the domain-based and flow-based types of testing
3. Apply logic-based testing strategy
4. Describe the graph-based approach.
5. To develop skills in software test automation and management using the latest tools.

Course Outcomes:

1. Design the best test strategy in accordance with the development model.
2. Applytransaction-flow and domain path testing strategies.
3. Illustrate the logic-based testing method.
4. Apply the network-flow testing for the application.
5. Develop automated testing using the Jmeter or WinRunner tools.

UNIT - I

Introduction: Purpose of testing, dichotomies, a model for testing, consequences of bugs, the taxonomy of bugs.

Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of data flow testing, strategies in data flow testing, application of data flow testing.

Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT - III

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic-Based Testing: overview, decision tables, path expressions, kV charts, specifications.

UNIT - IV

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT - V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Winrunner).

TEXT BOOKS:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCES:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques –SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, JohnWiley.
5. Art of Software Testing – Meyers, JohnWiley.

20CS604PC: MACHINE LEARNING LAB

B. Tech VI SEM. **L T P C**
0 0 3 1.5

Course Objective:

1. Overview of the various machine learning techniques using python.
2. Understand the data analysis using ML techniques.

Course Outcomes:

1. Performing experiments in Machine Learning using real-world data.
2. Applythe modern notions in data analysis-oriented computing;

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans:15%)
2. Extract the data from database using python
3. Implement k-nearest neighbor's classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3centroids)

VAR1	VAR2	LASS
1.713	586	
0.180	786	
0.353	240	
0.940	566	
1.486	759	
1.266	106	
1.540	419	
0.459	799	
0.773	186	

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium	skiing	design	single	twenties	no -> highRisk
high	golf	trading	married	forties	yes ->lowRisk
low	speedway	transport	married	thirties	yes -> medRisk
medium	football	banking	single	thirties	yes -> lowRisk
high	flying	media	married	fifties	yes ->highRisk
low	football	security	single	twenties	no -> medRisk
medium	golf	media	single	thirties	yes -> medRisk
medium	golf	transport	married	forties	yes -> lowRisk
high	skiing	banking	single	thirties	yes -> highRisk
low	golf	unemployed	married	forties	yes ->highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

20CS605PC: COMPILER DESIGN LAB

B. Tech VI SEM. **L T P C**
0 0 2 1

Prerequisites

1. A Course on "Objected Oriented Programming through Java"
2. A course on "C Programming"

Course Objectives

1. Understand the design of top-down and bottom-up parsers.
2. Understand syntax-directed translation schemes and introduce lex and yacc tools.

Course Outcomes

1. Implement a compiler for top-down and bottom-up parsers.
2. Use of lex and yacc tools for developing a scanner and a parser.

List of Experiments

Compiler Design Experiments

1. Write a LEX Program to scan reserved word & Identifiers of C Language
2. Implement Predictive Parsing algorithm
3. Write a C program to generate three address code.
4. Implement SLR(1) Parsing algorithm
5. Design LALR bottom up parser for the given language

<program> ::= <block>
<block> ::= { <variabledefinition><slist> }
|{ <slist> }
<variabledefinition> ::= int <vardeflist> ;
<vardeflist> ::= <vardec> |<vardec> , <vardeflist>
<vardec> ::= <identifier> |<identifier> [<constant>]
<slist> ::= <statement> | <statement> ; <slist>
<statement> ::= <assignment> | <ifstatement> | <whilestatement>
|<block> | <printstatement> |<empty>
<assignment> ::= <identifier> = <expression>
|<identifier> [<expression>] = <expression>
<ifstatement> ::= if <bexpression> then <slist> else
<slist> endif
|if <bexpression> then <slist> endif
<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print (<expression>)
<expression> ::= <expression><addingop><term> |<term> | <addingop><term>
<bexpression> ::= <expression><relop><expression>
<relop> ::= < |<= |== |>= |> | !=

<addingop> ::= + | -
<term> ::= <term><multop><factor> | <factor>
<multop> ::= * |/
<factor> ::= <constant> | <identifier> | <identifier> [<expression>]
| (<expression>)
<constant> ::= <digit> | <digit><constant>
<identifier> ::= <identifier><letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9
<empty> has the obvious meaning

Comments (zero or more characters enclosed between the standard C/Java-style comment brackets
/*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2]. Note also that you should worry about the scoping of names.

A simple program written in this language is:

```
{ int
  a[3]
  ,t1,t
  2;
  t1=
  2;
 a[0]=1; a[1]=2; a[t1]=3;
 t2=-(a[2]+t1*6)/(a[2]-t1);
   if t2>5 then print(t2); else {
  int t3; t3=99; t2=-25;
  print(-t1+t2*t3); /* this is a comment
                    on 2 lines */
 }
 endif
}
```

20CS631PEL: BIG DATA ANALYTICS LAB (Professional Elective - III)

B. Tech VI SEM. **L T P C**
0 0 3 1.5

Course Objectives:
1. Optimize business decisions and create a competitive advantage with Big data analytics
2. Practice java concepts required for developing map-reduce programs on the Hadoop environment.

Course Outcomes:
1. Understand the installation of VMWare, Hadoop and LINUX Operating System.
2. Apply Map Reduce program that mines weather data and other applications.

List of Experiments:

1. INSTALL VMWARE
Installation of VMWare to setup the Hadoop environment and its ecosystems.

2. HADOOP MODES
a. Perform setting up and Installing Hadoop in its three operating modes.
i. Standalone.
ii. Pseudo distributed.
iii. Fully distributed.
b. Use web based tools to monitor your Hadoop setup.

3. USING LINUX OPERATING SYSTEM
Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations.

4. FILE MANAGEMENT IN HADOOP
Implement the following file management tasks in Hadoop:
i. Adding files and directories
ii. Retrieving files
iii. Deleting files
Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

5. MAPREDUCE PROGRAM 1
Run a basic word count Map Reduce program to understand Map Reduce Paradigm.

6. MAPREDUCE PROGRAM 2
Write a Map Reduce program that mines weather data. Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.

7. MAPREDUCE PROGRAM 3
Implement matrix multiplication with Hadoop Map Reduce

8. PIG LATIN LANGUAGE - PIG
Installation of PIG

9. PIG COMMANDS
Write Pig Latin scripts sort, group, join, project, and filter your data.

10. PIG LATIN MODES, PROGRAMS
a. Run the Pig Latin Scripts to find Word Count.
b. Run the Pig Latin Scripts to find a max temp for each and every year.

11. HIVE
Installation of HIVE.

12. HIVE OPERATIONS
Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

BOOKS:
1. Jay Liebowitz, ―Big Data And Business Analytics Laboratory, CRC Press.

20CS632PEL: NETWORK PROGRAMMING LAB (Professional Elective - III)

B. Tech VI SEM. **L T P C**
0 0 3 1.5

Course Objectives:

1. Understand inter-process and inter-system communication and socket programming in its entirety.
2. To understand the usage of TCP/UDP / Raw sockets.

Course Outcomes:

1. Implement client-server applications using TCP and UDP sockets.
2. Analyze network programs

List of Experiments

1. Implement programs for Inter Process Communication using PIPE, Message Queue and Shared Memory.
2. Write a program to create an integer variable using shared memory concept and increment the variable simultaneously bytwo processes. Use semaphores to avoid race conditions.
3. Design TCP iterative Client and server application to reverse the given input sentence
4. Design TCP iterative Client and server application to reverse the given input sentence
5. Design TCP client and server application to transfer file
6. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
7. Design a TCP concurrent server to echo given set of sentences using poll functions
8. Design UDP Client and server application to reverse the given input sentence
9. Design UDP Client server to transfer a file
10. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into uppercase.
11. Design a RPC application to add and subtract a given pair of integers

TEXT BOOKS:

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education.
2. UNIX Network Programming, 1st Edition, - W. Richard Stevens. PHI.

20CS633PEL: SCRIPTING LANGUAGES LAB (Professional Elective - III)

B. Tech VI SEM. **L T P C**
0 0 3 1.5

Prerequisites:

1. A course on "C programming"
2. A course on "Java programming"

Course Objectives:

1. Understand the concepts of scripting languages for developing web-based projects
2. Understand the applications, the of Ruby, TCL, Perl scripting languages

Course Outcomes:

1. Understand the differences between Scripting languages and programming languages
2. Applythe programming in Ruby, Perl, TCL

List of Experiments

1. Write a Ruby script to create a new string which is n copies of a given string where n is a non- negative integer
2. WriteaRubyscriptwhichacceptstheradiusofacirclefromtheuserandcomputethepar ameter and area.
3. Write a Ruby script which accepts the user's first and last name and print them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return their sum
8. WriteaRubyscripttochecktwotemperaturesandreturntrueifoneislessthan0andthe other is greater than100
9. Write a Rubyscript to print the elements of a given array
10. Write a Rubyprogram to retrieve the total marks where subject name and marks of a student stored in a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to10
13. Write a TCL script for Sorting a list using a comparison function
14. Write a TCL script to (i)create a list (ii) append elements to the list (iii)Traverse the list (iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.
    b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.

18. Write a Perl program to implement the following list of manipulating functions
    a) Shift b) Unshift c)Push
19. a) Write a Perl script to substitute a word, with another word in a string.
    b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

20CS634PEL: MOBILE APPLICATION DEVELOPMENT LAB
(Professional Elective - III)

B. Tech VI SEM. **L T P C**
0 0 3 1.5

Prerequisites:

1. A course on "Java programming"

Course Objectives:

1. To learn how to develop Applications in android environment.
2. To learn how to develop user interface applications.

Course Outcomes:

1. Develop user interfaces on Android platform.
2. Deploy and maintain the Android Applications.

List of Experiments

1. Create an Android application that shows Hello + name of the user and run it on an emulator.

(b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State(Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use
   (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.

7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of log in names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.
11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00AM. Modify it to use a time picker to set alarm time.
13. Create an application that shows the given URL (from a text field) in a browser.

20CS635PEL: SOFTWARE TESTING METHODOLOGIES LAB
(Professional Elective - III)

B. Tech VI SEM. **L T P C**
0 0 3 1.5

Prerequisites:

1. A course on "Java programming".

Course Objectives

1. Understand knowledge of Software Testing Methods.
2. Develop skills in software test automation and management using latest tools.

Course Outcome

1. Develop the best test strategies in accordance to the development model.
2. Apply the test cases on test automation tools.

List of Experiments:

1. Recording in context sensitive mode and analog mode
2. GUI checkpoint for single property
3. GUI checkpoint for single object/window
4. GUI checkpoint for multiple objects
5. a) Bitmap checkpoint for object/window
   a) Bitmap checkpoint for screen area
6. Database checkpoint for Default check
7. Database checkpoint for custom check
8. Database checkpoint for runtime record check
9. a) Data driven test for dynamic test data submission
   b) Data driven test through flat files
   c) Data driven test through front grids
   d) Data driven test through excel test
10. a) Batch testing without parameter passing
    b) Batch testing with parameter passing
11. Data driven batch
12. Silent mode test execution without any interruption
13. Test case for calculator in windows application

20MC608ES: ENVIRONMENTAL SCIENCE

B. Tech. VI Sem.

L	T	P	C
3	0	0	0

Course Objectives: Upon completing this course, the student will be able to

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures
- Understanding the environmental policies and regulations

Course Outcomes:

Based on this course, the Engineering graduate will understand/evaluate/develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT - I

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution.

Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.

Water pollution: Sources and types of pollution, drinking water quality standards.

Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards,

Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT - V

Environmental Policy, Legislation &EIA: Environmental Protection act, Legal aspects AirAct-1981, Water Act, Forest Act, Wildlife Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon lifestyle.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008, PHI Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt.Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Textbook of Environmental Science and Technology- Dr.M.Anji Reddy2007, BS Publications.

20MB701BS: ORGANIZATIONAL BEHAVIOUR (PC)

B. Tech VII SEM. **L T P C**
2 0 0 2

Course Objectives:

1. The conceptual framework and theories underlying Organizational Behavior.
2. Understand the cognitive processes and their attributes.
3. Explore the knowledge of decision making effective communication.
4. Empowerment of nature in groups and teams.
5. Analyzing the leading performance.

Course Outcomes:

1. Introducing environmental and organizational behavior.
2. Describing the personality and process attributes at a cognitive level.
3. Usage of decision making at individual and team levels.
4. Comprehend power and politics.
5. Analyzing the leading performance.

UNIT- I:

Introduction to OB: Definition, Nature and Scope–Environmental and organizational context– Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behavior.

Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception–Perceptual selectivity and organization – Social perception–Attribution Theories–Locus of control –Attribution Errors –Impression Management.

UNIT-II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality

- Johari Window and Transactional Analysis – Nature and Dimension of Attitudes – Jobs satisfaction and organizational Commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behavior: Optimism – Emotional intelligence –Self-Efficacy.

UNIT- III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making.

Dynamics of OB –II: Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra- individual conflict - strategies to cope with stress and conflict.

UNIT- IV:

Dynamics of OB: III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in the modern workplace.

UNIT- V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work-Life- Socio technical Design and High-performance work practices-Behavioral performance management: reinforcement and punishment as principles of Learning –Process of Behavioral modification - Leadership theories - Styles, Activities and skills of Great leaders.

TEXT / REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behavior 10/e, McGraw-Hill,2009
2. McShane: Organizational Behavior, 3e, TMH,2008
3. Nelson: Organizational Behavior, 3/e, Thomson,2008.
4. Newstrom W. John & Davis Keith, Organizational Behavior--HumanBehaviouratWork,12/e, TMH, New Delhi,2009.
5. Pierce and Gardner: Management and Organizational Behavior: An Integrated perspective, Thomson,2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organizational Behavior, 12/e, PHI/Pearson, New Delhi,2009.
7. Pareek Udai: Behavioral Process at Work: Oxford & IBH, New Delhi,2009.
8. Schermerhorn: Organizational Behavior 9/e, Wiley,2008.
9. Hitt: Organizational Behavior, Wiley,2008

20DS702PC: DATA MINING (PC)

B. Tech VII SEM **L T P C**
3 0 0 3

Pre-Requisites:

1. A course on "Database management systems"
2. Knowledge of probability and statistics

Course Objectives:

1. Understand the data preprocessing methods.
2. Presents methods for mining frequent patterns, associations, and correlations.
3. Describes methods for data classification and prediction
4. Explore the data clustering approaches.
5. It covers mining various types of data stores such as spatial, textual, multimedia, streams.

Course Outcomes:

1. Understand the types of data to be mined and primitives of the data mining system.
2. Extract interesting patterns from large amounts of data.
3. Discover the classification of data mining in various fields.
4. Employsuitable data mining algorithms to clustering applications
5. Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT - I

Data Mining: Data–Types of Data, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems–Data mining Task primitives–Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

UNIT - II

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis–Constraint-based Association mining. Graph Pattern Mining, SPM.

UNIT - III

Classification: Classification and Prediction **–** Basic concepts–Decision tree induction–Bayesian classification, Rule-based classification, Lazy learner.

UNIT - IV

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT - V

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

TEXTBOOKS:

1. Data Mining–Concepts and Techniques–Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

REFERENCE BOOK:

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

20CS741PE: CLOUD COMPUTING (Professional Elective - IV)

B. Tech VII SEM **L T P C**
3 0 0 3

Pre-requisites:

1. A course on "Computer Networks"
2. A course on "Operating Systems"
3. A course on "Distributed Systems"

Course Objectives:

1. Comprehend distributed system models.
2. Outline Cloud characteristics and its services.
3. Explore the knowledge of cloud computing and migration tools.
4. Illustrate the computing service models.
5. Describing the cloud programming and software environments, resource management.

Course Outcomes:

1. Abilityto understand the cloud computing paradigms.
2. Understand various service delivery models of a cloud computing architecture.
3. Identifythe cloud infrastructure management and migration tools.
4. Understand the cloud service ways in which the cloud can be programmed.
5. Understanding cloud service providers.

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT - V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg andAndrzej
   M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

20CS742PE: SOFT COMPUTING (Professional Elective - IV)

B. Tech VII SEM. **L T P C**
3 0 0 3

Prerequisites

1. Knowledge of Algorithms.
2. A course on "Database Management Systems".
3. A course on "Mathematical Computations".

Course Objectives:

1. Familiarize with soft computing concepts.
2. Introduce and use the idea of fuzzylogic and use of heuristics based on human experience.
3. Familiarize the Neuro-Fuzzymodeling using Classification and Clustering techniques.
4. Learn the concepts of Genetic algorithm and its applications.
5. Acquire the knowledge of Rough Sets.

Course Outcomes:

1. Understand the concepts of soft computing.
2. Introduce fuzzy logic and reasoning.
3. Apply Particle Swarm optimization algorithms.
4. Perform genetic algorithms for classification.
5. Comprehend Soft computing techniques.

UNIT - I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III

Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995

20CS743PE: MOBILE COMPUTING (PROFESSIONAL ELECTIVE - IV)

B. Tech VII SEM. **L T P C**
3 0 0 3

Course Objectives:

1. Understand the concept of the mobile computing paradigm, the limitations and infrastructure of its novel application of GSM protocol.
2. Understand the issues and solutions of various layers of mobile networks MAC layer.
3. Understand the platforms and protocols used in a mobile environment Network Layer & Transport Layer.
4. Understand the database issues in mobile environments & data delivery models.
5. Understand the ad hoc networks and related concepts.

Course Outcomes:

1. Explore the knowledge of mobile communication and GSM protocols.
2. Describe the mobile network MAC layer protocols.
3. Use of protocols TCP and IP in the mobile transport layer.
4. Design data dissemination and synchronization.
5. Develop ad-hoc network applications and/or algorithms/protocols.

UNIT - I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/ Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT – II

Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT – III

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing &Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT - IV

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data

Synchronization – Introduction, Software, and Protocols

UNIT - V

Mobile Adhoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc., Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772.

REFERENCE BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, Oct 2004.

20CS744PE: ARTIFICIAL INTELLIGENCE (Professional Elective - IV)

B. Tech VII SEM.

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"
3. A course on "Design and Analysis of Algorithms"
4. A course on "Mathematical Foundations of Computer Science"
5. Some background in linear algebra, data structures and algorithms, and probability will all be helpful

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human-like reasoning.
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.
- To understand uncertainty learning.

Course Outcomes:

- Formulate an efficient problem space for a problem expressed in natural language.
- Select a search algorithm for a problem and estimate its time and space complexities.
- Representing knowledge using the appropriate technique for a given problem.
- Apply AI techniques to solve problems of game playing and machine learning.
- Act on uncertain problem solving.

UNIT - I

Problem Solving by Search-I: Introduction to AI, Intelligent Agents

Problem Solving by Search–II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environment.

UNIT - II

Propositional Logic

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT - III

Logic and Knowledge Representation

First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT -IV

Planning

Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT - V

Uncertain Knowledge and Learning

Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

TEXT BOOK:

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

20CS745PE:AD-HOC & SENSOR NETWORKS (Professional Elective - IV)

B. Tech VII SEM. **L T P C**
3 0 0 3

Prerequisites

1. A course on "Computer Networks"
2. A course on "Mobile Computing"

Course Objectives:

1. To understand the concepts of sensor networks.
2. To understand the MAC and transport protocols for ad-hoc networks.
3. To understand the protocols TCP and MANET.
4. To understand the security of sensor networks.
5. To understand the applications of ad-hoc and sensor networks.

Course Outcomes:

1. Understand the Ad Hoc and Wireless Sensor Networks.
2. Explore the knowledge of routing protocols.
3. Design the solutions for TCP over Ad-hoc sensor networks.
4. Solve the issues in real-time application development based on ASN.
5. Conduct the applications in the domain of ASN.

UNIT - I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology- based routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.

UNIT - III

Geo casting: Data-transmission Oriented-LBM; Route Creation Oriented- Geo TORA, MGR**.** TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT - IV

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT - V

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks–Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN –981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

20CS751PE: REAL-TIME SYSTEMS (Professional Elective - V)

B. Tech VII SEM. **L T P C**
3 0 0 3

Prerequisite:

1. A course on "Computer Organization"
2. A course on "Operating System"

Course Objectives:

1. Explore the knowledge of Unix/Linux operating systems.
2. Understanding of the requirements of Real-Time Operating Systems.
3. Introducing the I/O services and other building blocks.
4. Describing the features of exceptions, interrupts and timer controls.
5. Understand the applications of Real-Time features using case studies.

Course Outcomes:

1. Explore the knowledge of Unix/Linux operating systems.
2. Describe a real-time operating system kernel is implemented.
3. Understand the tasks and management of tasks.
4. Know the real-time operating system implements exceptions, interrupts and time management.
5. Work with real-time operating systems like RT Linux, Vx Works, Micro C /OSII, Tiny OS

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O, (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - III

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT - V

Case Studies of RTOS: RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOK:

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

20CS752PE: INTERNET OF THINGS (Professional Elective - V)

B. Tech VII SEM **L T P C**
3 0 0 3

Course Objectives:

1. To introduce the terminology, technology and its applications
2. To introduce the concept of M2M (machine to machine) with necessary protocols
3. To introduce the Python Scripting Language which is used in many IoT devices
4. To introduce the Raspberry PI platform, which is widely used in IoT applications
5. To introduce the implementation of web-based services on IoT devices

Course Outcomes:

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to the network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate on the need for Data Analytics and Security in IoT.
5. Illustrate different sensor technologies for sensing real-world entities and identify the applications of IoT in Industry.

UNIT - I

Introduction to Internet of Things: Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies– Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II

IoT and M2M: Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III

Introduction to Python: Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV

IoT Physical Devices and Endpoints: Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN:9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson &Shawn Wallace, O'Reilly (SPD), 2014, ISBN:9789350239759

20CS753PE: SOFTWARE PROCESS & PROJECT MANAGEMENT

(Professional Elective - V)

B. Tech VII SEM **L T P C**
3 0 0 3

Course Objectives:

1. Acquire knowledge on software process management and models.
2. Understand the process production stages.
3. Learn the process plan and its checkpoints.
4. To acquire managerial skills for software project development
5. To understand software project policies and its next level adoption.

Course Outcomes:

1. Gain knowledge of software requirements, economics and CMM.
2. Develop the life cycle of software development, project organization.
3. Design project structural plan and scheduling cost.
4. Gain the project process management skills.
5. Develop software product using conventional and modern principles of software project management

UNIT - I

Software Process Maturity: Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models: Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II

Software Project Management Renaissance: Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts: Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT - III

Workflows and Checkpoints of process: Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.

Process Planning: Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT - IV

Project Organizations: Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation. The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT - V

CCPDS-R Case Study and Future Software Project Management Practices, Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education,2000
2. Process Improvement essentials, James R. Persse, O'Reilly,2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH,2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly,2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly,2007
6. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India,2004.
7. Agile Project Management, Jim Highsmith, Pearson education,2004.

20CS754PE: DESIGN PATTERNS (PROFESSIONAL ELECTIVE - V)

B. Tech VII SEM **L T P C**
3 0 0 3

Prerequisites

1. A Course on Software Engineering"
2. A Course on "Object Oriented Programming Through Java"

Course Objectives:

1. Use creational design patterns in software design for class instantiation
2. Use structural design patterns for better class and object composition
3. Use behavioural patterns for better organization and communication between the objects
4. Use refactoring to compose the methods for proper code packaging
5. Use refactoring to better organize the class responsibilities of current code

Course Outcomes:

1. Design Patterns in handling common problems faced during building an application.
2. Designing of structure of document editor.
3. Designing the documental pattern.
4. Designing the structural patter for document handling.
5. Strategize the behavioural pattern

UNIT - I

Introduction: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalogue of Design Patterns, Organizing the catalogue, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT - II

Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary

UNIT - III

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT - IV

Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

UNIT - V

Behavioural Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

TEXT BOOK:

1. Design Patterns, Erich Gamma, Pearson Education

REFERENCE BOOKS:

1. Pattern's in Java, Vol –I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

20CS755PE: ADVANCED ALGORITHMS (Professional Elective - V)

B. Tech. VII SEM. **L T P C**
3 0 0 3

Pre-requisites:

1. A course on "Computer Programming & Data Structures"
2. A course on "Data Structures & Algorithms"

Course Objectives:

1. Introduces the recurrence relations for analyzing various algorithmic techniques.
2. Introduces the graphs and their traversals.
3. Describe sorting networks and applications of networks.
4. Introduces string matching algorithms
5. Explore the knowledge of non-linear programming techniques.

Course Outcomes:

1. Choose appropriate data structures and algorithm design methods for a specified application.
2. Describe the graph algorithms.
3. Apply the sorting networks.
4. Design the string matching algorithms.
5. Understand non-linear programming.

UNIT - I

Introduction: Role of Algorithms in computing, Order Notation, Recurrences, Probabilistic Analysis and Randomized Algorithms. Sorting and Order Statistics: Heap sort, Quick sort and Sorting in Linear Time.

Advanced Design and Analysis Techniques: Dynamic Programming- Matrix Chain Multiplication, Longest common Subsequence and optimal binary Search trees.

UNIT - II

Greedy Algorithms - Huffman Codes, Activity Selection Problem. Amortized Analysis.

Graph Algorithms: Topological Sorting, Minimum Spanning trees, Single Source Shortest Paths, Maximum Flow algorithms.

UNIT - III

Sorting Networks: Comparison Networks, Zero-one principle, bitonic Sorting Networks, Merging Network, Sorting Network.

Matrix Operations- Strassen's Matrix Multiplication, Inverting matrices, Solving system of linear Equations

UNIT - IV

String Matching: Naive String Matching, Rabin-Karp algorithm, matching with finite Automata, Knuth- Morris - Pratt algorithm.

UNIT- V

NP-Completeness and Approximation Algorithms: Polynomial time, polynomial time verification, NP-Completeness and reducibility, NP-Complete problems. Approximation Algorithms- Vertex cover Problem, Travelling Sales person problem

TEXT BOOK:

1. Introduction to Algorithms," T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, Third Edition, PHI.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia publications pvt. Ltd.
2. Design and Analysis Algorithms - Parag Himanshu Dave, Himanshu Bhalchandra Dave Publisher**:** Pearson
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and R. Tomassia, John Wiley andsons.
4. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.

20CS703PC: DATA MINING LAB (PC)

B. Tech VII SEM **L T P C**
0 0 2 1

Course Objectives:

1. To obtain practical experience using data mining techniques on real-world data sets.
2. Emphasize hands-on experience working with classification and clustering algorithms.

Course Outcomes:

1. Apply classification mining algorithms as a component to the existing tools.
2. Apply clustering mining techniques for realistic data.

List of Sample Problems:

Task 1: Credit Risk Assessment

Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset(original) Excel spreadsheet version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

A few notes on the German dataset

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
2. owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
3. foreign_worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
4. There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

Subtasks: (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes separately. (5 marks)
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes. (5 marks)
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training. (10marks)
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy? (10 marks)
5. Is testing on the training set as you did above a good idea? Whyor Why not? (10marks)
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why? (10 marks)
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute, you can use the pre-process tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss. (10 marks)
8. Another question might be; do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.) (10marks)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross validation results. Are they significantly different from results obtained in problem 6 (using equal cost)? (10 marks)
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model? (10 marks)
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase? (10 marks)
12.(Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Makeup your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules -one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? One R classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and one R. (10 marks)

Task Resources:

- Mentor lecture on Decision Trees
- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross
- Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
- Weka resources:
- Introduction to Weka (html version) (download ppt version)
- Download Weka
- Weka Tutorial
- ARFF format
- Using Weka from command line

Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table.

REMEMBER The following

Dimension

The dimension object (Dimension):

_ Name

_ Attributes (Levels), with one primary key

_ Hierarchies

One-time dimension is must.

About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:

H1: YearL>QuarterL>MonthL>WeekL>DayL

H2: YearL>WeekL>DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

About Unique Key Constraints

When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are 'NO UNITS', UNIT PRICE.

Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),

PATIENT (patient_name, Age, Address, etc.,)

MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,)

SUPPLIER :(Supplier_name, Medicine_Brand_name, Address, etc.,)

If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.

Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

20CS801PC: CRYPTOGRAPHY AND NETWORK SECURITY (PC)

B. Tech VIII SEM **LT P C**
3 1 0 4

Course Objectives:

1. Understand various cryptographic algorithms and their characteristics.
2. Describe the private and public-key cryptosystems.
3. Discussion of key management scenarios.
4. Describe the enhancements of Web security and Firewalls made to IPv4 by IPSec.
5. Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.

Course Outcomes:

1. Understand the key concepts of cryptography and security.
2. Comprehend the private and public key cryptographic algorithms.
3. Defining the key distribution and management methods.
4. Use of transporting data by Web security and Firewalls protocols.
5. Distribute the PGP to send a secured e-mail message.

UNIT - I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security **Cryptography Concepts and Techniques:** Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-Branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rdEdition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1stEdition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rdEdition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

20CS861PE: HUMAN COMPUTER INTERACTION (Professional Elective - VI)

B. Tech VIII SEM. **L T P C**
3 0 0 3

Course Objectives:

1. Importance of HCI and its characteristics.
2. Understand the design principles for the user interface.
3. Explore the concepts of multimedia interfaces.
4. Understand the basics of software tools.
5. Importance of cognitive levels of the user interface.

Course Outcomes:

1. Apply HCI and principles to interaction design.
2. Design process of human-computer interaction.
3. Design principles of GUI.
4. Design certain tools for blind or PH people.
5. Applications of virtual and augmented reality interfaces.

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface: popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II

Design process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing: Design goals–Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT- III

Windows – New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT- IV

HCI in the software process, The software life cycle Usability Engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT- V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2,3
2. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson Education Units4,5

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

20CS862PE: CYBER FORENSICS (Professional Elective - VI)

B. Tech VIII SEM **L T P C**
3 0 0 3

Prerequisites:

1. A course on "Network Security"

Course Objectives:

- Understand the types of crimes and response methodology.
- Learn the objectives to provide digital evidence which is obtained from digital media.
- Describe the data analysis and validation methods.
- Explore the modern tools used in an investigation.
- Retrieving of the data stored in various storage places.

Course Outcomes:

- Describe the crime types and incident response procedures.
- Understand the usage of computers in forensic laboratories.
- Explore the data analysis and visualization techniques.
- Use various forensic tools for a wide variety of investigations.
- Design principles of data management methods.

UNIT- I

Introduction of Cybercrime: Types, The Internet spawn's crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT-II

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT - III

Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honey net project.

UNIT -IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT- V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

20CS863PE: DEEP LEARNING (Professional Elective - VI)

B. Tech VIII SEM **L T P C**
3 0 0 3

Pre-requisites:

1. A course on "Computer Networks"
2. A course on Python Programming"

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To gain knowledge to apply optimization strategies
4. To learn various types of Artificial Neural Networks
5. To learn various applications of Deep Learning methods.

Course Outcomes:

1. Understand the concepts of Neural Networks
2. Select the Learning Networks in modeling real-world systems
3. Apply optimization strategies for large scale applications
4. Use an efficient algorithm for Deep Models
5. Implement Deep learning models in various domains.

UNIT - I

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes.

UNIT - II

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT - III

Optimization for Training Deep Models, How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

UNIT - IV

Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro-scientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning

UNIT - V

Applications:

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

TEXT BOOK:

1. Good fellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.

REFERENCE BOOKS:

1. Li Deng and Dong Yu, Deep Learning Methods and Applications, Foundations and Trends® in Signal
Processing Volume 7 Issues 3-4, ISSN: 1932-8346.
2. Dr. N.D. Lewis, Deep Learning Made Easy with R A Gentle Introduction for Data Science. Create
Space Independent Publishing Platform (January 10, 2016).
3. François Chollet, JJ Allaire, MEAP Edition Manning Early Access Program Deep Learning with R
Version 1, Copyright 2017 Manning Publications.

20CS864PE: ETHICAL HACKING (PROFESSIONAL ELECTIVE – VI)

B. Tech VIII SEM **L T P C**
3 0 0 3

Prerequisites

1. A course on "Operating Systems"
2. A course on "Computer Networks"
3. A course on "Network Security and Cryptography"

Course Objectives:

1. Introduce the methodologies and framework of ethical hacking for enhancing security.
2. Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps
3. Impacts of Hacking; Types of Hackers; Information Security Models; Information Reconnaissance.
4. Introducing exploitation.
5. Design document deliverables and integration of results.

Course Outcomes:

1. Understand the role of politics, inherent and imposed limitations and metrics for the planning of a test.
2. Comprehend the dangers associated with penetration testing.
3. The use and availability of tools to support an ethical hack
4. The knowledge of interpreting the results of a controlled attack.
5. Generation of test results and management of documents.

UNIT- I

Introduction: Hacking Impacts, The Hacker

Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration

Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture

Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

UNIT - II

The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges

Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, Timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement

UNIT - III

Preparing for a Hack: Technical Preparation, Managing the Engagement

Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance

UNIT - IV

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase

Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, Rootkits, applications, Wardialing, Network, Services and Areas of Concern

UNIT - V

Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation

Integration: Integrating the Results, Integration Summary, Mitigation, Defence Planning, Incident Management, Security Policy, Conclusion

TEXTBOOK:

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press

REFERENCE BOOKS:

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning

2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and Network Defence", Cengage Learning

20CS865PE: DATABASE SECURITY (Professional Elective - VI)

B. Tech VIII SEM **L T P C**
3 0 0 3

Prerequisites

1. A course on "DBMS"
2. A course on "Network Security and Cryptography"

Course Objectives:

1. To learn the security of databases.
2. To learn the design techniques of database security.
3. To learn the intrusion detection systems.
4. To learn the secure software design.
5. To learn the next generation database security models.

Course Outcomes:

1. Carry out a risk analysis for large database.
2. Set up, and maintain the accounts with privileges and roles.
3. Design the principles of IDS.
4. Design the security models for next generation databases.
5. Use of modern tools in providing database security.

UNIT - I

Introduction: Introduction to Databases Security Problems in Databases Security Controls Conclusions

Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

UNIT - II

Security Models -2: Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model the Lattice Model for the Flow Control conclusion

Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

UNIT - III

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

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

UNIT - IV

Models for the Protection of New Generation Database Systems -1: Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

UNIT - V

Models for the Protection of New Generation Database Systems -2: A Model for the Protection of New Generation Database Systems: The Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

TEXT BOOKS:

1. Database Security by Castano Pearson Edition (lie) Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCE BOOK:

1. Database security by Alfred basta, melissazgola, CENGAGE learning.