ACADEMIC REGULATIONS, COURSE STRUCTURE, AND DETAILED SYLLABUS

INFORMATION TECHNOLOGY

For

B.Tech.FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2020-2021)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

(UGC- AUTONOMOUS)

Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC with 'A' Grade. Accredited by NBA

(Medbowli, Meerpet, Balapur(M), Hyderabad, Telangana- 500097)

College

Vision:

Imparting Knowledge and instilling skills to the aspiring students in the field of Engineering, Technology, Science and Management to face the emerging challenges of the society.

Mission:

- Encouraging scholarly activities that transfer knowledge in the areas of Engineering, Technology, Science and Management.
- Ensuring students of all levels, well trained to meet the needs of education and their future endeavors.
- Inculcating human values and ethics into the education system for the all-round development of the students.

Department

About Department

The Department of Information Technology (IT) was established in 2005 with an Intake 60 for in Bachelor course in Information Technology. This Branch is fast growing discipline and full of rigorous practical analysis. This Department has well equipped laboratories and logical reasoning is stressed in all practical applications. With highly talented and dedicated faculty which includes one Professor with Doctorate and two Associate Professors. The department boasts of a unique mode of learning, Students of this branch has fulfilled the promise kept on them by getting selection in some of the top notch of software/hardware companies of India like Wipro, Infosys, Cognizant..etc

Vision:

The program aims at creating capable engineering professionals to meet the flourishing needs of the industry and society in the field of Information Technology.

Mission:

- Impart adequate employability skills to make the students industry ready with global standards.
- Inculcate ethical values and leadership qualities in addressing the societal needs using Information Technology.

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1.0 Under-Graduate Degree Program in Engineering & Technology (UGP in E & T)

Teegala Krishna Reddy Engineering College (TKREC) offers a VIII- Semesters (4-years) Bachelor of Technology (B.Tech.) degree Program, under the Choice Based Credit System (CBCS) with effect from the academic year 2020- 21 in the various branches of Engineering.

2.0 Eligibility for Admission

2.1 Seats for each Program in the college are classified into CATEGORY-A (70% of intake), CATEGORY-B (30% of intake) and CATEGORY-C (10% of intake through Lateral Entry in III semester).

2.2 Admission to the CATEGORY-A (70% of Intake) is made either on the basis of the merit rank obtained by the qualified candidate in the entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the Talangana State council for Higher Education, subject to reservations prescribed by the government from time to time.

2.3 The college fills CATEGORY-B (30% of Intake) as per the guidelines of the competent authority.

2.4 CATEGORY-C (10% of intake) are Lateral Entry students who are admitted into the third semester directly based on the rank secured by the candidate in the Engineering Common Entrance Test (ECET) in accordance with the instructions received from the convener, ECET and the competent authority.

2.5 The medium of instruction for the entire under graduate Program in E & T will only be in English.

2.6 It is mandatory that every student follows the undertaking and abides by the rules of Teegala Krishna Reddy Engineering College.

3.0 B. Tech. Program structure

3.1 A student after securing admission is required to pursue the under graduate Program in B.Tech for a minimum period of eight semesters, (four academic years) and a maximum period of eight academic years starting from the date of commencement of the first semester, failing which the student shall forfeit the seat in the B.Tech course.

Each student should secure 160 credits (with CGPA ≥ 5.0) for the completion of Undergraduate Program and award of B.Tech. Degree.

B. Tech. Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years. The student shall register for 123 credits and secure 123 credits with CGPA ≥ 5 from II year to IV year B.Tech program (LES) for the award of B.Tech. degree. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech (LES).

3.2 Definitions/descriptions specified by UGC/AICTE are adopted appropriately for various terms and abbreviations used in these academic regulations/norms are listed below.

3.2.1 **Semester scheme**

Each under graduate program constitutes eight semesters (four academic years). Each academic year is divided into two semesters, maximum of 22 weeks and minimum of 18 weeks (≥ 90 instructional days) each. In each semester, students are subjected to "Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE)". The Choice Based Semester System (CBSS) is implemented as prescribed by the UGC and the curriculum/course structure is followed as suggested by AICTE on time to time.

3.2.2 **Credit Courses**

All subjects/courses are to be registered by the student in a semester to earn credits which are assigned to each subject/course in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) structure which is on the following general pattern.

- One credit for one Period/hour per week per semester for theory/lecture (L) courses.
- Half credit for one Period/hour per week per semester for laboratory/practical (P).

Courses like Environmental Science, Professional Ethics, Gender Sensitization lab, other social context courses, CRT and student activities like NCC/NSO, NSS are identified as mandatory courses. These courses do not carry any credits.

3.2.3 The structure of the Under Graduate Engineering Program:

S.NO.	CATEGORY	Suggested breakup of credits (Total 160)
01	Humanities and Social sciences including Management	9*
02	Basic Sciences	25*
03	Engineering Sciences courses including Workshop, Drawing,basics of Electrical/Mechanical/Computer etc.	18*
04	Professional Core Courses	66*
05	Professional Elective Courses relevant to chosenspecialization/branch	18*
06	Open Electives-Electives from other technical and/oremerging subjects	9*
07	Project work, Seminar and Internship in Industry orelsewhere	15*
08	Mandatory courses [Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non- credit)
	Total	**160***

***Variation is allowed as per the need of the respective disciplines.**

3.2.4 Subject Code Classification

The subject codes of various branches in TKREC Regulations are formulated using the following Procedure

Regulation, Branch, Semester, Classification, S.No.

Regulation	**20,21, 22, …., and so on**
UG Branch	**Corresponding branch code like CE,EE …..etc**
Semester	**I,II,III,IV,V,VI,VII,VIII**
Classification	**HS-Humanities and Sciences, BS-Basic Sciences,ES-Engineering Sciences, PC- Professional Core,PE-Professional Elective, OE-Open Elective, PW-Project Work**
S.No.	**1 to 9**

4.0 Course registration

4.1 An adviser /counselor or mentor from the faculty shall be assigned to a group of 20 students, who instructs the students regarding the Under Graduate Program, its course structure and curriculum, choice/option for subjects/courses, which is based on their competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites 'registration forms' from students before the commencement of the semester through 'on-line registration' ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be completed before the commencement of the SEEs (Semester End Examinations) of the 'preceding semester', and for 1st semester students the online registration requests shall be completed four weeks from the date of admission.

4.3 A student can apply for on-line registration, only after obtaining the written approval from the faculty adviser/counselor 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 the Head of the Department, faculty advisor/counselor or mentor and the student.

4.4 A student should register for all the courses offered to him in that particular semester not exceeding nine subjects/courses, excluding the Mandatory Courses.

4.5 If the student submits ambiguous choices or multiple options during on-line registration for the subject /course under a given/specified course group/category as listed in the course structure, then the Head of the Department will allot a subject/course without considering the submission.

4.6 Subject/course options exercised through on-line 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 the Head of the Department in a semester cannot be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to select an alternate choice either for a new subject (subject to offering of such subject), or another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and within a time-framed schedule, in the first week after commencement of the class-work for that semester.

4.7 Open electives: The students have to choose three/four open electives (OE-I), (OE-II) (OE- III), (OE-IV) depending upon the curriculum. The student cannot opt for open elective subjects offered by their own (parent) department. The student can choose an open elective subject from the list of subjects offered by any other department of the same college. Once, a subject is chosen under the open elective category it cannot be opted again.

4.8 Professional electives: Students have to choose six professional electives (PE-I, PE-II, PE-III, PE-IV, PE-V, PE-VI). However, the students may opt for professional elective subjects offered in the related area.

5.0 Subjects/courses to be offered

5.1 The class strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60+ 1/3 of the

strength of the section).

5.3 More than one faculty member may offer the same subject (lab/practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice by the students will be based on – 'first come first serve basis and the CGPA criterion' (i.e. the primary shall be on on-line entry from the student for registration in that semester, and the focus that follows, if needed, will be on the CGPA of the student)

5.4 If more entries for registration of a subject comes into picture, then the concerned Head of the Department shall decide, whether or not to offer such a subject/ course for two (or multiple) sections.

5.5 An Elective Course is offered to the students if and only if there is a minimum of 1/3 strength of the sanctioned intake registers for that course.

6.0 Attendance requirements

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate in all the subjects/courses including days of internal examinations (excluding attendance in mandatory courses like Environmental Science, Professional Ethics, Gender Sensitization Lab, NCC and NSS, subjects related to social context and CRT) for that semester.

6.2 For Mandatory Courses a 'Satisfactory Participation' report shall be issued to those students from the authorities concerned only after securing ≥ 65% attendance in such a course.

6.3 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on valid grounds, like natural calamity, medical emergency, any sudden demise of close family members based on the students representation with supporting evidence/certificates.

6.4 A stipulated fee shall be paid to condone the shortage of attendance.

6.5 Shortage of attendance below 65% in aggregate shall, in no case be condoned.

6.6 Students whose shortage of attendance, is not condoned in a semester, are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall be cancelled. They will not be promoted to the next semester.

6.7 The students who are detained due to lack of attendance should seek re-admission into that semester as and when offered, and re-register all the courses offered in that semester.

6.8 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class, until completion of the VIII semester, even on payment of the requisite fees.

7.0 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 minimum academic requirements if he/she has earned the credits allotted to each subject/course, and has secured not less than 35% marks (26 out of 75) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together in terms of letter grades. This implies securing 'C' grade or above in that subject/course

7.2 Promotion Rules:

S.No.	Promotion	Conditions to be fulfilled
1.	**I Semester to II Semester**	**Regular course of study of I semester bysatisfying attendance requirements.**

2.	**II Semester to III Semester**	**Regular course of study of II Semester, by satisfying attendance requirements. Must have secured at least 50% credits up to from the offered credits from all the relevant regular and supplementaryexaminations, whether the student takes those examinations or not.**
3.	**III Semester to IV Semester**	**Regular course of study of III semester, bysatisfying attendance requirements.**
4.	**IV Semester to V Semester**	**Regular course of study of IV semester, bysatisfying attendance requirements, andmust have secured at least credits i.e., 60%credits up to IV semester from the offeredcredits (rounding to near low value) from all the relevant regular and supplementary examinations, whether the students takes those examinations or not**
5.	**V Semester to VI Semester**	**Regular course of study of V Semester, bySatisfying attendance requirements.**
6	**VI Semester to VII Semester**	**Regular course study of VI semester, by satisfying attendance requirements. Must have secured at least 60% credits (rounding to near lower value) up to VI Semester from the offeredcredits from all the relevant regular andsupplementary examinations, whether the student takes those examinations or not.**
7	**VII Semester to VIII Semester**	**Regular course of study of VII Semester, bysatisfying attendance requirements.**

Promotion Rules for Lateral Entry Students

S.No.	Promotion	Conditions to be fulfilled
01	**III Semester to IV Semester**	**Regular course of study of Second Year first semester, by satisfying attendance requirements.**
02	**IV Semester to V Semester**	**Regular course of study of IV Semester by satisfying attendance requirements and a minimum of 50 % of credits (rounding to thenear lower value) from the offered credits, from one regular and one supplementary examinations of III semester, irrespective of the candidate takes the examination or not.**
03	**V Semester to VI Semester**	**Regular course of study of V Semester bysatisfying attendance requirements.**
04	**VI semester to VII Semester**	**Regular course of study of VI Semester bysatisfying academic requirements and aminimum of 60% of credits (rounding to thenear low value) from the offered credits,from two regular and two supplementaryexaminations of III Semester; two regularand one supplementary examinations of IV Semester; one regular and one Supplementary examination of V Semester.**
05	**VII Semester to VIII Semester**	**Regular course of study of VII semester bysatisfying the academic requirements.**

7.3 A student shall register for subjects covering 160 credits as specified and listed in the course

structure, fulfill all the attendance and academic requirements for 160 credits, 'earn all 160 credits' by securing SGPA ≥ 5.0 (in each semester) and CGPA (at the end of each successive semester ≥ 5.0) to successfully complete the Under Graduate Program.

7.4 A student eligible to appear in the end semester examination for any subject/course, but absent from it or failed (there by failing to secure 'c' grade or above) may reappear for that subject/course in the supplementary examination as and when conducted. In such cases, the CIE assessed earlier for that subject/course will be carried over, and added to the marks to be obtained in the SEE Supplementary examination for evaluating the performance in that subject.

7.5 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 the student has been readmitted shall be applicable. However, no grade allotments or SGPA/CGPA calculations will be done for the entire semester in which the student has been detained.

7.6 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 the student has been re-admitted shall be applicable to him.

8.0 Evaluation – Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including Practical) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End Examination).

8.2 For theory subjects, during a semester there shall be two mid-term examinations and average of two internal examinations will be taken as the final marks for CIE. Each mid-term examination consists of only descriptive paper carrying 20 marks with the time duration of 1hour 20 minutes. The remaining 5 marks will be evaluated by the assignment given by the concerned faculty. The syllabus for the first mid examination shall be first 2.5 units. The second mid examination covers remaining 2.5 units of syllabus. **The total marks secured by the student for the whole CIE (Continuous Internal Evaluation) will be the average of two mid-terms.** If any student is absent from / would like to seek improvement in any subject of a mid- term examination, a computer based test will be conducted for him/her by the examination branch of the college, which will be scheduled after completion of both mid-term examinations.

The details of CIE exam question paper are as follows

- ❖ The pattern of Mid-term exam for CIE consists of 4 questions and no choice will be given.
- ❖ Each question carries 5 marks.
- ❖ There will be a CBT (Computer Based Test) for the students who are absent and secured less than 14 marks in the continuous internal evaluation. The CBT will be conducted before the announcement of the results of semester-end exams.
- ❖ The question bank for the CBT should cover entire syllabus of the corresponding course.

The details of the pattern of the end semester question paper are as follows

- ➢ The end semester examinations will be conducted for 75 marks.
- ➢ The question paper consists of two parts namely Part- A and Part-B.
- ➢ Part-A consists of 10 questions. Each question carries 2.5 marks each and no choice will be given. Two questions are from one unit and all the five units should be covered.
- ➢ Part-B consists of five questions (number from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. For each question, there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

The details of evaluation of end semester exam are as follows

- Double evaluation of the answer scripts is followed.
- The average of the two evaluations shall be considered as final marks.
- If the difference of two valuations is more than or equal to15 marks, third evaluation shall be recommended.
- If any difference appeared in the marks after the third valuation also, average of two evaluations will be considered whose difference is minimum, as final marks.

The details of challenging valuation of end semester exam are as follows

- There shall not be any recounting or re-evaluation for all subjects as the double valuation was adopted. But, the students will be given a chance to apply for challenging valuation for all the theory Subjects (no Practical/lab subjects) within one week from the date of declaration of results.
- Whenever the students apply for challenge valuation of answer scripts of semester end examinations, the students should submit their applications (through the HOD) within one week from the date of declaration of the results to the Examination Branch by paying Rs.10,000 (Rupees Ten Thousand only) per subject, in the form of Demand Draft, Drawn in Favor of "TKREC AUTONOMOUS". Any application received after the due date of submission for Challenge valuation, shall not be accepted under any circumstances.

On receipt of the DD

The answer script of the applied subject will be shown to the candidate to verify whether it belongs to him or not and the script will be evaluated by the senior faculty of the college appointed by the Controller of examinations. If there is any change in marks (Equal or above 15% of the maximum marks) the new marks will be awarded to the student. Otherwise, there will be no change in old marks. If the change in marks (Equal or above 15% of the maximum marks) occurs, an amount of Rs.9,000/- will be refunded to the student. Otherwise, the student will forfeit the total amount which he/she paid.

8.3 For practical subjects there shall be a continuous internal evaluation during the semester for 25 marks and 75 marks for end semester practical examinations. The duration for both Internal and External Practical Examination is 3 hours. For 25 marks of Internal Evaluation of practical subjects, day-to-day evaluation in laboratory is done for 15 marks and internal practical examination will be assessed for 10 marks. The concerned laboratory subject teacher (Internal Examiner) will conduct the internal practical examination only. The external practical examination will have 2 examiners, one is the external examiner and the other is the internal examiner. The controller of examinations of the college will appoint the external examiner with the consultation of the chief superintendent of examinations from the three names given by the concerned department.

8.4 For the subjects that include design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing and estimation), the distribution shall be 25 marks for continuous internal evaluation (15 marks for day-to-day evaluation and 10 marks for internal examination) and 75 marks for semester end examination. **There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations**.

8.5 (i) For subjects like **Engineering Graphics/ Engineering Drawing**, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

(ii) For the Subject **Estimation, Costing and Project Management**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A, 1 out of 2 questions from Unit – I for 30 Marks, (ii) Part – B, 1 out of 2 questions from Unit – II for 15 Marks,(iii) Part – C, 3 out of 5 questions from Units – III, IV, V for 30 Marks.

(iii) For subjects **Structural Engineering – I & II (RCC & STEEL),** the SEE will be conducted for 75 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 60 marks. Part

– A is a compulsory question consisting of ten sub- questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6).

8.6 The student has to undergo a comprehensive MCQ TEST/ Seminar/Internship/industry oriented mini project/Project Work offered to him by their respective departments and subsequently should satisfy the requirements for completion to acquire the required credits.

8.7 There shall be an Internship in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation for 15 days. The Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 internal marks. The committee consists of Head of the Department, supervisor of the Internship and a senior faculty member of the department.

8.8 There shall be an Industrial Oriented Mini Project in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation for one month. Industrial Oriented Mini Project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project.

8.9 There shall be a seminar presentation in IV year I semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.

8.10 There shall be a comprehensive MCQ exam in IV year I semester. For the comprehensive MCQ exam covers the core subjects which are related to Graduate Aptitude Test in Engineering. It shall be evaluated by the departmental coordinator nominated by Head of the Department. The comprehensive MCQ exam shall be evaluated for 100 internal marks and consists of 50 MCQs. The student has to secure 40% of 100 marks i.e.40 marks. If any student is absent or failed in the comprehensive MCQ exam then he/she can appear for next supplementary exam like other end semester examinations.

8.11 UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

(i) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 75 marks and project supervisor shall evaluate for 25 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together. A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one re-appearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(ii) For Project Stage – II, the external examiner shall evaluate the project work for 75 marks and the project supervisor shall evaluate it for 25 marks. The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum '

total of the CIE and SEE taken together. For conducting viva-voce of project stage – II, the controller of examination will nominate an external examiner with the consultation of the chief superintendent from the list of experts in the relevant branch submitted by the concerned department. A student who has failed may re-appear once for the above evaluation in the current semester, when it is scheduled again; if student fails in such 'one re-appearance' evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

(iii) Procedure for opting the MOOCs

- If any student got an opportunity to do the final year project as an internship in any reputed company (Approved by the departmental committee), the student can opt for MOOCs which are equivalent to the elective courses offered in VIII semester.
- The MOOCs should be approved by the concerned BOS.
- The selected MOOCs duration should be minimum of 12 weeks.
- A student is eligible to secure up to 12 credits only through MOOCs.

8.12 The laboratory marks, sessional marks, and the end examination marks awarded by the college are subject to scrutiny and scaling, if necessary, by a committee, constituted in this regard, with a university representative/under the guidance of the Director of Evaluation of the affiliating university. The recommendations of the committee are final and binding. The laboratory records, internal examination scripts and external examination scripts, shall be preserved as per the rules for two consecutive academic years if the respective subjects are cleared, and shall be produced before the committee as and when required, till preserved.

8.13 For mandatory courses related to Environmental Science, Constitution of India, Intellectual Property Rights, Gender Sensitization lab and Campus recruitment training a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. **These marks should also be uploaded along with the internal marks of other subjects**

8.14 For all non-credit courses and mandatory courses, no marks or letter grade is allotted.

9.0 Grading Procedure

9.1 Marks will be awarded to the student to indicate the performance in each theory subject, laboratory/ practical's, seminar, project stage I and project stage II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item no. 8 above, a corresponding letter grade shall be given.

9.2 As measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE/JNTUH guidelines) and corresponding percentage of marks shall be followed.

% of marks secured in a subject/course	Letter Grade	GradePoints
90% to 100%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (Fail)	0
Absent	Ab	0

**** Awarding of Letter Grade will be done for the benefit of the student.**

9.3 A student obtaining '**F**' grade in any subject shall be deemed to have **'failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In

such cases, internal marks in those subjects will remain same as those obtained earlier.

9.4 A student who has not appeared for an examination in any subject '**Ab'** grade will be allocated in that subject, and the student shall be considered as **'failed'.** The student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

9.5 A letter grade will not indicate any specific percentage of marks, but states only the range of marks he/she has obtained.

9.6 A student earns Grade Point (GP) in each subject/course, based on the Grade Point the letter grade is awarded for that subject/course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/course.

Credit points (CP) = grade points (GP) x Credits for a course

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 (∑CP) secured from all subjects/course registered in a semester, by the total number of credits registered during the semester. SGPA is rounded off to two decimal places. SGPA is thus calculated as

SGPA = {∑*N*i=1*CiGi*}/ {∑*N* *Ci*} ….. For each semester,

where 'i' is the subject indicator index (takes into account all subjects, in a semester), 'N' is the no. of subjects registered for the semester (as specifically required and listed under the course structure of the parent department), Ci is the no. of credits allotted to the ith subject, and Gi represents the grade points (GP) corresponding to the letter grade awarded for the ith subject.

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 to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

CGPA = {∑Mj=1*CjGj*}/ {∑Mj=1 C j for all semester registered}

(i.e., up to and inclusive of S semesters, S ≥ 2),

where '**M'** is the **total no. of subjects** (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), cj is the no. of credits allotted to the jth subject, and Gj represents the grade point (GP) corresponding to the letter grade awarded for that jth subject. After registration and completion of first year first semester, the SGPA of that semester itself can be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course/subject	Credits	Grade points	Letter Grade	Credit Points
Course1	3	8	A	3 x 8 = 24
Course2	3	10	O	3 x 10 = 30
Course3	3	5	C	3 x 5 = 15
Course4	3	6	B	3 x 6 = 18
Course5	3	9	A+	3 x 9 = 27
Course6	1.5	7	B+	1.5x 7 = 10.5
	16.5			**124.5**

SGPA = 124.5/16.5 = 7.55

Illustration of calculation of CGPA up to 2nd Semester

Course/subject	Credits	LetterGrade	Gradepoints	Credit Points
I year I semester				
Course1	4	A	8	4 x 8 = 32
Course2	4	O	10	4 x 10 = 40
Course3	4	C	5	4 x 5 = 20
Course4	3	B	6	3 x 6 = 18
Course5	3	A+	9	3 x 9 = 27
Course6	3	B+	7	3 x 7 = 21
I year II semester				
Course7	4	B	6	4 x 7 = 28
Course8	4	O	10	4 x 10 = 40
Course9	4	C	5	4 x 5 = 20
Course10	3	B	6	3 x 6 = 18
Course11	3	A+	9	3 x 9 = 27
Course12	1.5	B+	7	1.5 x 7 = 10.5
Total Credits =	**40.5**		**Total Credit=**	**301.5**

CGPA = 301.5/40.5 = 7.44

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech . Programme.

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

9.11 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/courses (securing **F grade**) will also be taken into account, and the credits of such subjects/courses will be included in the multiplications and summations. After passing the failed subjects (s), newly secured grade points will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration for calculation of CGPA and SGPA.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if the 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); also a student shall be declared successful or 'passed' in the entire under graduate Program, only when he/she gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (Course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

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

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

% of marks = (CGPA-0.5) x 10

12 Award of degree

12.1 A student who registers for all the specified subjects/courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of the B.Tech degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with the final CGPA (at the end of the under graduate Program) ≥ 8.00, and fulfilling the following condition will be awarded **'first class with distinction'; should have secured a final (at the end of the undergraduate Program) CGPA ≥ 8.00,** for each year of course study.
Students with final CGPA (at the end of the under graduate Program) ≥ **6.50 but <8.00**, shall be placed in '**first class'**.
Students with final CGPA (at the end of the under graduate Program) ≥ **5.50 but<6.50**, shall be placed in '**second class'**.
Students with final CGPA (at the end of the under graduate Program) ≥ **5.00 but <5.50,** and all other students who qualify for the award of degree (as per 12.1) with final CGPA ≥ **5.00 but <5.50**, shall be placed in **'pass class'**.
A student with final CGPA (at the end of the under graduate Program) **<5.00, will not be eligible** for the award of the degree**.**

12.4 Student who secures SGPA ≥ 8.00 consistently in all semesters will be eligible to compete for the awards of 'rank' and 'gold medal'.

13 Withholding of results

13.1 If the student has not paid the fees to the college at any stage, has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory Regulations

14.1 A student, who has discontinued for any reason, is liable to completely pay his balance annual fees, up to discontinued year.

14.2 A student who is detained due to lack of credits or lack of attendance has to follow the existing regulations of the year in which he/she is re-admitted, with additional/substitute subjects if necessary.

15.0 Students Transfers

15.1 There shall be no branch transfers after the completion of the admission process.

15.2 There shall be no transfers from one branch to another branch within the constituent colleges and units of the affiliating university (JNTUH).

15.3 The students seeking transfer under the ceiling admission category to this college from any of the JNTUH affiliated Autonomous colleges or from various other Universities/institutions (National Importance, Autonomous) have to pass the failed subjects which are equivalent to the subjects of Teegala Krishna Reddy Engineering College and also pass the subjects of Teegala Krishna Reddy Engineering College which the students have not studied at the earlier institution/university. Further, though the students have passed some of the subjects at the earlier institution/university, if the same subjects are being offered in different semesters of Teegala Krishna Reddy Engineering College, the students have to study those subjects in Teegala Krishna Reddy Engineering College

in spite of the fact that those subjects are repeated.

15.4 The students transferred from other Universities/institutions to Teegala Krishna Reddy Engineering College, shall be provided a chance of writing online internal examination **for the failed subjects/and or subjects not studied** as per the equivalences recommended in the clearance letter issued by the university/institution, at the end of the semester as per the prescribed schedule by the college examination cell.

16.0 Scope

16.1 The academic regulations should be read as whole, for the purpose of any interpretation.

16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Governing Body of Teegala Krishna Reddy Engineering College is final.

16.3 The college may change or amend the academic regulations, course structure or syllabi, at any time, and the changes or amendments made shall be applicable to all students with effect from the date of notification by the college authorities.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the Student	
1. (a)	Possesses or carries accessible in the 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 (materialshall include any marks on the body of the candidate which can be used as an aid in thesubject of the examination)	Expulsion fromthe examination hall and cancellationof the performance in that subject only.
(b)	Gives assistance or guidance or receives it fromany other candidate orally or byany other bodylanguage methods or communicates through cell phones with any candidate or persons in oroutside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellationof the performance in that subject only of all the candidates involved. In case of an outsider, he will behanded 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 cancellationof the performance in that subject and all other subjects the candidate has already appeared includingpractical examinations and project work and shall notbe permitted to appear for the remaining examinationsof the subjects of that Semester. The hall ticket of the candidate should be cancelled.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from the examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical and project work) already appeared and shall not be allowed to appear for

		examinations of the remaining subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of the seat. If the imposteris an outsider, he will be handed over to the police and a case will be 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, during or after the examination.	Expulsion from the examination hall and cancellationof performance in that subject and all the other subjects the candidate has already appeared includingpractical examinations and project work and shall notbe permitted for the remaining examinations of the subjects of that semester. The student is also debarred for two consecutive semesters from class work and all end examinations. The continuation of the course by the student is subject to the academicregulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters tothe 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 Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk-out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury tohis person or to any of his relations whether	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 shallnot be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are

		debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.
	by words, either spoken or written or by signsor by visible representation, assaults the officer-in-charge, 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 thetendency to disrupt the orderly conduct of the examination	
7.	Leaves the exam hall taking away answerscript 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 inthat subject and all the other subjectsthe candidate has already appeared including practicalexaminations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all end examinations. The continuation of thecourse by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation ofthe performance inthat subject and all other subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.

9.	Indulges in any malpractice or improperconduct mentioned in clause 6 to 8 and is not a student for the particular examination or not a person connected with the college.	Student of the college expulsion from the examinationhall and cancellation ofthe Performance inthat subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation ofthe performance inthat subject and all other subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Is detected copying on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and allother subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall bereported to the PRINCIPAL / DIRECTOR forfurther action to award suitable punishment.	

I Year B.Tech. IT - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA1BS01	BS	Mathematics – I	3	1	0	4
02	20CH1BS02	BS	Chemistry	3	1	0	4
03	20EE1ES01	ES	Basic ElectricalEngineering	3	0	0	3
04	20ME1ES05	ES	Engineering Workshop	1	0	3	2.5
05	20EN1HS01	HS	English	2	0	0	2
06	20CH1BS03	BS	Engineering Chemistry Lab	0	0	3	1.5
07	20EN1HS02	HS	English Language and Communication Skills Lab	0	0	2	1
08	20EE1ES03	ES	Basic Electrical Engineering Lab	0	0	2	1
09		MC	Induction Programme				
	Total			**12**	**2**	**10**	**19**

I Year B.Tech. IT - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA2BS04	BS	Mathematics - II	3	1	0	4
02	20AP2BS05	BS	Applied Physics	3	1	0	4
03	20CS2ES04	ES	Programming forProblem Solving	3	1	0	4
04	20ME2ES05	ES	Engineering Graphics	1	0	4	3
05	20AP2BS06	BS	Applied Physics Lab	0	0	3	1.5
06	20CS2ES06	ES	Programming for Problem Solving Lab	0	0	3	1.5
07	20MC2ES07	MC	Environmental Science	3	0	0	0
	Total			**13**	**3**	**10**	**18**

II Year B.Tech. IT - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA3BS08	BS	Computer OrientedStatistical Methods	3	0	0	3
02	20IT3PC01	PC	Computer Organization	3	1	0	4
03	20CS3PC02	PC	Object Oriented Programming using C++	2	0	0	2
04	20CS3PC03	PC	Data Structures	3	1	0	4
05	20CS3ES08	ES	Analog and DigitalElectronics	3	0	0	3
06	20CS3PC04	PC	IT WORKSHOP Lab	0	0	2	1
07	20CS3PC05	PC	Data Structures Lab	0	0	3	1.5
08	20CS3PC06	PC	Object Oriented Programming using C++Lab	0	0	3	1.5
09	20MC3HS01	MC	Professional and Engineering Ethics	3	0	0	0
10	20MC3BS02	MC	Quantitative Analysis-I	3	0	0	0
	Total			**20**	**2**	**8**	**20**

II Year B.Tech. IT - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20MA4PC07	PC	Discrete Mathematics	3	0	0	3
02	20MS4HS03	MS	Business Economics and Financial Analysis	3	0	0	3
03	20CS4PC08	PC	Java Programming	3	1	0	4
04	20CS4PC09	PC	Operating Systems	3	0	0	3
05	20CS4PC10	PC	Database Management Systems	3	1	0	4
06	20CS4PC11	PC	Operating Systems Lab	0	0	3	1.5
07	20CS4PC12	PC	Java Programming Lab	0	0	2	1
08	20CS4PC13	PC	Database Management Systems Lab	0	0	3	1.5
09	20MC4HS03	MC	Gender Sensitization Lab	0	0	2	0
10	20MC4BS03	MC	Quantitative LogicalAnd Reasoning	3	0	0	0
	Total			**18**	**2**	**10**	**21**

III Year B.Tech. IT - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20CS5PC14	PC	Formal Languages and AutomataTheory	3	0	0	3
02	20CS5PC15	PC	Software Engineering	3	0	0	3
03	20IT5PE10	PE- I	Professional Elective- I	3	0	0	3
04	20CS5PC16	PC	Design and Analysis of Algorithms	3	1	0	4
05	20IT5PE20	PE-II	Professional Elective- II	3	0	0	3
06	20IT5PE20	PE-II Lab	Professional Elective- II Lab	0	0	3	1.5
07	20CS5PC17	PC Lab	Design and Analysis of Algorithmslab	0	0	3	1.5
08	20EN5HS04	HS Lab	Advanced Communication Skills Lab	0	0	3	1
09	20IT5PW01	PW	Summer Internship	0	0	0	1
10	20MC5HS05	MC	Intellectual Property Rights	3	0	0	0
11	20MC5HS06	MC	Personality and Soft SkillsDevelopment	3	0	0	0
	Total			**21**	**1**	**9**	**21**

Professional Elective – I

S. No	Subject Code	Subject Name
01	20IT5PE11	Artificial Intelligence
02	20IT5PE12	Advanced Computer Architecture
03	20IT5PE13	Digital Image Processing
04	20IT5PE14	Principles of Programming Languages

Professional Elective – II

S. No	Subject Code	Subject Name
01	20IT5PE21	Python Programming
02	20IT5PE22	Object Oriented Analysis and Design
03	20IT5PE23	Network Programming
04	20IT5PE24	Scripting Languages
05	20IT5PE25	Advanced Data Structures through C++

Professional Elective – II Lab

S. No	Subject Code	Subject Name
01	20IT5PE26	Python Programming Lab
02	20IT5PE27	Object Oriented Analysis and Design Lab
03	20IT5PE28	Network Programming Lab
04	20IT5PE29	Scripting Languages Lab
05	20IT5PE210	Advanced Data Structures through C++ Lab

III Year B.Tech. IT - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20CS6PC18	PC	Computer Networks	3	1	0	4
02	20CS6PC19	PC	Compiler Design	3	0	0	3
03	20IT6PC02	PC	Internet of Things	3	0	0	3
04	20CS6PC21	PC	Web Technologies	2	0	0	2
05	20IT6PE30	PE –III	Professional Elective- III	3	0	0	3
06	20IT6OE10	OE- I	Open Elective- I	3	0	0	3
07	20CS6PC22	PC Lab	Computer Networks & WebTechnologies Lab	0	0	3	1
08	20IT6PC03	PC Lab	Internet of Things Lab	0	0	3	1.5
09	20IT6PE30	PE-III Lab	Professional Elective- III Lab	0	0	3	1.5
10	20MC6HS07	MC	Constitution of India	3	0	0	0
11	20MC6CS01	MC	Basic Technical Training	3	0	0	0
	Total			**23**	**1**	**9**	**22**

Professional Elective – III

S. No	Subject Code	Subject Name
01	20IT6PE31	Machine Learning
02	20IT6PE32	Ethical Hacking
03	20IT6PE33	DevOps
04	20IT6PE34	Mobile Application Development
05	20IT6PE35	Software Testing Methodologies

Professional Elective – III Lab

S. No	Subject Code	Subject Name
01	20IT6PE36	Machine Learning Lab
02	20IT6PE37	Ethical Hacking Lab
03	20IT6PE38	Devops Lab
04	20IT6PE39	Mobile Application Development Lab
05	20IT6PE310	Software Testing Methodologies Lab

IV Year B.Tech. IT - I Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20IT7PC04	PC	Information Security	3	0	0	3
02	20IT7PC05	PC	Data Mining	3	0	0	3
03	20IT7PE40	PE-IV	Professional Elective- IV	3	0	0	3
04	20IT7PE50	PE-V	Professional Elective- V	3	0	0	3
05	20IT7OE20	OE-II	Open Elective- II	3	0	0	3
06	20IT7PC06	PC LAB	Data Mining Lab	0	0	3	1
07	20IT7PW02	PW	Industrial Oriented Mini Project	0	0	0	2
08	20IT7PW03	PW	Seminar	0	0	2	1
09	20IT7PW04	PW	Comprehensive Test	0	0	0	1
10	20IT7PW05	PW	Project Stage- I	0	0	6	3
11	20MC7CS02	MC	Advanced TechnicalTraining	3	0	0	0
	Total			**15**	**0**	**11**	**23**

Professional Elective – IV

S. No	Subject Code	Subject Name
01	20IT7PE41	Neural Networks & Deep Learning
02	20IT7PE42	High Performance Computing
03	20IT7PE43	Web Security
04	20IT7PE44	Cloud Computing
05	20IT7PE45	Blockchain Technology

Professional Elective – V

S. No	Subject Code	Subject Name
01	20IT7PE51	Data Science and R Programming
02	20IT7PE52	Quantum Computing
03	20IT7PE53	Cyber Forensics
04	20IT7PE54	Ad-hoc & Sensor Networks
05	20IT7PE55	Software Process & Project Management

IV Year B.Tech. IT - II Sem

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
01	20HS8MS02	PC	Organizational Behavior	3	0	0	3
02	20IT8OE30	OE-III	Open Elective- III	3	0	0	3
03	20IT8PE60	PE-VI	Professional Elective- VI	3	0	0	3
04	20IT8PW06	PW	Project Stage-II	0	0	15	7
	Total			**9**	**0**	**15**	**16**

Professional Elective – VI

S. No	Subject Code	Subject Name
01	20IT8PE61	Big Data
02	20IT8PE62	Augmented Virtual Reality
03	20IT8PE63	Cognitive Computing
04	20IT8PE64	Mobile Computing
05	20IT8PE65	Modern Software Engineering

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20MA1BS01) MATHEMATICS – I

Course Objectives: To learn.

1 Types of matrices and their properties. Concept of a rank of the matrix and applying this Concept to know the 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 Sequence.
4 Concept of nature of the series.
5 Geometrical approach to the mean value theorems and their application to the mathematical Problems.
6 Evaluation of surface areas and volumes of revolutions of curves.
7 Evaluation of improper integrals using Beta and Gamma functions.
8 Partial differentiation, concept of total derivative.
9 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. Represent the matrix form of a set of linear equations and to analyze the solution of the System of equations.
2. Reduce the quadratic form to canonical form.
3. Analyze the nature of sequence and series.
4. Apply the mean value theorems.
5. Find the extreme values of functions of two variables with / without constraints.

UNIT-I

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: 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: Sequence: Definition of a Sequence, limit, and 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 root test, logarithmic test. **Alternating series**: Leibnitz test; **Alternating Convergent series**: Absolute and Conditional Convergence.

UNIT-IV

Single Variable Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. **Applications of definite integrals:** To evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). Improper Integral: Definitions of Beta and Gamma functions and their applications.

UNIT-V

Multivariable calculus: 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:

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

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CH1BS02) CHEMISTRY

Course Objectives: To learn.

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 electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry?
4. To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
5. To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction path ways

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

1. Understand the atomic and molecular orbital's and conductivity of the materials using band theory.
2. Apply the principle of potable water for industrial and domestic purposes.
3. Make use of essential aspects of Electro chemistry and Corrosion in industry.
4. Analyze the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways.
5. Interpret the spectroscopic principles in medical field.

UNIT-I

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: 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

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UNIT-III

Sequences &Series: Sequence: Definition of a Sequence, limit, and Convergent, Divergent and Oscillatory sequences. **Series:** Convergent, Divergent and Oscillatory Series, Series of positive terms.

UNIT-III

Sequences &Series: Sequence: Definition of a Sequence, limit, and 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 root test, logarithmic test. **Alternating series:** Leibnitz test; Alternating Convergent series: Absolute and Conditional Convergence.

UNIT-IV

Single Variable Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. **Applications of definite integrals:** To evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). **Improper Integral:** Definitions of Beta and Gamma functions and their applications.

UNIT-V

Multivariable calculus: 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.

TEXT BOOKS:

1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing company (P) Ltd. New Delhi.

REFERENCE BOOKS:

1. Physical Chemistry, by P.W.Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and .S.Krishnan
3. University Chemistry, by B.H.Mahan
4. Fundamentals of Molecular Spectroscopy, by C.N.Banwell
5. Organic Chemistry: Structure and Function by K.P.C. VolhardtandN.E.Schore, 5thEdition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20EE1ES01) BASIC ELECTRICAL ENGINEERING

Course Objectives: To learn.

1. To introduce the basics of electrical circuits and its components
2. To understand DC circuits and AC single phase & three phase circuits.
3. To introduce the concept of power, power factor.
4. To study and understand the different types of magnetic circuits i.e. DC/AC machines and Transformers.
5. To import the knowledge of various electrical installations and power factor improvement methods.

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

1. Solve electrical circuits using basic network laws and theorems.
2. Understand basic AC Circuits and effect of resonance.
3. Extract the working and operation of Transformers and its applications.
4. Articulate working principles of Electrical Machines of both AC and DC.
5. Describe about components of Components of LT Switchgear and installations.

UNIT-I

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, The venin and Norton Theorems.Time-domain analysis of first-order RL and RC circuits.

UNIT-II

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 consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV

Electrical Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthling. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXTBOOKS:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata Mc Graw Hill.
2. D.C. Kulshreshtha, “Basic Electrical Engineering”, Mc Graw Hill, 2009.

REFERENCES:

1. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010.
3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall, India, 1989.
4. Circuit Theory Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat Rai& Co, 2016.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	1	**0**	**3**	**2.5**

(20ME1ES05) ENGINEERING WORKSHOP

Course Objectives: To learn.

1. To study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. To explain the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed to clearances.

Course outcomes: At the end of the course, the students will be able to

1. Demonstrate various machine tools and their operations.
2. Apply different workshop trades like fitting, carpentry, foundry and welding.
3. Practice various workshop trades including Tin smithy and Black smithy.
4. Identify suitable tools for different trades of engineering processes including drilling, material removing, measuring and chiseling.
5. Apply basic electrical engineering knowledge for house wiring practice

1. TRADES FOREXERCISES:

At least two exercises from each trade:

i. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint).

ii. Fitting – (V-Fit, Dovetail Fit &Semi-circular fit).

iii. Tin-Smithy – (Square Tin, Rectangular Tray &Conical Funnel).

iv. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern).

v. Welding Practice – (Arc Welding &Gas Welding).

vi. House-wiring – (Parallel &Series, Two-way Switch and Tube Light).

vii. Black Smithy – (Round to Square, Fan Hook and S-Hook).

2. TRADES FOR DEMONSTRATION &EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working.

TEXT BOOKS:`

1. Workshop Practice /B. L. Juneja /Cengage.
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual- P. Kannaiah/ K. L. Narayana/SciTech.
2. Workshop Manual / Venkat Reddy/BSP.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20EN1HS01) ENGLISH

Course Objectives: To learn.

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

Course outcomes: Students should be able to

1. Use English Language effectively in spoken and written communication.
2. Understand the given texts and respond appropriately.
3. Articulate confidently in various contexts and different cultures.
4. Demonstrate basic proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Choose appropriate vocabulary in oral and written communication.

UNIT-I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

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

'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 E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT-III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press. Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. Reading: Sub-skills of Reading- Skimming and Scanning Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT-IV

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press. Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oral and Written Communication. Reading: Comprehension- Intensive Reading and Extensive Reading Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT-V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press. Vocabulary: Technical Vocabulary and their usage Grammar: Common Errors in English Reading: Reading Comprehension-Exercises for Practice Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXTBOOKS:

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

REFERENCES:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.
7. Raju, Yadava B, B T Sujatha & C, Murali Krishna. English for Better Performance, Orient Blackswan, Pvt., Ltd, 2014.

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I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CH1BS03) ENGINEERING CHEMISTRY LAB

Course Objectives: The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to 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 adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

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

1. An ability to gain knowledge about different types of qualitative and quantitative estimation.
2. An ability to analyze the quality of water by determining its chemical parameters.
3. To acquire the skill for the preparation of common drugs like Paracetamol and Aspirin.
4. Estimation of rate constant of a reaction from concentration –time relationships.
5. Determination of physical properties like adsorption and viscosity of lubricants.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA.
2. Estimation of Fe+2 by Dichrometry.
3. Estimation of an 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 methylacetate
8. Synthesis of Aspirin and Paracetamol.
9. Thin layer chromatography calculation of Rfvalues. Eg- ortho and para nitrophenols
10. Determination of acid value of coconut oil.
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid oncharcoal
12. Determination of viscosity of Coconut oil and ground nut oil by using Ostwald' sviscometer.
13. Determination of surface tension of a give liquid using stalagmometer.
14. Determination of partition coefficient of acetic acid between n-butanol and water.

REFERENCE BOOKS:

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 5thedition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EN1HS02) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Course Objectives: To learn.

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students‟ pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence.
5. To train students to use language appropriately for public speaking and interviews.

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

1. Better understanding of nuances of English language through audio- visual experience and group activities.
2. Neutralization of accent for intelligibility by overcoming mother tongue influence.
3. Develop the skill of using appropriate language in various speaking contexts.
4. Understand how to use language to make formal presentations.
5. Speaking skills with clarity and confidence which in turn enhances their inter personal skills

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- Situational Dialogues – Greetings –Taking Leave – Introducing Oneself and Others.

EXERCISE – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

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

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

EXERCISE – III

CALL Lab:

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

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations. Practice: Formal Presentations.

EXERCISE – IV

CALL Lab:

Understand: Listening for General Details. Practice: Listening Comprehension Tests. ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

EXERCISE – V
CALL Lab:
Understand: Listening for Specific Details. Practice: Listening Comprehension Tests. ICS Lab:
Understand: Interview Skills.
Practice: Mock Interviews.

TEXTBOOKS

1. ELCS Lab Manual
   (The course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech. First English)

REFERENCES:

1. Suresh Kumar, E. &Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGrawHill
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal &J. B. Harrison. 2013. Orient Blackswan. Hyderabad.

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TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT - I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20EE1ES03) BASIC ELECTRICAL ENGINEERING LAB

Course Objectives: To learn.

1. To analyze and understand behavior given network by applying various electrical laws and network theorems.
2. To know the response of electrical circuits for different excitations.
3. To determine, measure and know the relation between basic electrical quantities.
4. To analyze the performance characteristics of DC and AC electrical machines.

Course outcomes:

1. Understand the basic electrical laws.
2. Sketch the response of different types of electrical circuits to different excitations.
3. Solve the response of electrical circuits under resonance condition.
4. Understand the measurement, calculation and relation between the basic electrical parameters.
5. Categorize the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient Response of Series RL and RC circuits using DC excitation.
4. Transient Response of RLC Series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor.
14. Torque-Speed Characteristics of a Three-phase Induction Motor.
15. No-Load Characteristics of a Three-phase Alternator.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20MA2BS04) MATHEMATICS – II

Course Objectives: To learn.

1. Methods of solving the differential equations of first and higher order.
2. Evaluation of multiple integrals and their applications.
3. The physical quantities involved in engineering field related to vector valued functions.
4. 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 will be able to

1. Determine different types of ordinary differential equations of first order.
2. Apply the concepts of higher differential equation to solve real world problems.
3. Apply the concept of multiple integrals to find areas and volumes
4. Evaluate the centre of mass and gravity for cubes, sphere and rectangular parallelepiped.
5. Calculate the line, surface and volume integrals and converting them from one toanother.

UNIT-I

First Order Ordinary Differential Equations: Exact, linear and Bernoulli's equations. **Applications:** Newton's law of cooling, Law of natural growth and decay. **Equations not of first degree:** equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II

Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients. Non-Homogeneous terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $xV(x)$.Method of variation of parameters. **Equations reducible to linear ODE with constant coefficients:** Legendre's equation, Cauchy-Euler equation.

UNIT-III

Multiple Integrals: 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 and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.
Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).

UNIT-IV

Vector Differentiation: Vector point functions and scalar 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: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:`

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

REFERENCE BOOKS:

3. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishers.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

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I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20AP2BS05) APPLIED PHYSICS

Course Objectives: To learn.

1. Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
2. Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and Electromagnetic theory and a broad base of knowledge in physics.
3. The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
4. To study applications in engineering like memory devices, transformer core and electromagnetic machinery.

Course outcomes: After learning the contents of the syllabus the student will be

1. Demonstrate the fundamentals concepts of modern physics and quantum mechanics.
2. Design various electronic circuits using fundamentals of Semiconductor physics.
3. Apply the concepts of optoelectronic in various optoelectronic devices.
4. Apply the learned knowledge of laser and fibre optics in communication system.
5. Analyze various magnetic and Electromagnetic properties applicable in magnetic materials.

UNIT – I

Quantum Mechanics: Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, 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: Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination. **Carrier transport**: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics. **Bipolar Junction Transistor (BJT)**: Construction, Principle of operation.

UNIT - III

Optoelectronics: Radiative and non-radiative recombination mechanisms in semiconductors. **LED and semiconductor lasers**: Device structure, Materials, Characteristics and figures of merit, Semiconductor. **Photodetectors**: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT - IV

Lasers and Fibre Optics Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, pumping. Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, Applications of laser. **Fibre Optics**: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

UNIT - V

Electromagnetism and Magnetic Properties of Materials: Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius- Mossotti equation, **Ferroelectrics and** Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCE BOOKS:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS2ES04) PROGRAMMING FOR PROBLEM SOLVING

Course Objectives: To learn.

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems.

Course outcomes: The student able to

1. Build the algorithm for the given unsolved problems.
2. Apply the concepts of arrays, strings, structures and pointers to find the solution for the given problem.
3. Apply the various preprocessor commands in a given different real time situations.
4. Dissect a problem into sub functions to develop modular reusable code.
5. Demonstrate various searching, sorting techniques along with the complex city analysis.

UNIT - I

Introduction to Programming 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: 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

Preprocessor and File handling in C: Preprocessor: Commonly used Preprocessor 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: 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: 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.

TEXTBOOKS:

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

REFERENCES:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	1	**0**	**4**	**3**

(20ME2ES05) ENGINEERING GRAPHICS

Course Objectives: To learn.

1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

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

1. Apply the principles of engineering graphics to create engineering drawings of various geometric construction, conic section, curves and scales as per BIS standards.
2. Construct orthographic projections for points, lines and planes in different quadrants and auxiliary views.
3. Draw the sectional views and true shape of sections of solids, by applying the principles of projections.
4. Draw the development of surfaces and intersections of solids in real time situations.
5. Develop isometric and orthographic views of the objects.

UNIT – I

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II

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

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder.

UNIT – V

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 – Conventions.

INTRODUCTION TO CAD: (**For Internal Evaluation Weight age only**): Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

TEXT BOOKS:`

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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20AP2BS06) APPLIED PHYSICS LAB

Course outcomes: The student will be

1. Compute the (V-I/P-I) characteristics of LED, LASER, and Solar cell.
2. Calculate the energy gap of semiconductor diode.
3. Interpret the theory of Hall Effect with experiment by determining the Hall coefficient.
4. Examine the bending losses for different Optical fiber Cables.
5. Construct various circuits –Resonance, Time constant and Magnetic field using LCR, RC, Stewart and Gees circuits.

List of Experiments:

1. Energy gap of P-N junction diode:
   To determine the energy gap of a semiconductor diode.
2. Solar Cell:
   To study the V-I Characteristics of solar cell.
3. Light emitting diode:
   Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee's experiment:
   Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect:
   To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect:
   To determine work function of a given material.
7. LASER:
   To study the characteristics of LASER sources.
8. Optical fibre:
   To determine the bending losses of Optical fibres.
9. LCR Circuit:
   To determine the Quality factor of LCR Circuit.
10. R-C Circuit:
    To determine the time constant of R-C circuit.

Note: Any 8 experiments are to be performed.

REFERENCES:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
2. Engineering physics practicals by Dr.B. Srinivasa Rao, V.K.V Krishna.K.S.Rudramamba

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I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS2ES06) PROGRAMMING FOR PROBLEM SOLVING LAB

Course Objectives: The students will learn the following:

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

Course outcomes: The student will be able to:

1. Formulate The Algorithms For Simple Problems.
2. Translate the given algorithms to C program.
3. Correct the logical errors found during program execution.
4. Make use of pointers in different types to modularize the code with functions.
5. Apply the appropriate sorting techniques for the given list of elements.

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:

5 x 1 = 5
5 x 2 = 10
5 x 3 = 15Synthesis of Aspirin and Paracetamol.

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

i. 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 compute 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:
- i. Addition of Two Matrices
- ii. Multiplication of Two Matrices
- iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

d. Write C programs that use both recursive and non-recursive functions
- i. To find the factorial of a given integer.
- ii. To find the GCD (greatest common divisor) of two given integers.
- iii. To find x^n

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

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

g. 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.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)

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

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:
    i. To insert a sub-string in to a given main string from a given position.
    ii. To delete n Characters from a given position in a given string.
d. 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.)
e. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
f. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

1. 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.
2. 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
iv. Hall of India
v. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
vi. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vii. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.

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I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC2ES07) ENVIRONMENTAL SCIENCE

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures
3. 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 help in sustainable development.

The students should be able to:

1. Develop an understanding of ecological perspective and the value of the environment.
2. Understand the significance of various natural resources and its management.
3. Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
4. Identify different types of pollution and their control measures, Discover effective methods of waste management and come out with best possible solutions.
5. Raise awareness about environmental laws and 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, Biomagnifications, 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**: Waste water Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues 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. NAPCC- GoI Initiatives.

UNIT-V

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.

TEXTBOOKS

1. Text book 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, 4thEdition, 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..

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II Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20MA3BS08) COMPUTER ORIENTED STATISTICAL METHODS

Course Objectives: To learn.

1 The theory of Probability, and probability distributions of single and multiple random variables.
2 The sampling theory and testing of hypothesis and making inferences.
3 Stochastic process and Markov chains.

Course outcomes: After the end of the course students will be able to

1. Make use of concepts of probability and distributions to given case studies.
2. Calculate the Mean, Variance and covariance of given discrete random variable.
3. Apply the concept of Uniform Distributions to find out continuous distribution values.
4. Estimate the of test of hypothesis to take decision for profit or loss in a given problem.
5. Describe stochastic principles to simplify processes that satisfy Markov Property.

UNIT – I

Random Variables and Probability Distributions: Introduction, Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

UNIT – II

Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables. **Discrete Probability Distributions**: Binomial, Distribution, Geometric Distributions and Poisson distribution.

UNIT – III

Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions. **Fundamental Sampling Distributions**: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t–Distribution, F-Distribution.

UNIT – IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion.

UNIT – V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes-Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXTBOOKS:

1. R K Jain & S R K Iyengar - Advanced Engineering Mathematics - fifth Edition, Narosa Publications.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi.

REFERENCE BOOKS:

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.

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II Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20IT3PC01) COMPUTER ORGANIZATION

Course Objectives:

1. Construction of computers out of a set of functional units and how the functional units operate, Interact, and communicate.
2. Representation of data at the machine level and how computations are performed at the machine level.
3. Working procedure of various input/output devices and transfer of data from different modes.
4. Advanced concepts like parallelism and pipelining.

Course outcomes: The Student will be able to

1. Demonstrate the functional organization of digital computer system.
2. Classify different addressing modes for fetching machine instructions.
3. Apply different data representation formats and perform arithmetic operations.
4. Tell the design of input/output organization and memory organization of computer.
5. Demonstrate the concepts of parallel processing, pipelining and inter process communication.

UNIT – I

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

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.

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

UNIT – II

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

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

UNIT – III

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

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

UNIT – IV

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

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

UNIT – V

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, Inter processor arbitration, Inter processor communication and synchronization, Cache Coherence.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGrawHill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20CS3PC02) OBJECT ORIENTED PROGRAMMING USING C++

Prerequisites: A course on "Programming for Problem Solving using C".

Course Objectives: To learn.

1. Introduces Object Oriented Programming concepts using the C++language.
2. Introduces the principles of data abstraction, inheritance and polymorphism.
3. Introduces the principles of virtual functions and polymorphism.
4. Introduces handling formatted I/O and unformatted I/O.
5. Introduces exception handling.

Course outcomes:

1. Identify the object-oriented programming approach with respect to C++.
2. Apply the concepts of classes for data abstraction for the given set of programs.
3. Build the learned knowledge of polymorphism for the given set of problems.
4. Construct the programs by using Input/output streams.
5. Discover the exceptions handling process in object oriented programming.

UNIT - I

Object-Oriented Thinking: Different paradigms for problem solving, need for OOP paradigm, differences between OOP and Procedure oriented programming, Overview of OOP concepts- Abstraction, Encapsulation, Inheritance and Polymorphism.

C++ Basics: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers to Arrays, Strings, Structures, References. Flow control statement- if, switch, while, for, do, break, continue, goto statements. Functions - Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de- allocation operators-new and delete, Preprocessor directives.

UNIT - II

C++ Classes and Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

UNIT - III

Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class. **Virtual Functions and Polymorphism**: Static and Dynamic binding, virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

UNIT - IV

C++ I/O: I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O. **Templates:** Function templates, class templates.

UNIT - V

Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Rethrowing an exception, Catching all exceptions.

TEXTBOOKS:

1. The Complete Reference C++, 4th Edition, Herbert Schildt, Tata McGraw Hill.
2. Problem solving with C++: The Object of Programming, 4th Edition, Walter Savitch, Pearson Education.

REFERENCES:

1. The C++ Programming Language, 3rd Edition, B. Stroutstrup, Pearson Education.
2. OOP in C++, 3rd Edition, T. Gaddis, J. Walters and G. Muganda, Wiley Dream Tech Press.
3. Object Oriented Programming in C++, 3rd Edition, R. Lafore, Galigotia Publications Pvt Ltd.

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS3PC03) DATA STRUCTURES

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives:

1. Introduce Analysis of Algorithm in terms of space and time complexity, Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and Pattern matching algorithms.

Course Outcomes: The Student will be able to

1. Choose appropriate data structures to represent data items in real world problems with linear data structures.
2. Apply dictionaries and hash tables to overcome problems of sequential data structures.
3. Develop the programs using trees for non linear data structures.
4. Measure the computational efficiency of the principal algorithms for sorting and searching.
5. Implement the graph traversal methods in non linear data structures.

UNIT - I

Introduction to Data Structures, Abstract Data types, Analysis of Algorithms-Big Oh and Theta Notations, Stacks using arrays, Queues using arrays, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, linked representations of stacks, stack applications, linked representations of Queues.

UNIT - II

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, and rehashing, extendible hashing.

UNIT - III

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.

UNIT - IV

Sorting: Heap Sort, Internal Sorting- Bubble sort, Selection Sort and Insertion Sort, External Sorting-Model for external sorting, Merge Sort. **Searching**: Linear Search and Binary Search.

UNIT - V

Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- Depth First Search and Breadth First Search.

TEXT BOOKS:`

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 BOOKS:

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

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS3ES08) ANALOG AND DIGITAL ELECTRONICS

Course Objectives:

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

.**Course Outcomes:** Upon completion of the Course, the students will be able to:

1. Identify the characteristics of various components and its utilization.
2. Compile the Construction, Operation and Characteristics of BJT, FET.
3. Make use of Boolean algebra Postulates to minimize combinational functions
4. Design and analyze combinational and sequential circuits
5. Categorize the logic families and realization of logic gates.

UNIT – I

Diodes and Applications: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, diode resistance, diffusion capacitance, diode switching times, breakdown diodes, Tunnel diodes, photo diode, LED. Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT – II

BJTs: Transistor characteristics: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations. FETs: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers, CS and CD amplifiers.

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.

TEXT BOOKS:`

1. Electronic Devices and Circuits- Jacob Millman, McGraw Hill Education
2. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
3. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3 rd Edition,Cambridge, 2010.

REFERENCE BOOKS:

1. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.
2. Digital Design- Morris Mano, PHI, 4th Edition,2006
3. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R.Peterson, 3rd Ed, John Wiley & Sons Inc.

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20CS3PC04) IT WORKSHOP LAB

Course Objectives:

The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

Course Outcomes:

1. Gain the knowledge of computer hardware.
2. Install the system software in the specified hardware.
3. Build the computer by assemble different parts and make sure of troubleshoots.
4. Make use of the Web browsers, email and news groups.
5. Craft professional word documents; excel spread sheet and power point presentations.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible. Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced. Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their 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.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by thestudent.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fontsin word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns,Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting LaTeX and MS/equivalent (FOSS)

Tool Power Point

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes: - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. 5.LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS3PC05) DATA STRUCTURES LAB

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives:

1. Introduce Analysis of Algorithm in terms of space and time complexity, Exploring basic data It covers various concepts of Java programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues, Hashing Techniques.
4. It provides and understanding of Tree, Graph Data Structures and also pattern matching algorithms.

Course Outcomes:

1. Design an algorithm along with the complexity for a given problem.
2. Able to implement the stack, queues using static and dynamic data structures.
3. Develop the programs to perform different operations on linked list.
4. Make use of different tree traversal techniques for non linear data structures.
5. Develop programs for searching and sorting techniques by different methods.

List of Experiments:

1. Write a program that implement Stack (its operations) using Arrays.
2. Write a program that implement Queues (its operations) using Arrays.
3. Write a program that uses functions to perform the following operations on singly linked list:
   i) .Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implements Stack (its operations) using Linked List.
5. Write a program that implement Queues (its operations) using Linked List.
6. Write a program that uses functions to perform the following operations on doubly linke dlist.
   i).Creation ii) Insertion iii) Deletion iv) Traversal
7. Write a program that uses functions to perform the following operations on circular linked list:
   i).Creation ii) Insertion iii) Deletion iv) Traversal
8. Write a program that uses functions to perform the following:
   a).Create a binary search tree of integers.
   b).Traverse the above Binary search tree non recursively in
   i) in order ii) preorder iii) post order.
9. Write a program that uses functions to perform the following operations on AVL trees:
   i).Rotation ii) Insertion iii) Deletion.
10. 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.
11. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
    i).Merge Sort ii) Heap sort.
12. 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

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

TEXT BOOKS:`

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 BOOKS:

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

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS3PC06) OBJECT ORIENTED PROGRAMMING USING C++ LAB

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives:

1. Introduces object-oriented programming concepts using the C++ language.
2. Introduces the principles of data abstraction, inheritance and polymorphism.
3. Introduces the principles of virtual functions and polymorphism.
4. Introduces handling formatted I/O and unformatted I/O.
5. Introduces exception handling.

Course Outcomes:

1. Ability to develop programming solutions for a range of problems using object-oriented programming techniques.
2. Apply the concepts of classes for data abstraction for the given set of programs.
3. Build the learned knowledge of polymorphism for the given set of problems.
4. Construct the programs by using Input/output streams.
5. Demonstrate the exceptions handling process in object oriented programming.

List of Experiments:

1. Write a program to print the sum of digits of a given number
2. Write a program to check whether the given number is Armstrong or not
3. Write a program to check whether the given string is Palindrome or not
4. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared I in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects read and display the contents of the array.
5. Write a C++ program to declare a class. Declare pointer to class. Initialize and displaythe contents of the class member.
6. Write a C++ to illustrate the concepts of console I/O operations.
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
8. Write a program to implement inline function inside and outside of a class for a. Finding the area of a square b. Finding the area of a cube.
9. Write a program to implement friend function and friend class
10. Write a program to implement constructor and destructor with in a class.
11. Write a program to demonstrate hierarchical inheritance.
12. Write a program to demonstrate multiple inheritances.
13. Write a program to demonstrate the constructor overloading.
14. Write a program to demonstrate the operator overloading.
15. Write a program to demonstrate static polymorphism.
16. Write a program to demonstrate dynamic polymorphism.
17. Write a program to implement polymorphism using pure virtual functions.
18. Write a program to demonstrate the function templates and class templates.
19. Write a program to demonstrate exception handling using try, catch, and finally..

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC3HS01) PROFESSIONAL AND ENGINEERING AND ETHICS

Course Objectives:

1. To enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives..

Course Outcomes:

1. To gain the knowledge on different codes of ethics, such as personal & professional, accountability, controllability, governability, life skills and consequentialism.
2. To perceive moral values in different fields in different ways.
3. To follow value based education system by learning different techniques.
4. To asses workplace responsibilities by following different case studies.
5. To realize the work place responsibilities, honesty, integrity, and promise-keeping & trustworthiness, loyalty, fairness.

UNIT – I

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – II

Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT – III

Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC- 10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – IV

Work Place Rights & Responsibilities: Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT – V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:`

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCE BOOKS:

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e, Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

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I I Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC3BS02) QUANTITATIVE APTITUDE

Course Objectives: The Students learn

1. To improve the problem solving skills.
2. To enhance the employability skills among students to meet out the corporate expectations.
3. To enhance the student's interest towards industry expectations.
4. To prepare students for the campus recruitment program.
5. To produce the most competitive man power to fit in all scenario of the job market.

Course Outcomes:

1. To Understand and Practice Simplifications.
2. To Understand and Practice the Problems on Ages.
3. To Understand and Practice the Quadratic Equations.
4. To Understand and Practice arrangement and selection in their daily life.
5. To Understand and Practice commercial mathematics.

UNIT-I

Numbers, H.C.F & L.C.M. of Numbers, Decimal Fractions & Simplifications.

UNIT-II

Square Roots & Cube Roots, Problems on Ages, Pipes & Cistern.

UNIT-III

Average, Time & Distance, Time & Work, Logarithm, Set Theory, Progressions, Quadratic Equations and Surds.

UNIT-IV

Permutation & Combination, Probability, Co-ordinate Geometry, Inequalities, Functions, Alligation & Mixtures, Number System.

UNIT-V

Partnership, Profit & Loss, Simple & Compound Interest, Percentage, Ratio & Proportion, Mensuration 2D & 3D.

TEXT BOOKS:`

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations.
2. R.S. Aggarwal, A Modern Approach to Logical Reasoning.

REFERENCE BOOKS:

1. Arun Sharma, Teach Yourself Quantitative Aptitude.
2. Rajesh Verma, Fast Track Objective Arithmetic.
3. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude For Competitive Examination.
4. Abhijit Gupta, Quantitative Aptitude for all Competitive Exam

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20MA4PC07) DISCRETE MATHEMATICS

Course Objectives: To learn

- Introduces the elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and Combinations, counting principles; recurrence relations and generating functions

Course Outcomes: learning the contents of this paper the students must able to.

- Construct precise mathematical proofs.
- Predict logic and set theory to formulate precise statements.
- Apply the concept of group theory in given Algebraic System.
- Calculate linear recurrence relations using advanced counting techniques.
- Explain graph theory in solving computing problems.

UNIT – I

The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT – II

Basic Structures: Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT – III

Algebraic Structures: Algebraic Systems-Semi groups And Monoids –Groups-Sub Groups-Homomorphism's-Normal Subgroups-Cosets-Lagrange's Theorem-Definition's And Examples of Rings and Fields.

UNIT–IV

Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Baye's Theorem, Expected Value and Variance Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion Exclusion, Applications of Inclusion-Exclusion.

UNIT–V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring. Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Tree.

TEXT BOOKS:`

- Discrete Mathematics and its Applications with Combinatorics and Graph Theory - Kenneth H Rosen, 7th Edition, TMH.

REFERENCE BOOKS:

- Discrete Mathematical Structures with Applications to Computer Science -J.P. Tremblay and R.Manohar, TMH,

- Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd ed, Pearson Education.
- Discrete Mathematics- Richard Johnsonbaugh, 7Th Edn., Pearson Education.
- Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
- Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P.Grimald, 5th edition, Pearson Education.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20MS4HS03) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives: To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcomes:

1. Identify the various forms of business and its impact on economic variables.
2. To realize the demand fluctuations and factors influencing the demand.
3. To analyze different market structures, pricing strategies and forms of business organization.
4. To study the firms, financial position and the financial statements of a company.
5. To evaluate different types of financial ratios for knowing liquidity and profitability positions of business concern.

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 andLong run Cost Functions. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and 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, and 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.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS4PC08) JAVA PROGRAMMING

Course Objectives:

1. To introduce the object-oriented programming concepts.
2. To understand object-oriented programming concepts, and apply them in solving problems.
3. To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
4. To introduce the implementation of packages and interfaces.
5. To introduce the concepts of exception handling and multithreading.
6. To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes: The Student will be able to

1. Apply the basic concepts of OOPs including data hiding to develop Java Applications.
2. Utilize the concepts of Packages and Stream based IO to build java API.
3. Implement the concepts of Exception handling and Multithreading.
4. Develop the applications using java collection framework.
5. Design GUI Applications using AWT Swing and Event Handling.

UNIT - I

Object-Oriented Thinking- A way 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, and forms of inheritance: specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT - II

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

Exception handling - Fundamentals of exception handling, Exception types, Termination or presumptive 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. Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT - IV

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

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, JText Field, 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. Radha Krishna, and University Press.
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.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS4PC09) OPERATING SYSTEMS

Prerequisites: A course on "Computer Programming and Data Structures".
A course on "Computer Organization and Architecture".

Course Objectives:

1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
2. Introduce the issues to be considered in the design and development of operating system.
3. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix.

Course Outcomes: The Student will be able to

1. Demonstrate the fundamental components of a computer operating system.
2. Identify appropriate scheduling algorithm for process management.
3. Solve the situations occurred by deadlock to maintain appropriate process synchronization.
4. Make use of page replacement algorithm for effective memory management.
5. Apply the various system calls to enable the operating system services..

UNIT – I

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

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, and exec.

UNIT - III

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

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

UNIT - V

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, System protection-Goals.

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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS4PC10) DATABASE MANAGEMENT SYSTEMS

Course Objectives:

1. To learn the basic database concepts, applications and data models
2. To understand ER model and Relational models
3. To learn Relational algebra and calculus operations
4. To master the basics of SQL and write queries using SQL.
5. To learn transaction control, concurrency control, storage structures and access techniques

.**Course Outcomes:** The Student will be able to

1. Build the appropriate ER Model for the given problem.
2. Illustrate the concepts of Relational Model, Algebra and Calculus.
3. Apply the concepts of Normalization for the consistent database.
4. Write the proper SQL queries to access the database.
5. Apply the concurrency control protocol to maintain the ACID properties while designing the database.
6. Apply the proper indexing techniques for accessing the data.

UNIT - I

INTRODUCTION: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

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

THE RELATIONAL MODEL: 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 AND CALCULUS: Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

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 AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

TRANSACTION MANAGEMENT: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log– Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

OVERVIEW OF STORAGE AND INDEXING: 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.
TREE STRUCTURED INDEXING: 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 Graw Hill 3rd Edition.
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, 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.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS4PC11) OPERATING SYSTEMS LAB

Prerequisites:

1. A course on "Programming for Problem Solving".
2. A course on "Computer Organization and Architecture".

Co-requisite:

A course on "Operating Systems".

Course Objectives:

1. To provide an 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 programs based on operating system concept of scheduling.
2. Develop a programs based on operating system concept of deadlock management.
3. Simulate the concept to implement programs based on operating system concept of file management.
4. Apply the concept of memory management for implementing a program.
5. Implement C programs using UNIX system calls.

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms
   a. 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. 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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

(20CS4PC12) JAVA PROGRAMMING LAB

Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using java collection frame work.
3. To write multithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.
6. To impart hands on experience with java programming.

Course Outcomes: After the completion of the lab, the graduates will be able to:

1. Write programs for given real world problems using java collection frame work.
2. Build the programs using abstract classes to solve the specified problems.
3. Make use the concept of multithreading to allow parallel processing in the given program.
4. Create GUI programs using Java swing controls for the given example program.
5. Create web pages using Applets for given example problem.

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 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.
3. 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 “Compute” is clicked.
4. 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.
5. 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.
6. 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.
7. Write a Java program that simulates a traffic light. The program lets the user select oneof

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.

8. 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.

9. 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.

10. 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).

11. 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 a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table.
(hint: use hash tables).
12. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order.

15. 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.

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.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20CS4PC13) DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives:

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation
3. Learn triggers, concurrency control mechanisms

Course Outcomes:

1. Design a database schema for given problem data.
2. Build a GUI application.
3. Apply the normalization techniques for development of application software to realistic problems.
4. Formulate queries using SQL DML/DDL/DCL commands.
5. Implement triggers to raise as per real time data and also Implement concurrency control mechanisms.

List of Experiments:

1. Concept design with E-R Model (Draw ER diagrams which includes key constraints and participation constraints also)
2. Relational Model (Convert ER model to Relational model)
3. Normalization
4. Practicing DDL commands: Creating tables along with primary key and foreign key. Altering tables, Dropping tables.
5. Practicing DML commands: Practicing insert, select, update and delete commands.
6. Practicing queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, Constraints etc.
7. Practicing queries using Aggregate functions (COUNT, SUM, AVG, MIN, MAX), GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers: Creation of trigger, insert trigger, delete trigger, update trigger.
9. Procedures: Creation procedures, executing procedures and modification of procedures.
10. Usage of Cursors.

TEXT BOOKS:`

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Corone 7th 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 X Team, 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.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**0**

(20MC4HS03) GENDER SENSITIZATION LAB

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender- based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

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

Course Outcomes:

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

UNIT - I

Understanding Gender: Introduction: Definition of Gender-Basic Gender Concepts and Terminology- Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men, Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT - II

Gender Roles and Relations: Two or Many? -Struggles with Discrimination-Gender Roles and Relations- Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

UNIT - III

Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.

Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

UNIT - IV

Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". **Domestic Violence**: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT - V

Gender and Culture: Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular. Literature - Just Relationships: Being Together as Equals. Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

TEXT BOOKS:`

"Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

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I I Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**0**

(20MC4BS03) QUANTITATIVE LOGICAL AND REASONING

Course Objectives: To learn

1. To improve the Logical Ability and Reasoning skills among the students to meet the expectations of Industry.
2. To counsel the students to improve their career exposure across the Industry
3. To improve the Data Sequences & Calendars problems.
4. To enhance Non-Verbal Reasoning among the students as per the industry requirements
5. To improve the graphical representation skills among the students.

Course Outcomes: The Students able

1. To understand and practice logical reasoning
2. To understand and practice the different classifications
3. To understand and practice different Sitting Arrangements, Data Sequences.
4. To understand and practice the Non-Verbal Reasoning.
5. To understand and practice the graphs..

UNIT-I

Coding Decoding, Directions, Blood Relations & Alphabet Test.

UNIT-II

Statements & Arguments, Analogy Classification & Clocks.

UNIT-III

Sitting Arrangements, Data Sequences & Calendars and Syllogism.

UNIT-IV

Puzzle Test, Non-Verbal Reasoning, Cubs & Dice.

UNIT-V

Tabulation, Bar Graphs, Pie Charts and Line Graphs.

TEXT BOOKS:`

1. R.S. Aggarwal, A Modern Approach to Logical Reasoning.
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning.

REFERENCE BOOKS:

1. R.V.Praveen, Quantitative Aptitude and Reasoning.
2. Praxis groups, Campus Recruitment Complete Reference.
3. BS Sijwalii & Indu Sijwali, A New Approach to Reasoning Verbal, Non-Verbal & Analytical.

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS5PC14) FORMAL LANGUAGES AND AUTOMATA THEORY

Course Objectives:

1. To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammars and automata theory.
3. Classify machines by their power to recognize languages.
4. Employ finite state machines to solve problems in computing.
5. To understand deterministic and non-deterministic machines.
6. To understand the differences between decidability and undesirability.

Course Outcomes: The student will be able to

1. Make use of the concept of automata and to recognize the appropriate languages.
2. Model finite state machine for the given regular expression and languages.
3. Construct context free grammars for any given formal languages.
4. Construct Turing machine for the given grammar.
5. Distinguish between decidability and undesirability.

UNIT-I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems. **Nondeterministic Finite Automata**: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions. **Deterministic Finite Automata**: Definition of DFA, How a DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melay machines, Conversions from Melay to Moore and Moore to Melay machines.

UNIT-II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. **Pumping Lemma for Regular Languages**: Statement of the pumping lemma, Applications of the Pumping Lemma. **Closure Properties of Regular Languages**: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT-III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost 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, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata, From CFG to PDA, and From PDA to CFG.

UNIT-IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions, Eliminating unit productions , Chomsky Normal form Griebech Normal form, Conversion from Context Free Grammar to Chomsky Normal form (CNF) and Context Free Grammar to Griebech Normal form (GNF). **Pumping Lemma for Context-Free Languages**: Statement of pumping lemma, Applications. **Closure Properties of Context**-Free Languages: Closure properties of CFL's, Decision Properties of CFL's **Turing Machines**: Introduction to Turing Machine, Formal Description, Instantaneous description, the language of a Turing machine.

UNIT-V

Types of Turing machine: Turing machines and halting. **Undecidability**: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXT BOOKS:`

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandra shekaran, 2nd edition, PHI.

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 the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS5PC15) SOFTWARE ENGINEERING

Course Objectives:

1. The aim of the course is to provide an understanding of the working knowledge of the techniques. for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams.

Course Outcomes: The student will be able to

1. Make use of the basic software engineering methods and process models.
2. Identify the different requirements, requirement engineering process and system models.
3. Analyze the software architectural styles, conceptual model of UML diagrams for software developing life cycle.
4. Choose different testing strategies and product metrics to verify the software quality.
5. Apply the various approaches in risk management and quality management for the software quality assurance

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: 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.

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

UNIT-V

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, Mc Graw 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.

REFERENCE BOOKS:

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.

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

(20CS5PC16) DESIGN AND ANALYSIS OF ALGORITHMS

Course Objectives:

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate.
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes: The student will be able to

1. Make use of divide and conquer methods for developing algorithms.
2. Apply the concept of backtracking to solve the optimization problems.
3. Solve the optimization problems using dynamic programming methodology.
4. Solve the optimization problem by using Greedy method.
5. Solve the optimization problem by using branch and bound method and NP-Hard and NP-Complete for the given example problems.

UNIT - I

Introduction: Algorithm, pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms, Graph Traversals-Breadth first search and depth first search.

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring.

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, all pairs shortest path problem, Traveling sales person problem, Reliability design, Matrix chain multiplication.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theory.

TEXT BOOKS:`

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Raja sekharan, University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and Stein, PHI Pvt. Ltd. / Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons

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(20CS5PC17) DESIGN AND ANALYSIS OF ALGORITHMS LAB

Course Objectives:

1. To write programs in C language to solve problems using Divide and Conquer problem solving method.
2. To write programs in C language to solve problems using Backtracking problem solving technique.
3. To write programs in C language to solve problems suing Greedy Method.
4. To write programs in C language to solve problems using Dynamic Programming.

Course Outcomes:

1. Write C programs using Divide & Conquer strategy(sorting algorithms)
2. Implement C program to solve the given problems using Backtracking (N-Queen's, sum of subset)
3. Develop C program using Greedy approach for job sequencing with deadlines, single source shortest path problems)
4. Implement C program to generate minimum cost spanning trees using Prims & Kruskals algorithm.
5. Design C program to implement 0/1 Knapsack & OBST using dynamic programming.

List of Experiments:

1. Write a C program to implement Quick sort algorithm for sorting a list of integers in ascending order
2. Write a C program to implement Merge sort algorithm for sorting a list of integers in ascending order.
3. Write a C program to implement the DFS algorithm for a graph.
4. Write a C program to implement the BFS algorithm for a graph.
5. Write a C program to implement Backtracking algorithm for the N-queens problem.
6. Write a C program to implement the Backtracking algorithm for the sum of subsets problem.
7. Write a C program to implement Greedy algorithm for job sequencing with deadlines.
8. Write a C program to implement Dijkstra's algorithm for the Single source shortest path problem.
9. Write a C program that implements Prim's algorithm to generate minimum cost spanning tree.
10. Write a C program that implements Kruskal's algorithm to generate minimum cost spanning tree
11. Write a C program to implement Floyd's algorithm for the all-pairs shortest path problem.
12. Write a C program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
13. Write a C program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree problem.

REFERENCE BOOKS:

1. Data structures, Algorithms and Applications in java, 2nd Edition, S. Sahani, Universities Press.
2. Data structures and Algorithms in java, 3rd edition, A. Drozdek, Cengage Learning.
3. Data structures with Java, J. R. Hubbard, 2nd edition, Schaum's Outlines, TMH.
4. Data structures and algorithms in Java, 2nd Edition, R. Lafore, Pearson Education.
5. Data Structures using Java, D. S. Malik and P.S. Nair, Cengage Learning.

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	0	**0**	**3**	**1**

(20EN5HS04) ADVANCED COMMUNICATION SKILLS LAB

Course Objectives: This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

Course Outcomes: The student will be able to

1. Develop LSRW skills and soft skills.
2. Demonstrate the nuances of language through group activities and oral presentations.
3. Build written communication skills to meet the needs of their academics and career endeavors.
4. Take part in interviews with confidence thereby enhancing their employability skills.
5. Choose appropriate language in their social and professional communication.

UNIT - I

Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - 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.

UNIT – II

General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

UNIT – III

Activities on Writing Skills – Subject-Verb Agreement (Concord), Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

UNIT – IV

Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

UNIT – V

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.

1. Writing Skills – Structure and Presentation of Different Types of Writing – Letter Writing/Resume Writing/ e-correspondence/Technical Report Writing.
2. Presentation Skills – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written PresentationsthroughPosters/Projects/Reports/e-mails/Assignments…etc.,
3. Group Discussion and Interview Skills – Dynamics of Group Discussion, Intervention,

Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference &Video-conference and Mock Interviews.

Minimum Hardware Requirement

Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Eight round tables with five movable chairs for each table.
- Audio-visual aids
- LCD Projector
- Public Address system
- Computer with suitable configuration

Suggested Software

The software consisting of the prescribed topics elaborated above should be procured and used.

- OxfordAdvancedLearner'sCompass,8thEdition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

REFERENCE BOOKS:

1. Kumar, Sanjay and PushpLata. English for Effective Communication, Oxford University Press, 2015.
2. Konar, Nira. English Language Laboratories – A Comprehensive Manual, PHI Learning Pvt. Ltd., 2011.

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(20MC5HS05) INTELLECTUAL PROPERTY RIGHTS

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 secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes 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 & REFERENCE BOOKS:`

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

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(20MC5HS06) PERSONALITY AND SOFT SKILLS DEVELOPMENT

Course Objectives:

1. Projecting the Right First Impression
2. Polishing manners to behave appropriately in social and professional circles
3. Enhancing the ability to handle casual and formal situations in terms of personal grooming, dining and entertaining etiquette
4. Developing and maintaining a positive attitude and being assertive
5. Mastering Cross Cultural Etiquette
6. Handling difficult situations with grace, style, and professionalism
7. To understand the importance of oral & written Communication Skills in Corporate Sector

.**Course Outcomes:**

1. Students will possess the personality development techniques and communication skills.
2. Students will possess knowledge about leadership.
3. Students will be able to acquire the skills to manage stress and conflict.
4. Students will able to acquire Problem Solving & Critical Thinking.
5. Students will able to acquire different resume preparation & Essay Writing Techniques.

UNIT-I

Personality Development Body Language: Professional and Casual attire, Public Speaking, Strengths & Weakness, Organizational Skills, Self Assessment.

UNIT-II

Goal Setting: Time Management, Stress Management, Career Management, Confidence / Motivation, Tolerance of Change and Uncertainty.

UNIT-III

Soft Skills Grammar: Noun, Pronoun, Adjectives, Tenses, Verb, Subject + Verb, Agreement, Adverb, Preposition, Article, Conjunction. **Vocabulary**: Synonyms & Antonyms, Words often Confused & Misused **Verbal Ability**: Sentence Improvement, Reading Comprehension, Cloze Test, Sentence Rearrangements, Fill in the Blanks, Theme Detection Analogy.

UNIT-IV

Just A Minute (JAM), Group Discussion (GD), Debate, Role Play, Cognitive Skills, Leadership Qualities, Work Ethics, Problem Solving & Adaptability, Critical Thinking, Random Words, and Interview Skills: Tell me about yourself.

UNIT-V

Team Work, Self-Awareness and Presentation Skills, Resume Building: Normal Resume Preparation, Video Resume & Career Specific Resume, Email Etiquette, Essay Writing.

TEXT BOOKS:`

1. Personality Development and Soft Skills - Barun K. Mitra.
2. Personality Development and Soft Skills: Preparing for Tomorrow - Shikha Kapoor.
3. Soft Skills Personality Development for Life Success – Prashanth Sharma.

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(20IT5PE11) ARTIFICIAL INTELLIGENCE (Professional Elective - I)

Course Objectives:

1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

.**Course Outcomes:**

1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem.
4. Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
5. Ability to design Expert system.

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: A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search.

UNIT II

Problem Solving by Search-II and Propositional Logic

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems.

Propositional Logic: Knowledge-Based Agents, 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,

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 BOOKS:`

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.

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(20IT5PE12) ADVANCED COMPUTER ARCHITECTURE (Professional Elective-I)

Prerequisites: Computer Organization

Course Objectives:

1. Knowledge of contemporary computer architecture, issues and techniques.
2. Understand the advanced hardware-based techniques for exploiting instruction level parallelism.
3. Analyze the architectures and techniques used for building high performance scalable multithreaded and multi processor systems.
4. Apply the learned knowledge to conduct research in computer architecture.

.**Course Outcomes:**

1. Summarize the basic principles of computer design.
2. Classify instruction set architectures.
3. Use various methods for performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors.
4. Acquire Knowledge of memory hierarchy design and describe modern architectures such as RISC, VLIW and multiprocessor systems.
5. List the issues in designing a cluster.

UNIT I

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

UNIT II

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

UNIT III

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared- Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT IV

Parallel and Scalable Architectures, Multiprocessors and Multi computers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputer, Message-passing Mechanisms, Multivector and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-
5.

UNIT V

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multi computers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

TEXT BOOKS:`

1. John L. Hennessy and David A. Patterson Morgan Kaufmann, Computer Architecture: A Quantitative Approach, 3rd Edition, (An Imprint of Elsevier).

REFERENCE BOOKS:`

1. Kai Hwang and A.Briggs, Computer Architecture and parallel Processing International Edition, McGraw- Hill.
2. DezsoSima, Terence Fountain and Peter Kacsuk, Advanced Computer Architectures, Pearson.
3. David E. Culler and Jaswinder Pal singh with Anoop Gupta, Parallel Computer Architecture, A Hardware / Software Approach, Elsevier.

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(20IT5PE13) DIGITAL IMAGE PROCESSING (Professional Elective-I)

Pre-Requisites:

1. Digital Signal Processing.

Course Objectives:

1. To provide a approach towards image processing and introduction about 2D transforms.
2. To expertise about enhancement methods in time and frequency domain.
3. To expertise about segmentation and compression techniques.
4. To understand the Morphological operations on an image.

.**Course Outcomes:**

1. Summarize the image fundamentals and mathematical transforms used in digital image processing.
2. Analyze the special and frequency domain concepts for image enhancement.
3. Apply the various restoration techniques for image.
4. Apply the various segmentation & morphological operations on an image.
5. Design image compression techniques on an image.

UNIT-I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT-II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering. Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

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. Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT –V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:`

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008.
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

REFERENCE BOOKS:`

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - Scotte Umbaugh, 2nd Ed, CRC Press, 2011.
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
3. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
4. Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2 nd Edition, BS Publication, 2008.

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(20IT5PE14) PRINCIPLES OF PROGRAMMING LANGUAGES (Professional Elective-I)

Course Objectives:

1. Describe the main principles of imperative, functional, object oriented and logic oriented programming languages;
2. To provide an introduction to formalisms for specifying syntax and semantics of programming languages, including an introduction to the theory of formal languages,
3. To provide an exposure to core concepts and principles in contemporary programming languages, and
4. To explore various important programming methodologies and
5. The Functional programming, logic programming, programming with abstract data types, and object- oriented programming.

.**Course Outcomes:**

1. Analyze the skills for expressing syntax and semantics informal notation.
2. Apply a suitable programming paradigm for a given computing application.
3. Acquire knowledge of various programming languages.
4. Demonstrate the use of scripting languages
5. Differentiate various data types of different 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, and 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, Co routines

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, Binding sand Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.(TextBook2)

TEXT BOOKS:`

1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education., 2008
2. Programming Languages – Louden, Second Edition, Thomson.

REFERENCE BOOKS:`

1. Programming Languages- Ghezzi, 3/e, John Wiley.
2. Programming Languages Design and Implementation – Pratt and Zelkowitz, Fourth Edition PHI/Pearson Education.

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(20IT5PE21) PYTHON PROGRAMMING(Professional Elective-II)

Course Objectives:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build Web Services and introduction to Network and Database Programming in Python.

Course Outcomes: The student will be able to

1. Apply Python syntax, semantics and be proficient in the use of Python functions.
2. Implement File operations, Exception handling and modules in using Python.
3. Use the Regular Expressions and create ,run and manipulate Multithreaded Python programs.
4. Illustrate the concepts of GUI, Web and Network programming in Python.
5. Inspect exemplary applications related to Databases in Python.

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types.

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules.

Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

UNIT - II

FILES: 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 - III

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.

UNIT - IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs. WEB Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

UNIT – V

Database Programming: Introduction, Python Database App lication Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

TEXT BOOKS:`

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Python Tutorial by Guido Van Rossum, Fred L. Drake Jr. editor, Release 2.6.4.

REFERENCE BOOKS:

1. Learning Python – 2nd Ed., Mark Lutz and David Ascher, 2003, O'Reilly.

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(20IT5PE22) OBJECT ORIENTED ANALYSIS AND DESIGN (Professional Elective-II)

Course Objectives:

1. Develop the skills to analyze and design object-oriented problems.
2. Create design patterns to solve problems based on object-oriented concepts.
3. Understand the various processes and techniques for building object-oriented software systems.

.**Course Outcomes:**

1. Discuss the overview of object oriented modeling and benefits of each.
2. Make use of the advance object-oriented approach from the traditional approach for design and development of system.
3. Implement Unified Modeling Language (UML) for representation of an object-oriented system using different modeling views.
4. Apply appropriate design patterns to model or design of the system.
5. Prepare unified modeling techniques for case studies

UNIT I : STRUCTURAL MODELLING

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, architecture, software development life cycle.

UNIT II : BASIC STRUCTURAL MODELLING

Classes, relationships, common mechanisms and diagrams. Advanced structural modeling: Advanced classes, advanced relationships, interfaces, types, roles and packages.

UNIT III : CLASSES AND OBJECT DIAGRAMS

Terms, concepts, modeling techniques for class and object diagrams; Interactions: Interaction diagrams; Use cases: Use case diagrams, activity diagrams.

UNIT IV : ADVANCED BEHAVIORAL MODELING

Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT V : ARCHITECTURALMODELING

Component, Deployment, Component diagrams, Deployment diagrams. Case Study: The Unified Library Application.

TEXT BOOKS:`

1. Grady Booch, James Rumbaugh, IvarJacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML2Toolkit, WILEY-Dream tech India Pvt.Ltd.

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 India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw Hill Companies.
4. Craig Larman Appling UML and Patterns: An introduction to Object Oriented Analysis and Design and Unified Process, Pearson Education.
5. Mark Priestley: Practical Object-oriented Design with UML, TATA McGraw Hill..

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT5PE23) NETWORK PROGRAMMING (Professional Elective-II)

Course Objectives:

1. To understand inter process and inter-system communication.
2. To understand socket programming in its entirety.
3. To understand usage of TCP/UDP / Raw sockets.
4. To understand how to build network applications.

Course Outcomes: The student will be able to

1. write socket API based programs.
2. Design and implement client-server applications using TCP and UDP sockets.
3. Analyze network programs.
4. Implement address conversions.
5. Design and implement programs on Raw socket.

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 unctions, recvmsg and send msgFunctions, AncillaryData, 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, SNTP(Continued).

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.
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..

REFERENCE BOOKS:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, Kingabls, pearson Education.
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education.

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT5PE24) SCRIPTING LANGUAGE (Professional Elective-II)

Course Objectives:

1. This course provides an introduction to the script programming paradigm.
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL..

.**Course Outcomes:**

1. Acquire the skills for expressing syntax and semantics informal notation.
2. Identify and apply a suitable programming paradigm for a given computing application.
3. Gain knowledge of and able to compare the features of various programming languages.
4. Demonstrate the use of scripting languages
5. Demonstrate various data types of different programming languages.

UNIT - I

Introduction: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages.

Ruby: 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 Interperter.

UNIT - III

Introduction to 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 uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

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 Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly.
3. "Programming Ruby" The Pramatic Programmers 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.
5. Perl Power, J.P.Flynt, Cengage Learning.

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT5PE25) ADVANCED DATA STRUCTURES THROUGH C++ (professional Elective –II)

Course Objectives:

1. To impart the knowledge on External Sorting and Hashing Techniques
2. To help the students to learn Priority Queues.
3. To demonstrate the students about the operations of Efficient Binary Search Trees.
4. To illustrate the concept of various Multiway Search Trees.
5. To make the students to learn the use of Digital Search Structures.

.**Course Outcomes:**

1. Demonstrate the working principle of External Sorting.
2. Apply the Hashing Techniques in information storage and retrieval.
3. Analyze the concept of Priority Queues.
4. Make use of AVL and Red-Black Trees to solve computational problems.
5. Construct the Multiway Search Trees.

UNIT I

External Sorting: Introduction, K-way Merge Sort, Buffer Handling for parallel Operation, Run Generation, Optimal Merging of Runs.

UNIT II:

Priority Queues (Heaps): Introduction, Binary Heaps-Model and Simple Implementation, Basic Heap Operations, Other Heap Operations, Applications of Priority Queues, Binomial Heaps (or Queues), Binomial Heap Structure and Implementation, Binomial Queue Operations.

UNIT- III:

Balanced Trees: Introduction to AVL- Red-Black Trees-Properties and Representation of Red-Black Trees, Operations on Red-Black Trees, Applications of Red-Black Trees, Splay trees.

UNIT- IV:

Multiway Search Trees: M-Way Search Trees-Definition and Properties, Searching an M-Way Search Tree, B- Trees-Definition and Properties, Number of Elements in a B-tree, Searching for an Element in a B-Tree, Inserting a New Element in a B-Tree, Deleting an Element from a B-Tree, B+ Trees - Searching a B+ Tree, Inserting a New Element in a B+ Tree, Deleting an Element from a B+ Tree.

UNIT-V:

Digital Search Structures: Introduction to Digital Search Tree, Operations on Digital Search Trees – Insertion, Searching, and Deletion, Binary Tries and Patricia- Binary Tries, Compressed Binary Trie, Patricia, Multiway Tries Definition, Searching a Trie, Sampling Strategies, Insertion into a Trie, Deletion from a Trie, Keys with Different Length, Height of a Trie, Space Required and Alternative Node Structure, Prefix Search and Applications, Compressed Tries, Compressed Tries with Skip Fields, Compressed Tries with Labeled Edges, Space Required by a Compressed Tries.

TEXT BOOKS:`

1. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2017.
2. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed, Second Edition, 2008.

REFERENCE BOOKS:`

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002
3. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, Third Edition, The MIT Press.
4. Data Structures and Algorithm Analysis in C,Mark Allen Weiss, Second Edition, Pearson.

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III Year B.Tech. IT-I Sem	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1.5**

(20IT5PE26) PYTHON PROGRAMMING LAB (professional Elective –II)

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.
3. To understand the high-performance programs designed to strengthen the practical expertise.

.Course Outcomes:

1. Implement simple Python programs
2. Use control structures to write Python programs.
3. Develop Python programs by defining functions.
4. Use Python Lists, Tuples, Dictionaries for representing compound data.
5. Implement File operations in Python.

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 IST 2017”
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 than 20.
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.
21. Write a Python program to find whether given text is matched or not using regular expression.
22. Write a Python program to create a Button, Canvas, combo box by importing Tkinter module.
23. Write a Python program to handle division by zero error.

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	0	**0**	**3**	**1.5**

(20IT5PE27) OBJECT ORIENTED ANALYSIS AND DESIGN LAB
(professional Elective –II)

Course Objectives:

1. Main objective of this lab is to enable the student to practice the object- oriented analysis and design through UML on a particular application (project).
2. Understand how UML supports the entire OOAD process.
3. Become familiar with all phases of OOAD.

.Course Outcomes:

1. Apply UML diagrams on a particular application (project).
2. Implement and develop the UML diagrams for the entire OOAD process.
3. Design all phases of OOAD and it supports all the applications.
4. Design the case study of Unified Library Application this is mentioned in the theory, and Model it in different views.

List of Programs:

UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

Description for an ATM System:

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of Rs. 100, Rs. 500 and Rs. 1000), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.) The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) – both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/ she 142 COMPUTER SCIENCE AND ENGINEERING 2013-14 desires no further transactions, at which point it will be returned - except as noted below.

The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of Rs. 100 or Rs. 500 or Rs. 1000. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between any two accounts linked to

the card.

4. A customer must be able to make a balance inquiry of any account linked to the card.
5. A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine. The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.) If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back. If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction. The ATM will provide the customer with a printed receipt for each successful transaction The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on" position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. 143 COMPUTER SCIENCE AND ENGINEERING 2013-14 When the switch is moved to the "off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.
6. Study of any testing tool (e.g. Win runner).
7. Study of any web testing tool (e.g. Selenium).
8. Study of any bug tracking tool (e.g. Bugzilla, bugbit).
9. Study of any test management tool (e.g. Test Director).
10. Study of any open source-testing tool (e.g. Test Link).

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(20IT5PE28) NETWORK PROGRAMMING LAB (PROFESSIONAL ELECTIVE –III)

Course Objectives:

1. To understand inter process and inter-system communication
2. To understand socket programming in its entirety
3. To understand usage of TCP/UDP / Raw sockets
4. To understand how to build network applications

Course Outcomes:

1. To write socket API based programs
2. To design and implement client-server applications using TCP and UDP sockets
3. To analyze network programs.
4. Design TCP/UDP client & server programs.
5. Designing RPC application.

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 by two processes. Use semaphores to avoid race conditions.
3. Design TCP iterative Client and server application to reverse the given input sentence
4. Design TCP client and server application to transfer file
5. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select".
6. Design a TCP concurrent server to echo given set of sentences using poll functions
7. Design UDP Client and server application to reverse the given input sentence
8. Design UDP Client server to transfer a file
9. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into uppercase.
10. 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..

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	0	**0**	**3**	**1.5**

(20IT5PE29) SCRIPTING LANGUAGE LAB (PROFESSIONAL ELECTIVE –II)

Course Objectives:

1. To understand the concepts of scripting languages for developing web based projects.
2. To understand the applications the of Ruby, TCL, Perl scripting languages.

Course Outcomes:

1. Infer the differences between Scripting languages and programminglanguages
2. Acquire the knowledge of ruby programming.
3. Make use of perl programming for given problems.
4. Design applications by using TCL programming.
5. Develop application using scripting languages.

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 nonnegative integer.
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby script which accept 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 to 1.
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return their sum.
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100.
9. Write a Ruby script to print the elements of a given array.
10. Write a Ruby program 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 to 10.
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.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmers 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.
5. Perl Power, J.P.Flynt, Cengage Learning.

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	0	**0**	**3**	**1.5**

(20IT5PE210) ADVANCED DATA STRUCTURES THROUGH C++ LAB
(PROFESSIONAL ELECTIVE –II)

Course Objectives:
To understand the basic concept of Non Linear Data Structure and its basic operation in Data structure.

Course Outcomes:
1. Develop K way merge sorting methods to sort the list of integers.
2. Demonstrate the operations of Heap.
3. Build the programs on Operations of AVL trees.
4. Design the programs on B trees and B+trees.
5. Understand the operations of Digital search trees and Tries.

List of Experiments:

1. Write a program that implements the K way merge sorting methods to sort a given list of integers in ascending order.
2. Write a program to perform the following operations of Heap
   a) Heapify
   b) Delete an item from the heap
   c) Search maximum or minimum element in max-heap and min-heap respectively.
3. WAP to implement insertion, deletion and display operation in Min-Max Heap for the given data as integers.
4. Write a Program to implement priority queue to add and delete elements.
5. Write a program to perform the following operations:
   a) Insert an element into a AVL tree.
   b) Delete an element from a AVL tree.
   c) Search for a key element in a AVL tree.
6. Write a program to perform the operations on Red Black trees.
7. WAP to implement insertion, deletion, display and search operation in m-way B tree (i.e. a non-leaf node can have at most m children) for the given data as integers (Test the program for m=3, 5, 7)
8. Write a program to perform the following operations:
   a) Insert an element into a B+ tree.
   b) Delete an element from a B+ tree.
   c) Search for a key element in a B+ tree.
9. Write a program to perform the operations on Digital search trees.
10. Write a program to perform the following operations on tries
    a)Insertion b)Deletion c)Search.

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	3	**1**	**0**	**4**

(20CS6PC18) COMPUTER NETWORKS

Course Objectives:

1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes: The student will be able to

1. Demonstrate the concepts of Data communication procedures and various models of Networking.
2. Summarize the features of various protocols used in Data Link Layer.
3. Identify appropriate routing algorithm for broadcasting in Network Layer.
4. Demonstrate the services and features of TCP/UDP protocols in Transport Layer.
5. Summarize the services and features of Application Layer with respect to World Wide Web.

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, Protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier senses 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 protocol.

UNIT V

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

TEXT BOOKS:`

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.

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20CS6PC19) COMPILER DESIGN

Course Objectives:

1. To understand the various phases in the design of a compiler.
2. To study various data structures used.
3. To understand the design of top-down and bottom-up parsers.
4. To understand syntax directed translation schemes.
5. To introduce lex and yacc tools.
6. To learn intermediate languages.
7. To learn to develop algorithms to generate code for a target machine.
8. To learn how to optimize machine code.

Course Outcomes: The student will be able to

1. Use Lex and Yacc tools for developing a scanner and a parser.
2. Make use of LL and LR parsers to develop the Parse tree.
3. Generate intermediate code for procedures.
4. Identify appropriate method for code generation.
5. Apply proper techniques for code optimization.

UNIT-I

Introduction: Phases of Compiler, Grouping of phases. 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.

UNIT-II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: LR (0), Simple LR, Look Ahead LR (LALR), More Powerful LR Parsers (Canonical LR).

UNIT-III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

UNIT-IV

Run-Time Environments: Storage organization, Stack Allocation strategies, Symbol tables. 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 Optimizations: 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 BOOKS:`

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica, Ravi Sethi, Jeffry D. Ullman, Pearson.

REFERENCE BOOKS:

1. Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.
2. Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
3. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
4. Writing compilers and interpreters, R. Mak, 3rd edition, Wiley studentedition.
5. lex&yacc – John R. Levine, Tony Mason, Doug Brown,O'reilly.

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT6PC02) INTERNET OF THINGS

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, that is widely used in IoT applications.
5. To introduce the implementation of web-based services on IoT devices.

.**Course Outcomes:**

1. To interpret the knowledge on areas to be used and protocols of communication in IoT.
2. To compare and contrast software and hardware things in different networks.
3. To extend the knowledge on python and its libraries used in IoT.
4. To apply the skills to develop the small-scale things.
5. To 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 rotocols, 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

IoTandM2M–Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP NETPEER.

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

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

(20CS6PC21) WEB TECHNOLOGIES

Course Objectives:

1. To understand the technologies used in Web Programming.
2. To know the importance of object-oriented aspects of Scripting.
3. To understand creating database connectivity using JDBC.
4. To learn the concepts of web-based application using sockets.

Course Outcomes: The student will be able to

1. Apply the concepts of PHP in creating web pages and connecting to database(My sql)
2. Apply the concepts of XML for structurizing the web pages.
3. Make use of Servlets to create dynamic web pages in client-server architecture.
4. Make use of JSP to develop interactive web pages.
5. Apply the techniques of Java script in client side scripting.

UNIT- I

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

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

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 (CGt), 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, onsubmit etc.), Document Object Model, Form validation.

TEXT BOOKS:`

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

REFERENCE BOOKS:

1. John Pollock, Javascript - A Beginners Guide, 3rd Edition – Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1**

(20CS6PC22) COMPUTER NETWORKS AND WEB TECHNOLOGIES LAB

Course Objectives:

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyze the traffic flow and the contents of protocol frames

Course Outcomes:

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
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. Write a program for frame sorting technique used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to Transmission of Packets

Web Technologies Experiments

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
    i. Find the length of a string.
    ii. Count no of words in a string.
    iii. Reverse a string.
    iv. 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.
5. 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 JavaScript.
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 assignments 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 assignments 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.

TEXT BOOKS:`

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCE BOOKS:

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.Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of Ind.

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	0	**0**	**3**	**1.5**

(20IT6PC03) INTERNET OF THINGS LAB

List of Experiments:

1. **Functional Testing Of Devices**
   Flashing the OS on to the device into a stable functional state by porting desktop environment with necessary packages.
2. **Exporting Display On To Other Systems**
   Making use of available laptop/desktop displays as a display for the device using SSH client & X11 display server.
3. **GPIO Programming**
   Programming of available GPIO pins of the corresponding device using native programming language. Interfacing of I/O devices like LED/Switch etc., and testing the functionality.
4. **ON/OFF Control Based On Light Intensity**
   Using the light sensors, monitor the surrounding light intensity & automatically turn ON/OFF the high intensity LED's by taking some pre-defined threshold light intensity value.
5. **Battery Voltage Range Indicator**
   Monitor the voltage level of the battery and indicating the same using multiple LED's (for ex: for 3V battery and 3 led's, turn on 3 led's for 2-3V, 2 led's for 1-2V, 1 led for 0.1-1V & turn off all for 0V).
6. **Dice Game Simulation**
   Instead of using the conventional dice, generate a random value similar to dice value and display the same using a 16X2 LCD. A possible extension could be to provide the user with option of selecting single or double dice game.
7. **Displaying RSS News Feed On Display Interface**
   Displaying the RSS news feed headlines on a LCD display connected to device. This can be adapted to other websites like twitter or other information websites. Python can be used to acquire data from the internet.
8. **Porting Openwrt To the Device**
   Attempt to use the device while connecting to a wifi network using a USB dongle and at the same time providing a wireless access point to the dongle.
9. **Hosting a website on Board**
   Building and hosting a simple website (static/dynamic) on the device and make it accessible online. There is a need to install server (eg: Apache) and thereby host the website.
10. **Webcam Server**
    Interfacing the regular usb webcam with the device and turn it into fully functional IP webcam & test the functionality.
11. **FM Transmission**
    Transforming the device into a regular fm transmitter capable of transmitting audio at desired frequency (generally 88-108 Mhz).

Note: Devices mentioned in the above lists include Arduino, Raspbery Pi, Beaglebone.

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(20MC6HS07) CONSTITUTION OF INDIA

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. The Directive Principles of State Policy – Its importance and implementation.
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.

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(20MC6CS01) BASIC TECHNICAL TRAINING

UNIT I

Data definition languages (DDL) commands of base tables and views.Data manipulation language (DML) of base tables and views.High level programming language extensions.Front end tools.Forms- triggers- menu design.Reports,Design and implementation of employee.An exercise using Open-Source Software like MySQL.

UNIT-II

Java Basics-Data Types, Variables, Arrays, Operators, Expressions, Control Statements, Introducing Classes, Methods, Constructors, Inner Classes, Anonymous Inner Classes, String Handling, Random, Scanner. Inheritance. Interfaces, Concepts of exception handling and multithreading. Java collection framework and I/O classes. Swing controls and connecting to database using JDBC.

UNIT-III

Python- Objects, Numbers, Sequences, files and Exceptions. Decision Structures and Boolean Logic, conditionals, functions, loop, lists, tuples, and dictionaries for representing compound data, Read and write data from/to files in
Python

UNIT- IV

PHP- Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists. JSP Servlets, Handling Http Request & Responses, Cookies and Sessions, 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.

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	3	**0**	**0**	**3**

(20IT6PE31) MACHINE LEARNING (Professional Elective- III)

Course Objectives:

1. This course explains machine learning techniques such as Decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

Course Outcomes:

1. Summarize the concepts of computational intelligence like machine learning.
2. Apply machine learning techniques to address the real time problems in different areas.
3. Infer the Neural Networks and its usage in machine learning application.
4. Application & implementation of Decision trees.
5. Gain knowledge on Bayesian Networks, Reinforcement Algorithms & analytical learning.

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 tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT – II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, preceptor, 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 neighbour 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.
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC).

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences: Neural Networks and Kernels, William W Hsieh, Cambridge University Press, 2008.
2. Pattern Classification, Richard O Duda, Peter E. Hart and David G. Stork, John Wiley & Sons Inc., 2001.
3. Neural Networks for Pattern Recognition, Chris Bishop, Oxford University Press, 1995.
4. Machine Learning: The Art and Science of Algorithms That Make Sense of Data, Peter Flach, Cambridge University Press, 2012.

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT6PE32) ETHICAL HACKING (Professional Elective- III)

PREREQUISITES::

1. A course on "Operating Systems".
2. A course on "Computer Networks".
3. A course on "Network Security and Cryptography".

Course Objectives:

1. The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
2. The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration).

Course Outcomes:

1. Make use of the concept of tools to support an ethical hack.
2. Interpret the results of a controlled attack.
3. Summarize the role of politics, inherent and imposed limitations and metrics for planning of a test.
4. Comprehend the dangers associated with penetration testing.
5. Construct the structure for deliver and implement the integration rules.

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: Intutive 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, Overal Structure, Aligning Findings, Presentation Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion.

TEXT BOOKS:`

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 Defense”, Cengage Learning.

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	3	**0**	**0**	**3**

(20IT6PE33) DEVOPS (Professional Elective - III)

Course Objectives:

1. DevOps improves collaboration and productivity by automating infrastructure and workflows and continuously measuring applications performance.

.**Course Outcomes: On successful completion of this course, students will be able to:**

1. Identify components of Devops environment.
2. Describe Software development models and architectures of DevOps.
3. Apply different project management, integration, and testing and code deployment tool.
4. Investigate different DevOps Software development models.
5. Collaborate and adopt Devops in real-time projects by assessing various DevOps practices.

UNIT - I

Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT - II

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.

DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT - III

Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT - IV

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT - V

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXT BOOKS:`

1. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
2. What is DevOps? Infrastructure as code, 1st Edition, Mike Loukides, O'Reilly publications, 2012.

REFERENCE BOOKS:`

1. Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
2. The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
3. Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
4. Achieving DevOps: A Novel about Delivering the Best of Agile, DevOps, and micro services, 1st Edition, Dave Harrison, Knox Lively, Apress publications, 2019.

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III Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT6PE34) MOBILE APPLICATION DEVELOPMENT (Professional Elective - III)

Course Objectives:

1. To demonstrate their understanding of the fundamentals of Android operating systems.
2. To demonstrate their skills of using Android software development tools.
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform.
4. To demonstrate their ability to deploy software to mobile devices.
5. To demonstrate their ability to debug programs running on mobile devices.

Course Outcomes: The student will be able to

1. Describe the working of Android OS.
2. Able to develop Android user interfaces.
3. Able to develop, deploy and maintain the Android Applications.
4. Able to implement Files concept.
5. Implement the concept of Creating Alarms.

UNIT I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, 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 units. 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. 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).

UNIT V

Advanced Topics: Alarms – Creating and using alarms. Using Internet Resources – Connecting to internet resource, using download manager Location Based Services – Finding Current Location and showing location on the Map, updating location.

TEXT BOOKS:

1. Professional Android 4 Application Development, RetoMeier, Wiley India, (Wrox),2012.
2. Android Application Development for Java Programmers, James C Sheusi, CengageLearning, 2013**.**

REFERENCE BOOKS:

1. Beginning Android 4 Application Development,Wei-Meng Lee, Wiley India (Wrox),2013.

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III Year B.Tech. IT-II Sem **L T P C**
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(20IT6PE35) SOFTWARE TESTING METHODOLOGIES (Professional Elective - III)

Prerequisite:
1. A course on "Software Engineering"

Course Objectives:
1. To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
2. To develop skills in software test automation and management using latest tools.

Course Outcomes: The student will be able to
1. Design and develop the path testing
2. Transaction Flow Testing.
3. Gain knowledge in Domain testing.
4. Summarize the State Graphs.
5. Analyze Graph Metrics & their Applications.

UNIT I
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy ofbugs 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 dataflow testing, strategies in dataflow testing, application of dataflow 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 orWin-runner).

TEXT BOOKS:
1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS:
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, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

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III Year B.Tech. IT-II Sem

L	T	P	C
0	0	3	1.5

(20IT6PE36) MACHINE LEARNING LAB

Course Objectives:

1. The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes:

1. Memorize the basics of Python programming.
2. Implement modern notions in data analysis-oriented computing;
3. Analyzing data sets using python programming.
4. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
5. Be capable of performing experiments in Machine Learning using real-world data

.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 theprobability 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 neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and 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., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

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.

- Identify any contradictions in the data.
- What is the unconditional probability of `golf' in the dataset?

- What is the conditional probability of `single' given `medRisk' in the dataset?
- Show how Bayes rule would be applied to probabilities derived from the dataset to calculate the conditional probability of `highRisk' given `low'.
- Draw out the tree that would be constructed by the decision-tree method for these examples. If you have no way to formally calculate uniformity (entropy) values, estimate these informally.
- Calculate the classification error rate generated by your decision tree for the following unseen examples.

```
medium   flying   banking    married  thirties yes -> lowRisk
high     speedway media      single   forties  yes -> highRisk
low      golf     transport  married  thirties yes -> medRisk
```

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

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	0	**0**	**3**	**1.5**

(20IT6PE37) ETHICAL HACKING LAB (Professional Elective - III)

Prerequisite:

1. A course on "Operating Systems"
2. A course on "Computer Networks"
3. A course on "Network Security and Cryptography".

Course Objectives:

1. The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
2. The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

Course Outcomes: The student will be able to

1. Make use of the concept of tools to support an ethical hack.
2. Interpret the results of a controlled attack.
3. Summarize the role of politics, inherent and imposed limitations and metrics for planning of a test.
4. Comprehend the dangers associated with penetration testing.
5. Construct the structure for deliver and implement the integration rules.

List of Experiments:

1. Setup a honey pot and monitor the honey pot on network
2. Write a script or code to demonstrate SQL injection attacks
3. Create a social networking website login page using phishing techniques
4. Write a code to demonstrate DoS attacks.
5. Install rootkits and study variety of options.
6. Study of Techniques uses for Web Based Password Capturing.
7. Install jcrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric Crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security And Management.
8. Implement Passive scanning, active scanning, session hijacking, cookies extraction using Burp suit tool.

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	0	**0**	**3**	**1.5**

(20IT6PE38) DEVOPS LAB (Professional Elective –III)

Course Outcomes: The student will be able to

1. Identify the Dev Ops tools used in software development life cycle
2. Sketch the importance of Jenkins to Build, Deploy and Test Software Applications
3. Examine the different Version Control strategies
4. Analyze & Illustrate the Containerization of OS images and deployment of applications over Docker
5. Summarize the importance of Software Configuration Management in DevOps
6. Synthesize the provisioning using Chef/Puppet/Ansible or Saltstack.

List of Experiments:

1. Installing Git
   a.Installing on Linux
   b.Installing on Windows
   c.Initial setup
2. Workstation Setup
   a.How to configure knife
   b.Execute some commands to test connection between knife and workstation
3. Organization Setup

   •Create organization
   •Add yourself and node to organization
4. Test Node Setup
   a.Create a server and add to organization
   b.Check node details using knife

5. Node Objects and Search
   a.How to Add Run list to Node
   b.Check node Details

6. Environments
   a.How to create Environments
   b.Add servers to environments

7. Roles
   •Create roles
   •Add Roles to organization

8. Attributes
   a.Understanding of Attributes
   b.Creating Custom Attributes
   c.Defining in Cookbooks
9. Data bags
   a.Understanding the data bags
   b.Creating and managing the data bags
   c.Creating the data bags using CLI and Chef Console
   d.Sample data bags for Creating Users.

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	0	**0**	**3**	**1.5**

(20IT6PE39) MOBILE APPLICATION DEVELOPMENT LAB (PROFESSIONAL ELECTIVE –III)

Course Objectives:

1. To learn how to develop Applications in android environment.
2. To learn how to develop user interface applications.
3. To learn how to develop URL related applications.

Course Outcomes:

1. Implement the working of Android OS Practically.
2. To develop user interfaces.
3. To develop, deploy and maintain the Android Applications.
4. To create text files for authentication.
5. To develop alarm based 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, and 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 dialling 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 login 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 8:00 AM. 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.

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.

TEXT BOOKS:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

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	0	**0**	**3**	**1.5**

(20IT6PE310) SOFTWARE TESTING METHODOLOGIES LAB(PROFESSIONAL ELECTIVE –III)

Course Objectives:

1. To provide knowledge of Software Testing Methods.
2. To develop skills in software test automation and management using latest tools.

Course Outcomes:

1. Design and develop the best test strategies in accordance to the development model.
2. Design GUI checkpoint single & multiple objects.
3. Design GUI checkpoint for Object/window.
4. Design data driven batch .
5. Implementation of interrupt execution.

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
   a)Bitmap checkpoint for object/window b) Bitmap checkpoint for screen area
5. Database checkpoint for Default check
6. Database checkpoint for custom check
7. Database checkpoint for runtime record check
   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
8. a) Batch testing without parameter passing
   b) Batch testing with parameter passing
9. Data driven batch
10. Silent mode test execution without any interruption
11. Test case for calculator in windows application

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	3	**0**	**0**	**3**

(20IT7PC04) INFORMATION SECURITY

Prerequisite:

A Course on "Computer Networks and a course on Mathematics.

Course Objectives:

1. To understand the fundamentals of Cryptography
2. To understand various key distribution and management schemes
3. To understand how to deploy encryption techniques to secure data in transit across data
4. Networks
5. To apply algorithms used for secure transactions in real world applications

Course Outcomes: The student will be able to

1. Develop information security architecture, as well as any legal or regulatory challenges that may arise.
2. Summerize Devices for detecting, analyzing, and dealing with threats to an organization.
3. Evaluate network security threats and countermeasures.
4. Construct network security designs using available secure solutions. (such as PGP, SSL, IPSec, etc)
5. Acquire the knowledge of advanced security issues and technologies.

UNIT - I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security. Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

UNIT - II

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

UNIT - III

Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT - IV

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT - V

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

TEXT BOOKS:

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

REFERENCE BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

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	3	**0**	**0**	**3**

(20IT7PC05) DATA MINING

Pre-Requisites:

1. A course on "Database Management Systems"
2. Knowledge of probability and statistics

Course Objectives:

1. To improve the system performance.
2. To learn various distributed and parallel computing architecture.
3. To learn different computing technologies.

.**Course Outcomes:**

1. Summarize standard data mining methods and general classification of tasks and primitives to integrate a data mining system.
2. Perform the data preparation tasks and understand the implications.
3. Apply the alternative knowledge representation such as rules, decision trees, decision tables and Bayesian networks.
4. Apply core data mining techniques for data analytics.
5. Apply various Text Mining and Web Mining Techniques.

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.

UNITIV

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.

TEXT BOOKS:`

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 BOOKS:`

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques(Second Edition), Morgan Kaufmann, 2005.

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	0	**0**	**3**	**1**

(20IT7PC06) DATA MINING LAB

Course Objectives:

To obtain practical experience using data mining techniques on real world data sets. Emphasize hands-on experience working with all real data sets.

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.

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	3	**0**	**0**	**0**

(20MC6CS02) ADVANCED TECHNICAL TRAINING

Course Objectives:

- Understand the client-side JavaScript application development through React library.
- Apply React features such as forms, reuse and nest components.
- Develop functional front-end web application using React. Implement state management, routing and data incorporation in React

UNIT I:

React introduction: Strong foundation, React past and future, working with the files JavaScript for React: Declaring variables, Creating functions, Compilation, Objects and Arrays, Asynchronous JavaScript, Classes**.**

UNIT II:

Functional programming with JavaScript: Introduction, imperative versus declarative, functional concepts. Working with React: Page setup, React Elements, React DOM, React Components.

UNIT III:

React with JSX: React Elements in JSX, Babel, Recipes as JSX, React Fragments, Introduction to webpack. State Management: Building a star rating component, use State Hook, Refactoring, State in component trees, Building forms.

UNIT IV:

Incorporation of Data: Requesting data, Render Props, Virtualized Lists, Suspense: Error boundaries, Code splitting.

React Router: Incorporating router, Router properties.

TEXT BOOKS:`

1. Alex Banks and Eve Porcello, Learning React, O'Reilly Publications, 2020.

REFERENCE BOOKS:`

1. Robin Wieruch, The Road to React, 2022 edition, independently published, 2022.
2. KirupaChinnathambi Learning React: A Hands-On Guide to Building Web Applications Using React and Redux 2nd Edition Addison-Wesley Professional; 2nd edition, 2018.
3. E-resources and other digital material Andrei Neagoie, Yihua Zhang, Complete React Developer in 2022, Available: 08-06-2022, https://www.udemy.com/course/complete-react-developer-zero-to-mastery/
4. Jogesh K. Muppala, Front-End Web Development with React, The Hong Kong University of Science and Technology, Available: 08-06-2022https://www.coursera.org/learn/front-end-react
5. React, Official documentation,Available: 08-06-2022, https://reactjs.org/

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	3	**0**	**0**	**3**

(20IT7PE41) NEURAL NETWORKS & DEEP LEARNING
(Professional Elective- IV)

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks.
2. To acquire the knowledge on Deep Learning Concepts.
3. To learn various types of Artificial Neural Networks.
4. To gain knowledge to apply optimization strategies.

.**Course Outcomes:**

1. Summarize the concepts of Neural Networks.
2. Choose appropriate Learning Networks in modeling real world systems.
3. Make use of an efficient algorithm for Deep Models.
4. Analyze the regularization for deep learning.
5. Apply optimization strategies for large scale applications.

UNIT - I

Artificial Neural Networks: Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT - II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks- Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed – forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV

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 Typing and
Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms,

Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:`

1. Deep Learning: An MIT Press Book By Ian Good fellow and Yoshua Bengio and Aaron Courville.
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

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	3	**0**	**0**	**3**

(20IT7PE42) HIGH PERFORMANCE COMPUTING
(Professional Elective- IV)

Pre-Requisites:

1. Computer Organization & Architecture.
2. Operating System Programming.

Course Objectives:

1. To improve the system performance.
2. To learn various distributed and parallel computing architecture.
3. To learn different computing technologies.

.**Course Outcomes:**

1. Make use of the concepts in grid computing.
2. Set up cluster and run parallel applications.
3. Make use of cluster projects and cluster OS.
4. Discover the concepts of pervasive computing.
5. Demonstrate the concepts of quantum computing.

UNIT - I

Grid Computing: Data & Computational Grids, Grid Architectures and Its Relations to Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (Ibm).

UNIT - II

Cluster Setup & Its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging Systems. Process Scheduling, Load Sharing And Balancing; Distributed Shared Memory, Parallel I/O.

UNIT - III

Example Cluster System – Beowlf; Cluster Operating Systems: Compas And Nanos Pervasive Computing Concepts & Scenarios; Hardware & Software; Human – Machine Interface.

UNIT- IV

Device Connectivity; Java for Pervasive Devices; Application Examples.

UNIT - V

Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms**.**

TEXT BOOKS:`

2. "Selected Topics In Advanced Computing" Edited By Dr. P. Padmanabham And Dr. M.B. Srinivas, 2005 Pearson Education.

REFERENCE BOOKS:`

6. J. Joseph & C. Fellenstien: 'Grid Computing ', Pearson Education.
7. J. Burkhardt et.al: 'pervasive computing' Pearson Education.
8. Marivesar:' Approaching quantum computing', Pearson Education.
9. Raj kumar Buyya:'High performance cluster computing', Pearson Education.
10. Neilsen & Chung L:' Quantum computing and Quantum Information', Cambridge University Press.
11. A networking approach to Grid Computing, Minoli, Wiley.

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	3	**0**	**0**	**3**

(20IT7PE43) WEB SECURITY
(Professional Elective- IV)

Course Objectives:

1. Give an Overview of information security.
2. Give an overview of Access control of relational databases.

.**Course Outcomes:**

1. Summarize the Web architecture and applications.
2. Develop client side and service side programming.
3. Demonstrate the common mistakes can be bypassed and exploit the application.
4. Identify common application vulnerabilities.
5. Develop policies and procedures to manage enterprise security risks.

UNIT - I

The Web Security, the Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities.

UNIT - V

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:`

1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia.

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	3	**0**	**0**	**3**

(20IT7PE44) CLOUD COMPUTING (Professional Elective - IV)

Pre-requisites:

1. A course on "Computer Networks"
2. A course on "Operating Systems"
3. A course on "Distributed Systems"

Course Objectives:

1. This course provides an insight into cloud computing
2. Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes: The student will be able to

1. To discuss the concepts of computing paradigm.
2. To memorize the virtualization and cloud computing concepts.
3. To get the knowledge of cloud computing architecture layer management.
4. To discuss the various service delivery models.
5. To describe the various cloud service providers.

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, 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 BOOKS:`

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and AndrzejM. 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, rp 2011.

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(20IT7PE45) BLOCKCHAIN TECHNOLOGY
(Professional Elective- IV)

Pre-requisites:

1. Knowledge in security and applied cryptography;
2. Knowledge in distributed databases

Course Objectives:

1. To Introduce block chain technology and Crypto currency.

Course Outcomes: The student will be able to

1. Describe the basic concepts and technology used for block chain.
2. Describe the primitives of the distributed computing and cryptography related to block chain.
3. Illustrate the concepts of Bit coin and their usage.
4. Make use of the concepts of currency, Token, and Campus coin.
5. Analyze the challenges and discuss the government regulations.

UNIT- I

Introduction: Block chain or distributed trust, Protocol, Currency, Crypto currency, How a Crypto currency works, Crowd funding.

UNIT- II

Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment.

UNIT- III

Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs.

UNIT - IV

Currency, Token, Tokenizing, Campus coin, Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

UNIT - V

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

TEXT BOOKS:`

1. Block chain Blue print for Economy by Melanie Swan.

REFERENCE BOOKS:

1. Block chain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher.

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(20IT7PE51) DATA SCIENCE AND R PROGRAMMING (Professional Elective- V)

Pre-requisites:

1. A course on "Database Management Systems".
2. Knowledge of probability and statistics.

Course Objectives:

1. To explore the fundamental concepts of data analytics.
2. To learn the principles and methods of statistical analysis.
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. To understand the various search methods and visualization techniques.

Course Outcomes: The student will be able to

1. Make use of the concepts of R programming language.
2. Use R to solve statistical problems.
3. Apply and able to implement functions to list and to access data frames.
4. Implement the concepts minimize and maximize functions using R.
5. Demonstrate advanced skills in data acquisition and management.

UNIT – I

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations.

UNIT – II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations.

UNIT – III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations.

UNIT – IV

Factors And Tables, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions.

UNIT – V

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 & Processing.

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.

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(20IT7PE52) QUANTUM COMPUTING (Professional Elective- V)

Course Objectives:

1. To know the background of classical computing and quantum computing.
2. To learn the fundamental concepts behind quantum computation.
3. To study the details of quantum mechanics and the relation to Computer Science.
4. To gain knowledge about the basic hardware and mathematical models of quantum computation.
5. To learn the basics of quantum information and the theory behind it.

Course Outcomes: The student will be able to

1. Make use of the basics of quantum computing.
2. Apply the background of Quantum Mechanics for the computation models.
3. Model the circuits using quantum computation.
4. Apply the quantum operations such as noise and error–correction.
5. Appreciate the need of quantum computing.

UNIT I

FUNDAMENTAL CONCEPTS: Global Perspectives – Quantum Bits – Quantum Computation – Quantum Algorithms – Experimental Quantum Information Processing – Quantum Information.

UNIT II

QUANTUM MECHANICS AND OVERVIEW OF COMPUTATIONAL MODELS: Quantum Mechanics:

Linear Algebra – Postulates of Quantum Mechanics – Application: Super dense Coding – Density Operator – The Schmidt Decomposition and Purifications – EPR and the Bell Inequality – Computational Models: Turing Machines – Circuits – Analysis of Computational Problems.

UNIT III

QUANTUM COMPUTATION : Quantum Circuits: Quantum Algorithms – Universal Quantum Gates – Quantum Circuit Model of Computation – Simulation – Quantum Fourier Transform and Applications – Quantum Search Algorithms – Quantum Computers

UNIT IV

QUANTUM INFORMATION: Quantum Noise and Quantum Operations: Classical Noise and Markov processes – Quantum Operations – Examples – Applications – Distance Measures for Quantum Information – Quantum Error Correction – Entropy.

UNIT V

QUANTUM INFORMATION THEORY: Quantum States and Accessible Information – Data Compression – Classical Information over Noisy Quantum Channels – Quantum Information over Noisy Quantum Channels – Entanglement as a Physical Resource – Quantum Cryptography.

TEXT BOOKS:`

1. Michael A. Nielsen, Issac L. Chuang, “Quantum Computation and Quantum Information”, Tenth Edition, Cambridge University Press, 2010.

REFERENCE BOOKS:

1. Scott Aaronson, “Quantum Computing Since Democritus”, Cambridge University Press, 2013
2. N. David Mermin, “Quantum Computer Science: An Introduction”, Cambridge University Press, 2007.

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(20IT7PE53) CYBER FORENSICS (Professional Elective- V)

Course Objectives:

1. Objective is to provide digital evidences which are obtained from digital media. In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.

Course Outcomes: The student will be able to

1. Make use of the difference types of cyber crimes.
2. Acquire the knowledge of computers in forensic.
3. Implementation of various forensic tools for a wide variety of investigations.
4. Use of virtual machines in cyber forensics.
5. Continue their zeal in research in computer forensics.

UNIT I

Introduction of Cybercrime: Types, The Internet spawns 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, and 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 & 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 & mobile device forensics: mobile device forensics, understanding acquisition procedures for cell phones & 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, AddisonWesley Pearson Education
2. Forensic Compiling, A Practitioner is Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

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(20IT7PE54) AD-HOC & SENSOR NETWORKS
(Professional Elective- IV)

Pre-requisites:

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 security of sensor networks
4. To understand the applications of adhoc and sensor networks

Course Outcomes: The student will be able to

1. Illustrate the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks.
2. Discuss the data transmission and multicasting based on ASN.
3. Discuss the concept of geo casting.
4. Solve the lower layer issues in real-time application development based on ASN.
5. Solve the upper layer issues in real-time application development based on 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 outing 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

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, 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).

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(20IT7PE55) SOFTWARE PROCESS & PROJECT MANAGEMENT (Professional Elective - V)

Course Objectives:

1. To acquire knowledge on software process management
2. To acquire managerial skills for software project development
3. To understand software economics

Course Outcomes: The student will be able to

1. Infer the concept of software process assessment and reference models.
2. To get knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation.
3. To analyze the major and minor milestones, artifacts and metrics from management and technical perspective
4. To design and develop software product using conventional and modern principles of software project management
5. To analyze the case study and future 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 SoftwareEconomics, 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, Pragmaticsoftware 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.

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(20HS8MS02) ORGANIZATIONAL BEHAVIOR

Course Objectives:

To provide the students with the conceptual framework and the theories underlying Organizational Behavior.

Course Outcomes: The student will be able to

1. Analyze the behavior of individuals andgroups in organizations in terms of the key factors that influence organizational behavior.
2. Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behavior.
3. Summarize the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behavior.
4. Analyze organizational behavioral issues in the context of organizational behavior theories, models and concepts.

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 ofcontrol – 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 – Job 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 modern work place.

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 BOOKS:`

1. Luthans, Fred: Organizational Behavior 10/e, McGraw-Hill, 2009
2. Mc Shane: Organizational Behavior, 3e, TMH, 2008
3. Nelson: Organizational Behavior, 3/e, Thomson, 2008.
4. New strom W. John& Davis Keith, Organizational Behavior-- Human Behavior at Work, 12/e, TMH, New Delhi, 2009.

REFERENCE BOOKS::`

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.

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(20IT8PE61) BIG DATA
(Professional Elective- VI)

Pre- requisites:
Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

Course Objectives:

1. Understand the Big Data Platform and its Use cases.
2. Provide an overview of Apache Hadoop.
3. Provide HDFS Concepts and Interfacing with HDFS.
4. Understand Map Reduce Jobs.
5. Provide hands on Hodoop Eco System.
6. Apply analytics on Structured, Unstructured Data

.**Course Outcomes: The student will be able to**

1. Identify Big Data and its Business Implications.
2. Classify the components of Hadoop and Hadoop Eco-System.
3. Assess and Process Data on Distributed File System.
4. Manage Job Execution in Hadoop Environment.
5. Develop Big Data Solutions using Hadoop Eco System.

UNIT I
INTRODUCTION TO BIG DATA AND HADOOP
Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II
HDFS (Hadoop Distributed File System)
The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III
Map Reduce: Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT IV
Hadoop Eco System
Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables,

Querying Data and User Defined Functions.

UNIT V
Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.
Big SQL: Introduction.

TEXT BOOKS:`

1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS::`

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013).
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oraclepress.
4. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.

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(20IT8PE62) AUGMENTED VIRTUAL REALITY (Professional Elective – VI)

Course Objectives: To learn

1. This course is designed to introduce students to the field of virtual reality (VR) and provide students with hands-on experience developing applications for modern virtual and augmented reality systems.
2. The students learn about the historical development of virtual reality technology and virtual reality as a research field, gain mastery of fundamental principles, algorithms, and design patterns in computer graphics, discover the perceptual science behind mixed reality technologies, and explore libraries and tools for creating VR experiences such as WebGL and Unity.

Course Outcomes:

1. To apply the fundamental concepts relating to Virtual Reality such as presence, immersion, and engagement
2. To illustrate critique academic research papers relating to Virtual Reality
3. To work successfully with a group of peers from a variety of disciplines on a team project
4. To communicate and present individual and group project work
5. To demonstrate competence with several modern Virtual Reality technologies such as Google Cardboard, Google Sketch Up, Unity, the Oculus Rift and the HTC Vive.

UNIT I

VIRTUAL REALITY AND VIRTUAL ENVIRONMENTS: The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual environments, Requirements for VR, benefits of Virtual reality. HARDWARE TECHNOLOGIES FOR 3D USER INTERFACES: Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfaces.

UNIT II

3D USER INTERFACE INPUT HARDWARE: Input device characteristics, Desktop input devices, Tracking Devices, 3D Mice, Special Purpose Input Devices, Direct Human Input, Home - Brewed Input Devices, Choosing Input Devices for 3D Interfaces.

UNIT III

SOFTWARE TECHNOLOGIES: Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User Interface, Control Panel, 2D Controls, Hardware Controls, Room / Stage / Area Descriptions, World Authoring and Playback, VR toolkits, Available software in the market

UNIT IV

3D INTERACTION TECHNIQUES: 3D Manipulation tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation, Deign Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations of Wayfinding, User Centered Wayfinding Support, Environment Centered Wayfinding Support, Evaluating Wayfinding Aids, Design Guidelines - System Control, Classification, Graphical Menus, Voice Commands, Gestrual Commands, Tools, Mutimodal System Control Techniques, Design Guidelines, Case Study: Mixing System Control Methods, Symbolic Input Tasks, symbolic Input Techniques, Design Guidelines, Beyond Text and Number entry .

DESIGNING AND DEVELOPING 3D USER INTERFACES: Strategies for Designing and Developing Guidelines and Evaluation.

VIRTUAL REALITY APPLICATIONS: Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.

UNIT V

Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

TEXT BOOKS:`

1. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.
2. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
3. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice",Addison Wesley, USA, 2005.
4. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005.
5. Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology", Wiley Interscience, India, 2003.
6. John Vince, "Virtual Reality Systems", Addison Wesley, 1995.
7. Howard Rheingold, "Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society", Simon and Schuster, 1991.
8. William R Sherman and Alan B Craig, "Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
9. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

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(20IT8PE63) COGNITIVE COMPUTING (Professional Elective – VI)

Course Objectives: To learn

1. To know the theoretical background of cognition.
2. To understand the link between cognition and computational intelligence.
3. To explore probabilistic programming language.
4. To study the computational inference models of cognition.
5. To study the computational learning models of cognition.

Course Outcomes:

6. Develop the underlying theory behind cognition.
7. Connect to the cognition elements computationally.
8. Implement mathematical functions through WebPPL.
9. Develop a cognitive inference & learning models.
10. Explore the recent trends in cognitive computing..

UNIT I

PHILOSOPHY, PSYCHOLOGY AND NEUROSCIENCE : Philosophy: Mental-physical Relation – From Materialism to Mental Science – Detour before the naturalistic turn – The Philosophy of Science – The Mind in Cognitive Science – Logic and the Sciences of the Mind – Psychology: Place of Psychology within Cognitive Science – Science of Information Processing – Neurosciences: Cognitive Neuroscience – Perception – Decision
–Learning and Memory – Language Understanding and Processing.

UNIT II

COMPUTATIONAL INTELLIGENCE : Machines and Cognition – Artificial Intelligence – Architectures of Cognition – Knowledge Based Systems – Logical Representation and Reasoning – Logical Decision Making – Decision making under Uncertainty – Learning – Language – Vision – Robotics.

UNIT III

PROBABILISTIC PROGRAMMING LANGUAGE : WebPPL Language – Syntax – Using Javascript Libraries – Manipulating probability types and distributions – Finding Inference – Exploring random computation – Coroutines: Functions that receive continuations –Enumeration – Other basic computation.

UNIT IV

IMPLEMENTING THE INFERENCE MODELS OF COGNITION: Generative Models – Conditioning – Causal and statistical dependence – Conditional dependence – Data Analysis – Algorithms for Inference.

UNIT V

IMPLEMENTING THE LEARNING MODELS OF COGNITION: Learning as Conditional Inference – Learning with a Language of Thought – Hierarchical Models – Occam's razor – Learning (Deep) Continuous Functions – Mixture Models.

TEXT BOOKS:`

1. Robert A. Wilson, Frank C. Keil, "The MIT Encyclopedia of the Cognitive Sciences", The MIT Press, 1999.

REFERENCE BOOKS::`

1. Noah D. Goodman, Andreas Stuhlmuller, "The Design and Implementation of Probabilistic Programming Languages", Electronic version of book, https://dippl.org/.
2. Noah D. Goodman, Joshua B. Tenenbaum, The ProbMods Contributors, "Probabilistic Models of Cognition", Second Edition, 2016, https://probmods.org/.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

IV Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT8PE64) MOBILE COMPUTING (Professional Elective – VI)

Course Objectives: To learn

1. To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
2. To understand the typical mobile networking infrastructure through a popular GSM protocol.
3. To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer.
4. To understand the database issues in mobile environments & data delivery models.
5. To understand the ad hoc networks and related concepts.
6. To understand the platforms and protocols used in mobile environment.

Course Outcomes:

1. Develop new mobile application.
2. Solve technical issue related to this new paradigm and come up with a solution(s).
3. Develop new ad hoc network applications and/or algorithms/protocols.
4. Design a new protocol related to mobile environment.
5. Evaluate the effectiveness of different mobile computing frameworks.

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

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposedterminals, 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.

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IV Year B.Tech. IT-II Sem	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(20IT8PE65) MODERN SOFTWARE ENGINEERING (Professional Elective – VI)

Course Outcomes:

1. Illustrate agile development, Extreme Programming & XP life cycle.
2. Analyze the coding standards for collaboration.
3. Make use of Bug free version for documentation releasing.
4. Discover the risks involved in software planning
5. .Design architecture and testing for Modern software engineering process.

UNIT I

Introduction Extreme Programming (XP) - Agile Development Why Agile - Understanding Success, Beyond Deadlines, Importance of Organizational Success, Introduction to Agility, How to Be Agile - Agile methods, Don't make your own method, Road to mastery, Understanding XP (Extreme Programming) - XP life cycle, XP team, XP Concepts, Adopting XP - Knowing whether XP is suitable, Implementing XP, assessing Agility, Practicing XP - Thinking - Pair Programming, Energized work, Informative Workspace, Root cause Analysis, Retrospectives

UNIT II

Collaborating: Trust, Sit together, Real customer involvement, Ubiquitous language, meetings, coding standards, Iteration demo, Reporting

UNIT III

Releasing: Bug free Release, Version Control, fast build, continuous integration, Collective ownership, Documentation.

UNIT IV

Planning: Version, Release Plan, Risk Management, Iteration Planning, Slack, Stories, Estimating.

UNIT V

Developing: Incremental requirements, Customer tests, Test driven development, Refactoring, Incremental design and architecture, spike solutions, Performance optimization, Exploratory testing.

TEXT BOOKS:`

1. The art of Agile Development, James Shore and Shane Warden, 11th Indian Reprint, O'Reilly, 2018.

REFERENCE BOOKS::`

1. Learning Agile, Andrew Stellman and Jennifer Greene, O'Reilly, 4th Indian Reprint, 2018.
2. Practices of an Agile Developer, Venkat Subramaniam and Andy Hunt, SPD, 5th Indian Reprint, 2015.
3. Agile Project Management - Jim Highsmith, Pearson Low price Edition 2004.

Program Educational Objectives (PEO's):

PEO1: The graduates will be prepared to adopt emerging technologies for professional growth.

PEO2: The graduates will be able to pursue research in upcoming technologies related to Information Technology with ethics.

PEO3: The graduates will be able to apply their knowledge through lifelong learning to meet the challenges of the society.

Programme Outcomes (PO's) :

PO1.Engineering knowledge: Ability to obtain and apply the knowledge of science and engineering essentials in problem solving.

PO2.Problem Analysis: Ability to undertake problem recognition ,formulation and providing ideal solution.

PO3.Design/development of solutions: An ability to design and implement a computer based system to meet the essential of social and environmental applications.

PO4.Conduct investigations of complex problems: An ability to apply knowledge of mathematics, science, engineering fundamentals and concepts of Information Technology to solve complex problems.

PO5. Modern tool usage: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PO6.Engineer and society: An ability to understand the impact of engineering solutions on the society and also will be aware of contemporary issues.

PO7.Environment and sustainability: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.

PO8.Ethics: Understanding of the social, liberal, universal and provisional responsibilities as a well-qualified engineer.

PO9.Individual and team work: Ability to function adequately as an individual and in a group with the capacity to be a team leader.

PO10. Communication: Ability to communicate extensively, not only with engineers but also with the association at large.

PO11.Project management and finance: An understanding of engineering, finance and management principles to manage projects.

PO12.Life-long learning: Recognizing the need to undertake higher studies and inspires to update the latest technologies by the way of life-long learning process.

Program Specific Outcomes: (PSO's):

PSO1: Use and apply current trends, technologies and practices to provide Information Technology Solutions.

PSO2: Have strong skills in learning new programming environment as it is used to automate things and simplify real world problems and human efforts.

Institutes Under

TKR EDUCATIONAL SOCIETY

Teegala Krishna Reddy Engineering College(TKEM)

TKR College of Engineering and Technology(TKRC)

TKR Institute of Management and Science(TKRB)

TKR College of Pharmacy(TKRP)