R22

ACADEMIC REGULATIONS, COURSE STRUCTURE, AND DETAILED SYLLABUS

INFORMATION TECHNOLOGY

Applicable to

B.Tech Regular Four Year Degree Programme

(For the Batches admitted from the Academic Year 2022-23)

B.Tech (Lateral Entry Scheme)

(For the Batches admitted from the Academic Year 2023-2024)

Offered under Choice Based Credit System (CBCS)

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 Programme in Engineering & Technology (UGP in E&T)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE (TKREC) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice BasedCredit System (CBCS) in all branches of Engineering with effect from the Academic Year 2022-23

2.0. Eligibility for Admission

2.1. Admission to the undergraduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAMCET) or the University or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the government from time to time.

2.2. The medium of instructions for the entire undergraduate programme in Engineering & Technology will be **English** only.

3.0 B.TECH. PROGRAMME STRUCTURE

3.1. A student after securing admission shall complete the B.Tech. programme in a minimumperiod of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester,failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the undergraduate programme and award of the B.Tech. Degree.

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

3.2.1. Semester Scheme

Each undergraduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks (≥ 90 instructional days) each and in each semester - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum /course structure suggested by AICTE are followed.

3.2.2 Credit Courses

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

- One credit for one hour/ week/ semester for Theory/ Lecture (L) courses or Tutorials.
- One credit for two hours/ week/ semester for Laboratory/ Practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab are mandatory courses. These courses will not carry any credits.

3.2.3 Subject Course Classification

All subjects/ courses offered for the undergraduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The College

has followed almost all the guidelines issued by AICTE/UGC.

S. NO.	CATEGORY	Suggested breakup of credits (Total 160)
1	Humanities and Social sciences including Management	10*
2	Basic Sciences	22.5*
3	Engineering Sciences courses including Workshop, Drawing, basics of Electrical /Mechanical / Computer etc.	18.5*
4	Professional Core Courses	63*
5	Professional Elective Courses relevant to chosen specialization/branch	19*
6	Open Electives-Electives from other technical and/or emerging subjects	9*
7	Project work, Seminar and Internship in Industry or elsewhere	18*
8	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	01, 02, 03, 04, 05, 06, 07, 08
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.	01 to 09

4.0. COURSE REGISTRATION

4.1. A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

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

4.3. A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor / counselor, 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 and the student.

4.4. A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s) / course(s) limited to 6 Credits (any 2 elective subjects), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites'** as indicated for various subjects / courses, in the department course structure and syllabus contents.

4.5. Choice for '**additional subjects/ courses**', not more than any 2 elective subjects in any Semester, must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor / Mentor / HOD.

4.6. If the student submits ambiguous choices or multiple options or erroneous entries during **on-line** registration for the subject(s) / course(s) under a given/ specified course group/ category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.

4.7. 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 could not be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject(subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within **a week** after the commencement of class-work for that semester.

4.8. Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

4.9**. Open Electives**: The students have to choose three Open Electives (OE-I, II & III) from the list of Open Electives given by other departments. However, the student can opt for an Open Elective subject offered by his own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat / should not match with any category (Professional Core, Professional Electives, and Mandatory Courses etc.) of subjects even in the forthcoming semesters.

4.10**. Professional Electives**: The students have to choose six Professional Electives (PE-I to VI) from the list of professional electives given.

5.0. SUBJECTS / COURSES TO BE OFFERED

5.1. A subject/ course may be offered to the students, **only if** a minimum of 15 students opt for it.

5.2. 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 for students will be based on - '**first come first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

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

5.4. In case of options coming from students of other departments/ branches/ disciplines (not considering **open electives**), first **priority** shall be given to the student of the '**parent department**'.

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 of all the subjects/ courses (including attendance in mandatory courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab) for that semester. **Two periods** of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject. **This attendance should alsobe included in the attendance submitted every fortnight to the College Examination Branch.**

6.2. Shortage of attendance in aggregate upto 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

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

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

6.5. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled, including all academic credentials (internal marks etc.) of that semester**. They will not be promoted to the next semester.** They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re- registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

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

7.0. ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied, in addition to the attendancerequirements mentioned in Item No. **6**.

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

allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks including minimum 35% of average Mid-Term examinations for 25 marks) in the internal examinations, not less than 35% (21 marks out of 60 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 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. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship (or) Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industry Oriented Mini Project / Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time ResearchProject (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship evaluations.

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

7.3. **Promotion Rules**

S. No.	Promotion	Conditions to be fulfilled
1	**First year first semester to firstyear second semester**	**Regular course of study of first year first semester.**
2	**First year second semester to Second year first semester**	**(i) Regular course of study of first yearsecond semester.** **(ii) Must have secured at least 20 credits out of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whetherthe student takes those examinations or not.**
3.	**Second year first semester to Second year second semester**	**Regular course of study of second year first semester.**
4	**Second year second semester toThird year first semester**	**(i) Regular course of study of second year second semester.**

		(ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	**Third year first semester to Thirdyear second semester**	**Regular course of study of third year first semester.**
6	**Third year second semester to Fourth year first semester**	**(i) Regular course of study of third year second semester.** **(ii) Must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second Semester from all the relevant regular and supplementary examinations,whether the student takes those examinations or not.**
7	**Fourth year first semester toFourth year second semester**	**Regular course of study of fourth year first semester.**

7.4. A student (i) shall register for all courses /subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA $\geq$ 5.0 (in each semester), and CGPA $\geq$ 5 (at the end of 8 semesters), (iv) **passes all the mandatory courses,** to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA **(at the end of undergraduate programme),** and shall be indicated in the grade card / marks memo of IV-year II semester.

7.5. If a student registers for **'extra subjects'** (in the parent department or other departments / branches of Engg.) other than those listed subjects totaling to 160 credits as specified in the course structure of his department, the performances in those '**extra subjects**' (although evaluated and graded using the same procedure as that of the required 160 credits) will not be considered while calculating the SGPA and CGPA. For such '**extra subjects'** registered, percentage of marks and letter grade alone will be indicated in the grade card / marks memo as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations Items 6 and 7.1 – 7.4 above.

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

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

7.8. A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of academic credits.** The academic regulations under which the student has been readmitted 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 and Project Stage – I & II) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination).

8.2. In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of one part for 30 marks with a total duration of 2 hours as follows:

1. Midterm Examination in descriptive mode for 30 marks:

The remaining 10 marks of Continuous Internal Assessment (out of 40) are distributed as:

2. Assignment for 5 marks. (Average of 2 Assignments each for 5marks)
3. Subject Viva-Voce / PPT / Poster Presentation / Case Study on a topic in the concerned subject for 5 marks.

The descriptive paper shall contain 5 full questions out of which, the student has to answer all the questions, each carrying 6 marks and internal choice may be given. Average of two mid-term examinations (I Mid-Term & II Mid-Term) will be taken as final marks for mid-term examinations (For 30 marks).

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce / PPT / Poster Presentation / Case Study on a topic in the subject concerned for 5 marks before II Mid-Term Examination.

- The student, in each subject, shall have to earn 35% of marks(i.e.14 marks out of 40 marks) in CIE, 35% of marks (i.e.21 marks out of 60) in SEE and overall 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together to get pass grade (i.e. **C**) or above.
- The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 continuous Internal Examination (CIE) marks.
- In case, the student appears for Semester End Examination of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled in spite of appearing the SEE.

There is NO Computer Based Test (CBT) for R22 regulations.

8.2.1 The semester end examinations (SEE), for theory subjects, will be conducted for 60marks consisting of two parts viz. i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each 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 duration of Semester End Examination is 3 hours.

<u>The details of evaluation of end semester exam are as follows</u>

- Double evaluation of the answer scripts for the External Examinations 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.

8.2.2. For the subject, Computer Aided Engineering Graphics, the Continuous Internal Evaluation(CIE) and Semester End Examinations (SEE) evaluation pattern is same as for other theory subjects.

8.3 For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components / procedure, expected outcome) which shall be evaluated for 10 marks.
2. **10 marks for viva-voce (**or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before

semester end practical examination.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the college.

In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:

10 marks for write-up

15 marks for experiment/program

15 marks for evaluation of results

10 marks for presentation on another experiment / program in the same laboratory course and

10 marks for viva-voce on concerned laboratory course

❖ The student, in each subject, shall have to earn 35% of marks(i.e.14 marks out of 40 marks) in CIE, 35% of marks (i.e.21 marks out of 60) in SEE and overall 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together to secure Pass grade (i.e. "C") or above.

❖ The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 continuous Internal Examination (CIE) marks.

❖ In case, the student appears for Semester End Examination of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled in spite of appearing the SEE.

8.4 The evaluation of courses having ONLY internal marks in I-Year I Semester and II- Year II Semester is as follows:

1) I Year I Semester course (*ex., Elem ents of CE / ME / EEE / ECE / CSE*): The Continuous Internal Evaluation (CIE) is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations are the final for 50 marks. Student shall have to earn 40%, i.e. 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) is absent as per schedule,or (ii) secures less than 40% marks in this course.

   For CSE / IT and allied branches the Continuous Internal Evaluation (CIE) will be for 50 marks. Each Mid-Term examination consists of two parts i) Part – A for 20 marks, ii) Part – B for 20 marks with a total duration of 2 hours.

Part A: Objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 20 marks.

Part B: Descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.

The remaining 10 marks of Continuous Internal Evaluation are for Assignment (5 marks) and Subject Viva-Voce / PPT / Poster Presentation / Case Study (5 marks) and the evaluation pattern will remain same as for other theory subjects.

For all other branches, the Continuous Internal Evaluation (CIE) will be for 50 marks. Out of the 50 marks for internal evaluation:

a) A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks

b) 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.

c) Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 15 marks.

d) The remaining 15 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

2) II Year II Semester *Real-Time (or) Field-based Research Project* course: The Continuous Internal Evaluation (CIE) is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations are the final for 50 marks. Student shall have to earn 40%, i.e. 20 marks out of 50 marks from average of the two examinations. There shall be NO externalevaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (iii) secures less than 40% marks in this course..

8.5. There shall be Industry training (or) Internship (or) Industry oriented Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project in collaboration with an industry of their specialization. Students shall register for this immediately after II-Year II Semester Examinations and pursue it during summer vacation /semester break & during III Year without effecting regular course work. Internship at reputed organization (or) Skill development courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project

shall be submitted in a report form and presented before the committee in III-year II semester before end semester examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Industry Oriented Mini Project (or) Internship etc, Internal Supervisor and a SeniorFaculty Member of the Department. There shall be **NO internal marks** for Industry Training (or) Internship (or) Mini-Project (or) Skill Development Courses (or) Paper Presentation in reputed journal (or) Industry Oriented Mini Project.

8.6. The UG project shall be initiated at the end of the IV Year I Semester and the durationof the project work is one semester. The student must present Project Stage – I during IV Year I Semester before II Mid examinations, in consultation with his Supervisor, the title, objective and plan of action of his Project work to the departmental committee for approval before commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his project work.

8.7. UG project work shall be carried out in two stages: Project Stage – I for approval of project before Mid-II examinations in IV Year I Semester and Project Stage – II during IV Year II Semester. Student has to submit project work report at the end of IV Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

8.8. For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall approve the project work to begin before II Mid-Term examination of IV Year I Semester. The student is deemed to be not eligible to register for the Project work, if he 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.

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.

8.9. For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the internal project committee shall evaluate it for 40 marks. Out of 40 internal marks, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 20marks and Project Supervisor shall evaluate for 20 marks. The topics for Industry Oriented Mini Project / Internship / SDC etc. and the main Project shall be different fromthe topic already taken. The student is deemed to have failed, if he / she (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the External Examiner as per schedule, or (iii) secures less than 40% marks in the sum totalof the CIE and SEE taken together.

For conducting viva-voce of project, Controller and Principal selects an external examiner from the list of experts in the relevant branch submitted by the HOD concerned

A student, who has failed, may reappear once for the above evaluation, when it is scheduled again; if student 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.

8.10. A student shall be given one time chance to re-register for a maximum of two subjects in a semester

- If the internal marks secured by a candidate in the continuous Internal Evaluation marks for 40 (sum of average of two mid-term exams and two assignments & subject Viva-voce / PPT / Poster presentation / Case Study on the topic in concerned subject) are less than 35% and failed in those subjects.
- A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the class work in next academic year.

In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled

9.0 GRADING PROCEDURE

9.1. Grades will be awarded to indicate the performance of students in each Theory Subject, Laboratory/ Practical's / Industry-Oriented Mini Project/Internship / SDC and Project Stage. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

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

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	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

9.3. A student who has obtained an '**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 the same as those obtained earlier.

9.4. To a student who has not appeared for an examination in any subject, '**Ab**' grade will be allocated in that subject, and he is deemed to have '**Failed**'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remainthe same as those obtained earlier.

9.5. A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6. A student earns Grade Point (GP) in each subject/ course, on the basis of the letter grade secured in 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 Point (GP) x Credits …. For a course

9.7. A student passes the subject/course only when GP $\geq$ **5 ('C' grade or above)**

9.8. The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points ($\sum$CP) secured from all subjects / courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimalplaces. SGPA is thus computed as

$$\mathbf{SGPA} = \{\sum_{i=1}^{n} \mathbf{Ci\ Gi}\} / \{\sum_{i=1}^{n} \mathbf{Ci}\} \ldots\ldots \mathbf{For\ each\ semester},$$

where 'i' is the subject indicator index (considering all subjects in a semester), 'N' is the no. of subjects '**registered**' for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} 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 (of 160) in **all** semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$$\mathbf{CGPA} = \{\sum_{j=1}^{m} \mathbf{Cj\ Gj}\} / \{\sum_{j=1}^{m} \mathbf{Cj}\} \text{ for all S Semesters Registered}$$

(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 the 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), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

SGPA = 152/21 = 7.24

Illustration of Calculation of CGPA up to 3rd Semester:

Semester	Course/ Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24

II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	69		Total Credit Points	518

CGPA = 518/69 = 7.51

The calculation process of CGPA illustrated above 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 the CGPAs will be used.

9.11. SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

10.0. PASSING STANDARDS

10.1. A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when the student gets an SGPA $\geq$ 5.0 at the end of that particular semester); and he shall be declared successful or 'passed' in the entire undergraduate programme, only when gets a CGPA ≥ 5.00 ('C' grade or above) for the award of the degree as required.

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

earned. **There is NO exemption of credits in any case.**

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.

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

12.0. 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 $\geq$ 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 B.Tech. Degree in the branch of Engineering 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. A student with final CGPA (at the end of the undergraduate programme) > 8.00, and fulfilling the following conditions - shall be placed in '**First Class with Distinction'**.
However, he

(i) Should have passed all the subjects/courses in '**First Appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA > 8 shall beplaced in **'First Class'.**

12.4. Students with final CGPA (at the end of the undergraduate programme) $\geq$ 7.0 but < 8.00 shall be placed in **'First Class'.**

12.5. Students with final CGPA (at the end of the undergraduate programme) $\geq$ 6.00 but < 7.00, shall be placed in '**Second Class'**.

12.6. All other students who qualify for the award of the degree (as per item 12.1), with finalCGPA (at the end of the undergraduate programme) $\geq$ 5.00 but < 6, shall be placed in '**pass class**'.

12.7. A student with final CGPA (at the end of the undergraduate programme) < 5.00 will not be eligible for the award of the degree.

12.8. Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**Gold Medal**'.

12.9. **Award of 2-Year B.Tech. Diploma Certificate**

1. A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) up to B. Tech. – II Year – II Semester, if the student want to exit the 4-Year B. Tech. program. The student **once opted and awarded for 2-Year UG Diploma Certificate, the student will not be permitted to join** in B. Tech. III Year – I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree.

2. A student may be permitted to take one year break after completion of II Year – II Semester or B. Tech. – III Year – II Semester (with university permission through the principal of the college well in advance) and can re-enter the course in **next Academic Year in the same college** and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

13.0 WITHHOLDING OF RESULTS

13.1 If the student has not paid the fees to the College at any stage, or 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 the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

14.0. TRANSITORY REGULATIONS

A. For students detained due to shortage of attendance:

(1) A Student who has been detained in I year of R20 Regulations due to lack of attendance, shall be permitted to join I year I Semester of R22 Regulations and he is required to complete the study of B.Tech./B. Pharmacy programme within the stipulated period of eight academic years from the date of first admission in I Year.

(2) A student who has been detained in any semester of II, III and IV years of R20 regulations for want of attendance, shall be permitted to join the corresponding semester of R22 Regulations and is required to complete the study of B.Tech./B. Pharmacy within the

stipulated period of eight academic years from the date of first admission in I Year. The R22 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

(i) A student of **R20** Regulations who has been detained due to lack of credits, shall be promoted to the next semester of **R22** Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The total credits required are 160 including both **R20 & R22** regulations. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The **R22** Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in **R22** Regulations:

(i) A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

(ii) The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R22 Regulations. **There is NO exemption of credits in any case**.

(iii) If a student is readmitted to R22 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the University.

Note: If a student readmitted to R22 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R22 Regulations, the College Principals concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

15.0 STUDENT TRANSFERS

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

15.2. There shall be no transfers from one college/stream to another within the college.

15.3. The students seeking transfer to TKREC from various other Universities / institutions have to pass the failed subjects which are equivalent to the subjects of TKREC, and also pass the subjects of TKREC which the students have not studied at the earlier institution. Further, though the students

have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of TKREC, the students have to study those subjects in TKREC in spite of the fact that those subjects are repeated.

15.4 The transferred students from other Universities/Institutions to TKREC who are on rolls are to be provided one chance to write the CBT (for internal marks) in the **equivalent subject(s)** as per the clearance letter issued by the University.

15.5 The College will provide one chance to write the internal examinations in the equivalent subject(s) to the students transferred from other Universities/ institutions to TKREC who are on rolls, as per the clearance equivalence) letter issued by the University.

16.0 SCOPE

16.1. The academic regulations should be read as a 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 Vice-Chancellor is final.

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

16.4. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME) FROMTHE AY 2023-24

1. **Eligibility for the award of 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.

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech Programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. **Promotion rule**

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 24 credits out of 40 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester

6. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).
7. LES students are not eligible for 2-Year B. Tech. Diploma Certificate.

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MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices /Improper conduct	Punishment
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, notebook, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject to the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam Hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject to the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and the relevant material will be kept in the Examinations Branch.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all College examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also de barred for two consecutive semesters from class work and all **College** examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent/	In case of students of the college, they shall be expelled from

	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 to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-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 the tendency to disrupt the orderly conduct of the examination.	examination halls and cancellation of their performance in that subject and allot her subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any par there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all **College** examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also

		debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered Against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester / year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the **Controller/Principal** for further action to award suitable punishment.	

B. Tech. I Year I Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22MA101BS	BS	Matrices and Calculus	3	1	0	4
2	22CH102BS	BS	Engineering Chemistry	3	1	0	4
3	22CS103ES	ES	Programming for Problem Solving	3	0	0	3
4	22EE104ES	ES	Basic Electrical Engineering	2	0	0	2
5	22ME105ES	ES	Computer Aided Engineering Graphics	1	0	4	3
6	22CS106ES	ES	Elements of Computer Science & Engineering	0	0	2	1
7	22CH107BS	BS	Engineering Chemistry Laboratory	0	0	2	1
8	22CS108ES	ES	Programming for Problem Solving Laboratory	0	0	2	1
9	22EE109ES	ES	Basic Electrical Engineering Laboratory	0	0	2	1
	Total			**12**	**2**	**12**	**20**

B. Tech. I Year II Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22MA201BS	BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22PH202BS	BS	Applied Physics	3	1	0	4
3	22ME203ES	ES	Engineering Workshop	0	1	3	2.5
4	22EN204HS	HS	English for Skill Enhancement	2	0	0	2
5	22EC205ES	ES	Electronic Devices and Circuits	2	0	0	2
6	22PH207BS	ES	Applied Physics Laboratory	0	0	3	1.5
7	22CS206ES	BS	Python Programming Laboratory	0	1	2	2
8	22EN208HS	HS	English Language and Communication Skills Laboratory	0	0	2	1
9	22CS209ES	ES	IT Workshop	0	0	2	1
	Total			**13**	**4**	**12**	**20**

B. Tech. II Year I Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22EC308PC	PC	Digital Electronics	3	0	0	3
2	22CS301PC	PC	Data Structures	3	0	0	3
3	22MA302BS	BS	Computer Oriented Statistical Methods	3	1	0	4
4	22IT301PC	PC	Computer Organization and Microprocessor	3	0	0	3
5	22IT302PC	PC	Introduction to IoT	2	0	0	2
6	22EC309PC	PC	Digital Electronics Lab	0	0	2	1
7	22CS304PC	PC	Data Structures Lab	0	0	3	1.5
8	22IT303PC	PC	Internet of Things Lab	0	0	3	1.5
9	22MC309	MC	Gender Sensitization Lab	0	0	2	0
10	22CS306PC	PC	Skill Development Course (Data visualization- R Programming/ Power BI)	0	0	2	1
	Total			**14**	**1**	**12**	**20**

B. Tech. II Year II Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22MA401BS	BS	Discrete Mathematics	3	0	0	3
2	22SM401MS	MS	Business Economics & Financial Analysis	3	0	0	3
3	22CS401PC	PC	Operating Systems	3	0	0	3
4	22CS402PC	PC	Database Management Systems	3	0	0	3
5	22IT401PC	PC	Java Programming	2	0	0	2
6	22CS404PC	PC	Operating Systems Lab	0	0	2	1

7	22CS405PC	PC	Database Management Systems Lab	0	0	2	1
8	22IT402PC	PC	Java Programming Lab	0	0	2	1
9	22IT401PW	PW	Real-time Research Project/ Societal Related Project	0	0	4	2
10	22MC410	MC	Constitution of India	0	0	2	0
11	22CS406PC	PC	Skill Development Course(Node JS/ React JS/Django)	0	0	2	1
	Total			**14**	**0**	**14**	**20**

Program Outcomes (POs):

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 an 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

B. Tech. III Year I Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22IT501PC	PC	Software Engineering	3	0	0	3
2	22IT502PC	PC	Data Communications and Computer Networks	3	1	0	4
3	22AI501PC	PC	Machine Learning	3	0	0	3
4	22IT510PE	PE- I	Professional Elective- I	3	0	0	3
5	22IT520PE	PE- II	Professional Elective- II	3	0	0	3
6	22IT503PC	PC	Software Engineering Lab	0	0	2	1
7	22AI502PC	PC	Machine Learning Lab	0	0	2	1
8	22CS504PC	PC	Computer Networks Lab	0	0	2	1
9	22MC510	MC	Intellectual Property Rights	3	0	0	0
10	22CS506PC	PC	Skill Development Course (UI design-Flutter)	0	0	2	1
Total				**18**	**1**	**8**	**20**

Professional Elective – I

S. No	Subject Code	Subject Name
1	22IT511PE	Biometrics
2	22CS512PE	Advanced Computer Architecture
3	22CS513PE	Data Analytics
4	22CS514PE	Image Processing
5	22CS515PE	Principles of Programming Languages

Professional Elective-II

S. No	Subject Code	Subject Name
1	22CS521PE	Computer Graphics
2	22IT521PE	Quantum Computing
3	22IT522PE	Advanced Operating Systems
4	22CS524PE	Distributed Databases
5	22IT523PE	Pattern Recognition

B. Tech. III Year II Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22IT601PC	PC	Automata Theory and Compiler Design	3	0	0	3
2	22IT602PC	PC	Algorithm Design and Analysis	3	0	0	3
3	22IT603PC	ES	Embedded Systems	3	0	0	3
4	22IT604PC	PC	Compiler Design Lab	0	0	2	1
5	22IT610PE	PE- III	Professional Elective- III	3	0	0	3
6	22IT610OE	OE- I	Open Elective- I	3	0	0	3
7	22EN601HS	HS Lab	Advanced English Communication Skills Laboratory	0	0	2	1
8	22IT610PE	PE lab-III	Professional Elective- III Lab	0	0	2	1
9	22IT601PW	PW	Industrial Oriented Mini Project/ Internship/ Skill Development Course (Big data-Spark)	0	0	4	2
10	22MC610	MC	Environmental Science	3	0	0	0
Total				**18**	**0**	**10**	**20**

Professional Elective – III

S. No	Subject Code	Subject Name
1	22CS631PE	Full Stack Development
2	22IT631PE	Data Mining
3	22CS633PE	Scripting Languages
4	22CS634PE	Mobile Application Development
5	22CS635PE	Software Testing Methodologies

Professional Elective LAB – III

S. No	Subject Code	Subject Name
1	22CS636PE	Full Stack Development Lab
2	22IT632PE	Data Mining Lab
3	22CS638PE	Scripting Languages Lab
4	22CS639PE	Mobile Application Development Lab
5	22CS63APE	Software Testing Methodologies Lab

Open Elective -1:

S. No	Subject Code	Subject Name
1	22IT611OE	Java Programming
2	22IT612OE	Object Oriented Programming using

Open Elective subjects' syllabus is provided at the end of the document.
Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.
Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

B. Tech. IV Year I Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22IT701PC	PC	Information Security	3	0	0	3
2	22IT702PC	PC	Cloud Computing	3	0	0	3
3	22IT740PE	PE	Professional Elective- IV	3	0	0	3
4	22IT750PE	PE	Professional Elective- V	3	0	0	3
5	22IT720OE	OE	Open Elective- II	3	0	0	3
6	22IT703PC	PC	Information Security Lab	0	0	2	1
7	22IT704PC	PC	Cloud Computing Lab	0	0	2	1
8	22IT701PW	PW	Project Stage- I	0	0	6	3
	Total			**15**	**0**	**10**	**20**

Professional Elective – IV

S. No	Subject Code	Subject Name
1	22IT741PE	Human Computer Interaction
2	22IT742PE	High Performance Computing
3	22IT743PE	Artificial Intelligence
4	22IT744PE	Information Retrieval Systems
5	22CS745PE	Ad-hoc & Sensor Networks

Professional Elective – V

S. No	Subject Code	Subject Name
1	22IT751PE	Intrusion Detection Systems
2	22IT752PE	Real Time Systems
3	22IT753PE	Deep Learning
4	22CS754PE	Block chain Technology
5	22CS755PE	Software Process & Project Management

Open Elective -2:

S. No	Subject Code	Subject Name
1	22IT721OE	Full Stack development
2	22IT722OE	Scripting Languages

Open Elective subjects' syllabus is provided at the end of the document.
Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.
Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

B. Tech. IV Year II Sem (R22)

S. No	Subject Code	Category	Subject Name	Hours per			Credits
				L	T	P	
1	22HS801MS	MS	Organizational Behavior	3	0	0	3
2	22IT860PE	PE	Professional Elective- VI	3	0	0	3
3	22IT830OE	OE	Open Elective- III	3	0	0	3
4	22IT801PW	PW	Project Stage- II including	0	0	22	9+2
	Total			**9**	**0**	**22**	**20**

Professional Elective – VI

S. No	Subject Code	Subject Name
1	22IT861PE	Natural Language Processing
2	22CS862PE	Distributed Systems
3	22IT862PE	Augmented Reality & Virtual Reality
4	22IT863PE	Web Security
5	22CS865PE	Cyber Forensics

Open Elective subjects' syllabus is provided at the end of the document.
Open Elective – Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.
Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

Open Elective -3:

S. No	Subject Code	Subject Name
1	22IT831OE	Big Data Technologies
2	22IT832OE	DevOps

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech I Year I Sem

L	T	P	C
3	1	0	4

(22MA101BS) MATRICES AND CALCULUS

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- 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.
- Concept of eigen values and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables
- Evaluation of multiple integrals and their applications

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

CO1: Write the matrix representation of a set of linear equation s and to analyze the solution of the system of equations

CO2: Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.

CO3: Apply the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.

CO4: Find the extreme values of functions of two variables with / without constraints.

CO5: Evaluate the multiple integrals and apply the concept to find areas, volumes

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		1								1		
CO2	2	3												
CO3	2	2		1								1		
CO4	2	1		1	2							1		
CO5		1										1		

UNIT - I: Matrices **10 L**

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 by Gauss elimination method, Gauss Seidel Iteration Method.

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

Linear Transformation and Orthogonal Transformation: Eigen values, 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: Calculus **10 L**

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), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications) 10 L

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) 8 L

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).

TEXT BOOKS:

1 B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2 R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016

REFERENCE BOOKS:

1 Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2 G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3 N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4 H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22CH102BS) ENGINEERING CHEMISTRY

Course Objectives:

- To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer
- To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
- To imbibe the basic concepts of petroleum and its products.
- To acquire required knowledge about engineering materials like cement, smart materials and Lubricants

Course outcomes:

CO1: Apply the principle of potable water for industrial and domestic purposes.
CO2: Identify the electrolytic and electrochemical cells with different types of batteries and make use of corrosion control methods in industry
CO3: Explore the fundamental properties of polymers and other materials in engineering field
CO4: Distinguish various types of fuels and their applications in day-to-day life
CO5: Develop understanding of engineering materials like cement, smart materials and Lubricants.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	2					2		
CO2	3	2				2	2					3		
CO3	3	2				2	2					2		
CO4	3	2	1				2					3		
CO5	3	2					2					2		

UNIT – I : Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complex metric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluorination -Determination of F- ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis

UNIT – II: Battery Chemistry & Corrosion [8]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium-ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials: [8]

Definition – Classification of polymers with examples – Types of polymerizations –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). Rubbers: Natural rubber and its vulcanization. Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber. Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT-IV: Energy Sources: [8]

Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: Engineering Materials: [8] Cement

Cement: Portland cement, its composition, setting and hardening. Smart materials and their engineering applications Shape memory materials- Poly L- Lactic acid. Thermosyphons materials- Polyacryl amides, Poly vinyl amides. Lubricants: Classification of lubricants with examples-characteristics of a good lubricants – mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:

1 Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2 Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3 A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4 Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1 Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2 Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22CS103ES) PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language
- To learn the usage of structured programming approaches in solving problems.

Course outcomes: The student will learn

CO1: Build the algorithm for the given unsolved problems
CO2: Apply the concepts of arrays, pointers, strings and structures to find the solution for given problem
CO3: Apply the various pre-processor commands in a given different real time situations
CO4: Dissect a problem into sub functions to develop modular reusable code
CO5: Demonstrate various searching and sorting techniques along with the complexity analysis

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	2					2		
CO2	3	2				2	2					3		
CO3	3	2				2	2					2		
CO4	3	2	1				2					3		
CO5	3	2					2					2		

UNIT - I: Introduction to Programming

Compilers, compiling and executing a program.
Representation of Algorithm - Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode 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: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

TEXT BOOKS:

1 Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2 B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1 Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2 E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3 Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4 R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5 Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6 Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7 Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech I Year I Sem

L	T	P	C
2	0	0	2

(22EE104ES) BASIC ELECTRICAL ENGINEERING

Prerequisites: Mathematics

Course Objectives:

- To understand common forms of number representation in logic circuits.
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- Tounderstandtheconceptsofcombinationallogiccircuitsandsequentialcircuits.
- To understand the Realization of Logic Gates Using Diodes &Transistors.

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

CO1: Verify the basic Electrical circuits through different experiments

CO2: Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.

CO3: Analyze the transient responses of R, L and C circuits for different input conditions

CO4: To determine the performance of different types of DC, AC machines and Transformers.

CO5: To import the knowledge of various electrical installations and the concept of power, power factor and its improvement

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3			2	2	1						1		
CO2	2	3	2		2	2				1		1		
CO3	1		3	1		3					2			
CO4	1	2	3		1					1		1		
CO5	1	1	3	2	2	1						2		

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, nalysis of simple circuits with dc excitation. Superposition, Thevenin 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: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator

UNIT-V:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB,

MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.

Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS:

1 D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2 MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1 P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019
2 D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3 M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4 Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021
5 L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6 E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7 V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22ME105ES) COMPUTER AIDED ENGINEERING GRAPHICS

Course Objectives:

- To develop the ability of visualization of different objects through technical drawings
- To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

Course outcomes : Using conventional and computer aided drafting tools, the student will be able to:

CO1: Apply the principles of Engineering Graphics to create Engineering Drawings of various geometric constructions, conic sections, curves and scales as per BIS standards.
CO2: Construct orthographic projections for points, lines and planes in different quadrants and Auxiliary views.
CO3: Draw the sectional views and true shape of sections of solids, by applying principles of projections.
CO4: Draw the development of surfaces in real time situations
CO5: Develop isometric and orthographic views of the objects.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2			2				1	1		1		
CO2	2	2			2				1	1		1		
CO3	2	2			2				1	1		1		
CO4	2	2			2				1	1		1		
CO5	2	2			2				1	1		1		

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views.

UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting.

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. Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS:

1 Engineering Drawing N.D. Bhatt / Charotar
2 Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

REFERENCE BOOKS:

1 Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2 Engineering Graphics and Design, WILEY, Edition 2020
3 Engineering Drawing, M. B. Shah, B.C. Rane / Pearson
4 Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5 Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22CS106ES) ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

Course Objective: To provide an overview of the subjects of computer science and engineering

Course Outcomes (COs):

CO1: Know the working principles of functional units of a basic Computer
CO2: Understand program development, the use of data structures and algorithms in problem solving.
CO3: Know the need and types of operating system, database systems.
CO4: Understand the significance of networks, internet, and WWW and cyber security.
CO5: Understand Autonomous systems, the application of artificial intelligence.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1												3	
CO2	3											2	1	
CO3	1	2												**2**
CO4	2	2	1									2	2	
CO5	2	2	1									2	2	

UNIT – I

Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

UNIT – II

Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, data structures – definition, types of data structures

UNIT – III

Operating systems: Functions of operating systems, types of operating systems, Device & Resource management. **Database Management Systems**: Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

UNIT – IV

Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communication. World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks. Security – information security, cyber security, cyber laws

UNIT – V

Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development, natural language processing, image and video processing.

TEXT BOOK:

1 Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield

REFERENCE BOOKS:

1 Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2 Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3 Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4 Elements of computer science, Cengage.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22CH107BS) ENGINEERING CHEMISTRY LABORATORY

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

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

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

CO1: Determination of parameters like hardness of water and rate of corrosion of mild steel in various Conditions.

CO2: Performing experimental methods such as conductometry, potentiometry and pH metric in order to find out the concentrations or equivalence points of acids and bases.

CO3: Preparation of polymers like Bakelite and nylon-6.

CO4: Estimation of saponification value, surface tension and viscosity of lubricant oils.

CO5: Estimation of different types of qualitative and quantitative measurements of a given compound.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2		1			2					2		
CO2	2	2					2					2		
CO3	2	2				1	2					2		
CO4	3	2				2	2					2		
CO5	3	2		2								2		

List of Experiments:

I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.

III. **Potentiometry:** Estimation of the amount of Fe+2 by Potentiomentry.

IV. **pH Metry:** Determination of an acid concentration using pH meter.

V. Preparations:
   1. Preparation of Bakelite
   2. Preparation Nylon – 6.

VI. **Lubricants:**
   1. Estimation of acid value of given lubricant oil.
   2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer

VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VIII. **Virtual lab experiments**
   1. Construction of Fuel cell and it's working.
   2. Smart materials for Biomedical applications
   3. Batteries for electrical vehicles
   4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1 Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2 Vogel's text book of practical organic chemistry 5th edition
3 Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4 College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22CS108ES) PROGRAMMING FOR PROBLEM SOLVING LAB

[Note: The programs may be executed using any available Open Source/ Freely available IDE
Some of the Tools available are:
Code Lite: https://codelite.org/
Code: Blocks: http://www.codeblocks.org/
Dev Cpp : http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

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

Course Outcomes (COs):

CO1: Formulate the algorithms for simple problems
CO2: Translate the given algorithms to C Programs.
CO3: Build the logic using arrays, strings for the given problem.
CO4: Make use of pointers in different types to modularize the code with functions
CO5: Apply the appropriate sorting techniques for the given list of elements.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	2						2	3			2	**1**
CO2	2		2		2				2	3		2	2	
CO3			2		2				2	3			2	**3**
CO4	2	2			2				2	3		2	2	**3**
CO5	2	2		2					2	3		2		**3**

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 from standard input.

Simple numeric problems:

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

e. 5 x 1 = 5
f. 5 x 2 = 10
g. 5 x 3 = 15
h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, erforms the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value.
i. 1-x/2 +x^2/4-x^3/6
j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+ .....+x^n. For example: if n is 3 and x is 5, then the program Computes 1+5+25+125.

Arrays, Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array
c. Write a C program that uses functions to perform the following.
d. Addition of Two Matrices
e. Multiplication of Two Matrices
f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer
i. To find the GCD (greatest common divisor) of two given integers.
j. To find x^n
k. Write a program for reading elements using a pointer into an array and display the values using the array.
l. Write a program for display values reverse order from an array using a pointer
m. Write a program through a pointer variable to sum of n elements from an array.

Files:

a. Write a C program to display the contents of a file to standard output device
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments
d. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function
The program should then read all 10 values and print them back
e. Write a C program to merge two files into a third file (i.e., the contents of the first file followed

by those of the second are put in the third file).

Strings:

i Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent
ii Write a C program that converts a number ranging from 1 to 50 to Roman equivalent.
iii Write a C program that uses functions to perform the following operations.
iv To insert a sub-string into a given main string from a given position.
v To delete n Characters from a given position in a given string
vi 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.)
vii Write a C program that displays the position of a character ch in the string S or – 1 if S oesn't contain ch.
viii Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

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

b. Write a C program to construct a pyramid of numbers as follows:

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

Sorting and Searching:

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

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(2EE109ES) BASIC ELECTRICAL ENGINEERING LABORATORY

Prerequisites: Basic Electrical Engineering

Course Objectives:

- To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach
- To study the transient response of various R, L and C circuits using different excitations
- To determine the performance of different types of DC, AC machines and Transformers

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

CO1: Verify the basic Electrical DC and AC circuits through different experiments.
CO2: Evaluate the performance calculations of Transformers through various testing methods.
CO3: Evaluate the performance calculations of DC Electrical Machines through various testing methods
CO4: Evaluate the performance calculations of AC Electrical Machines through various testing methods.
CO5: Analyze the simple circuit for lighting and power installations

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1		1				2		2	2		
CO2	3	2	1	1	3	2			1		2	2		
CO3	2	1	1		1		1		2	1	2	1		
CO4	3	2	2	1	3	1		1	2	2	1	2		
CO5	2	3	1	1	1	2			1		2	1		

List of experiments/demonstrations:

PART- A (compulsory)

1 Verification of KVL and KCL
2 Verification of Thevenin's and Norton's theorem
3 Transient Response of Series RL and RC circuits for DC excitation
4 Resonance in series RLC circuit
5 Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6 Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7 Performance Characteristics of a DC Shunt Motor
8 Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1 Verification of Superposition theorem
2 Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
3 Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4 Measurement of Active and Reactive Power in a balanced Three-phase circuit
5 No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

1 D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2 MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1 P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2 D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22MA201BS) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Prerequisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms.
- Solving ordinary differential equations using Laplace transforms techniques
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes (COs):

CO1: Identify whether the given differential equation of first order is exact or not.
CO2: Apply the concept of differential equation to real world problems
CO3: Use the Laplace transforms techniques for solving ODE's.
CO4: Use gradient to evaluate directional derivatives and conservative vector field.
CO5: Calculate the line, surface and volume integrals and converting them from one to another.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3		1	1							1		
CO2	1	2			2							2		
CO3	3	2		2										
CO4	2	1		2								1		
CO5	2	2										1		

UNIT-I: First Order ODE **8 L**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

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

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type eax, sin ax , cos ax, polynomials in x, $eaxV(x)$ and $x\ V(x)$, method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

UNIT-III: Laplace transforms **10lL**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation **10lL**

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 **10lL**

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 R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1 Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 200
2 G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3 H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi
4 N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech I Year II Sem

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(22PH202BS) APPLIED PHYSICS

Prerequisites: 10 + 2 Physics

Course Objectives: The objectives of this course for the student are to:

- Understand the basic principles of quantum physics and band theory of solids.
- Understand the underlying mechanism involved in construction and working principles of various semiconductor devices
- Study the fundamental concepts related to the dielectric, magnetic and energy materials
- Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
- Study the characteristics of lasers and optical fibres.

Course Outcomes (COs): At the end of the course the student will be able to:

CO1: Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids

CO2: Identify the role of semiconductor devices in science and engineering Applications

CO3: Explore the fundamental properties of dielectric, magnetic materials and energy for their applications

CO4: Appreciate the features and applications of Nan materials.

CO5: Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	3			1						2		
CO2	2	1			1							2		
CO3	2	1			1							1		
CO4	3			2	2							2		
CO5	2	1			1				1			1		

UNIT - I: QUANTUM PHYSICS AND SOLIDS

Quantum Mechanics: Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect - Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

Solids: Symmetry in solids, free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators.

Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction,

magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics. Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

UNIT - IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

UNIT - V: LASER AND FIBER OPTICS

Lasers: Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods- ruby laser, He-Ne laser, CO2 laser, Argon ion Laser, Nd: YAG laser-semiconductor laser-applications of laser.

Fiber Optics: Introduction to optical fiber- advantages of optical Fibers - total internal reflection-construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers-losses in optical fiber - optical fiber for communication system - applications

TEXT BOOKS:

1 M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2 Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3 Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4thEdition,2021.
4 B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition,2022.
5 Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1 Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012
2 Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018
3 Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019
4 Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5 A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007
6 Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7 Energy Materials, Taylor & Francis Group, 1st Edition, 2022

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22ME203ES) ENGINEERING WORKSHOP

Prerequisites: Practical skill

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place
- It explains the construction, function, use and application of different working tools, equipment and machines
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

CO1: Demonstrate various machines, tools and their operations.
CO2: Apply different workshop trades like fitting, carpentry, foundry and welding.
CO3: Practice workshop trades like Tim smith, Black smithy
CO4: Apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiseling.
CO5: Apply basic electrical engineering knowledge for house wiring practice

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	1						2	1		1		
CO2	2	2	1						2	1		1		
CO3	2	1	1						2	1		1		
CO4	2	1	1						2	1		1		
CO5	2	2	1						2	1		1		

1. TRADES FOR EXERCISES:

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

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

(22EN204HS) ENGLISH FOR SKILL ENHANCEMENT

Course Objectives: This course will enable the students to:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Develop study skills and communication skills in various professional situations.
- Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Course Outcomes (COs): Students will be able to:

CO1: Understand the importance of vocabulary and sentence structures.
CO2: Choose appropriate vocabulary and sentence structures for their oral and written communication.
CO3: Demonstrate their understanding of the rules of functional grammar
CO4: Develop comprehension skills from the known and unknown passages.
CO5: Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1						3			3	3		3		
CO2						2			3	3		3		
CO3						3			2	3		3		
CO4						2			3	3		3		
CO5						3			2	3		3		

UNIT - I

Chapter entitled '**Toasted English' by R.K.Narayan** from **"English: Language**, **Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions

Reading: Reading and Its Importance- Techniques for Effective Reading

Writing: 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

Chapter entitled **'Appro JRD' by Sudha Murthy** from "English: Language, Context and Culture" published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT – III

Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al from "English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.
Vocabulary: Words Often Confused - 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 – Intensive Reading and Extensive Reading – Exercises for Practice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV
Chapter entitled **'Art and Literature' by Abdul Kalam from "English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad
Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice
Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing

UNIT - V
Chapter entitled **'Go, Kiss the World' by Subroto Bagchi from "English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.
Vocabulary: Technical Vocabulary and their Usage
Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
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
Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note: 1.** As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is Open-ended, besides following the prescribed textbook, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.**Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode

TEXT BOOKS:

1 "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1 Effective Academic Writing by Liss and Davis (OUP)
2 Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
3 Wood, F.T. (2007). Remedial English Grammar. Macmillan
4 Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5 (2019). Technical Communication. Wiley India Pvt. Ltd.
6 Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7 Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech I Year II Sem

L	T	P	C
2	0	0	2

(22EC205ES) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

1 To introduce components such as diodes, BJTs and FETs.
2 To know the applications of devices.
3 To know the switching characteristics of devices.

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

1 Apply the concepts of Diode applications
2 Apply concepts of Non-Linear application in solving various problems.
3 Analyse the switching concepts of BJT.
4 Compare BJT with FET and MOSFET.
5 Design circuits using Special Purpose Devices

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	1			1	1					1		
CO2	3	2	1	1		2	1					1		
CO3	3	3	1	1		2	1					1		
CO4	3	2	2	1							1	1	1	
CO5	3	2	2	1							1	1	2	

UNIT - I

Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers

UNIT - III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times

UNIT - IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXT BOOKS:

1 Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2 Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson**.**

REFERENCE BOOKS:

1 Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2 Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22PH207BS) APPLIED PHYSICS LABORATORY

Course Objectives: The objectives of this course for the student to

- Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
- Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
- Able to measure the characteristics of dielectric constant of a given material
- Study the behavior of B-H curve of ferromagnetic materials.
- Understanding the method of least squares fitting.

Course Outcomes (COs): The students will be able to:

CO1: Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
CO2: Appreciate quantum physics in semiconductor devices and optoelectronics.
CO3: Gain the knowledge of applications of dielectric constant.
CO4: Understand the variation of magnetic field and behavior of hysteresis curve.
CO5: Carried out data analysis.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2		1		2				2			2		
CO2	2		1		1				2			2		
CO3	2			1	2				1			2		
CO4	2		2		1							2		
CO5	2	2	2									2		

LIST OF EXPERIMENTS:

1 Determination of work function and Planck's constant using photoelectric effect.
2 Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3 Characteristics of series and parallel LCR circuits.
4 V-I characteristics of a p-n junction diode and Zener diode
5 Input and output characteristics of BJT (CE, CB & CC configurations)
6 a) V-I and L-I characteristics of light emitting diode (LED), b) V-I Characteristics of solar cell
7 Determination of Energy gap of a semiconductor
8 Determination of the resistivity of semiconductor by two probe method.
9 Study B-H curve of a magnetic material.
10 Determination of dielectric constant of a given material
11 a) Determination of the beam divergence of the given LASER beam
b) b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber
12 Understanding the method of least squares – torsional pendulum as an example

Note: Any 8 experiments are to be performed.

REFERENCE BOOK:

1 S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech I Year II Sem

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(22CS206ES) PYTHON PROGRAMMING LABORATORY

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python.
- To Handle Strings and Files in Python

Course Outcomes (COs): After completion of the course, the student should be able to

CO1: Implement simple Python programs
CO2: Make use of control structures to write Python programs
CO3: Develop Python programs by defining functions.
CO4: Implement File operations in Python
CO5: Design and implement GUI application and how to handle exceptions and file.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2							1	1			2	
CO2	3	2	2	2	1				1	2			2	**2**
CO3	3	2	2		1				1	2			2	**2**
CO4	1	1	2		1				1	2			1	**2**
CO5	1	2	1		3					1				

Week -1:

1 i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
ii) Start the Python interpreter and type help() to start the online help utility.

2 Start a Python interpreter and use it as a Calculator
i) Write a program to calculate compound interest when principal, rate and number of periods is given.
ii) given coordinates (x1, y1), (x2, y2) find the distance between two points

3 Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:

1 Print the below triangle using for loop.

```
5
4 4
3 3 3
2 2 2 2
1 1 1 1 1
```

2 Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)

3 Python Program to Print the Fibonacci sequence using while loop

4 Python program to print all prime numbers in a given interval (use break)

Week - 3:

1 i) Write a program to convert a list and tuple into arrays.

ii) Write a program to find common values between two arrays

2 Write a function called gcd that takes parameters a and b and returns their greatest common divisor..

3 Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string

Week - 4:

1 Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.

2 Write a function called has duplicates that take a list and returns True if there is any element that appears more than once. It should not modify the original list

i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

3 i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

ii) Remove the given word in all the places in a string?

iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

4 Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1 i) Write a python program that defines a matrix and prints.

ii) Write a python program to perform addition of two square matrices

iii) Write a python program to perform multiplication of two square matrices.

2 How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions

3 Use the structure of exception handling all general purpose exceptions Use the structure of exception handling all general purpose exceptions.

Week-6:

1 a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.

c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.

d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.

2 Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances

3 Write a python code to read a phone number and email-id from the user and validate it for correctness

Week- 7

1 Write a Python code to merge two given file contents into a third file.

2 Write a Python code to open a given file and construct a function to check for given words present in it and display on found

3 Write a Python code to Read text from a text file, find the word with most number of occurrences

4 Write a function that reads a file file1 and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters

Week - 8:

1 Import numpy, Plotpy and Scipy and explore their functionalities
2 a) Install NumPy package with pip and explore it.
3 Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4 Write a program to implement Half Adder, Full Adder, and Parallel Adder
5 Write a program to implement Half Adder, Full Adder, and Parallel Adder

TEXT BOOKS:

1 Supercharged Python: Take your code to the next level, Overlan
2 Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1 Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2 Python Programming A Modular Approach with Graphics, Database, Mobile, and Web .Applications, Sheetal Taneja, Naveen Kumar, Pearson
3 Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition.
4 Think Python, Allen Downey, Green Tea Press.
5 Core Python Programming, W. Chun, Pearson.
6 Introduction to Python, Kenneth A. Lambert, Cengage.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22EN208HS) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the 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 the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes: Students will be able to:

CO1 Employ the nuances of English language through audio-visual experience and group activities
CO2 Articulate a neutral accent of English for intelligibility by overcoming mother tongue influence
CO3 Develop the skill of using appropriate language in various speaking contexts.
CO4 Understand how to use language to make formal presentations
CO5 Interpret speaking skills with clarity and confidence which in turn enhances their interpersonal skills.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1					3	2			3	3		3		
CO2					3	3			3	3		3		
CO3						3			3	3		3		
CO4					3				3	3		3		
CO5									3	3		3		

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

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

Listening Skills:

Objectives

1 To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2 To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences

- Listening for general content
- Listening to fill up information
- Intensive listening

- Listening for specific information

Speaking Skills:

Objectives

1 To involve students in speaking activities in various contexts
2 To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

The following course content is prescribed for the English Language and Communication Skills Lab

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.
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– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.
Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).
Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.
Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.
Practice: Making a Short Speech – Extempore- Making a Presentation

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:

Understand: Group Discussion
Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i. Computers with Suitable Configuration
ii. High Fidelity Headphones

2 **Interactive Communication Skills (ICS) Lab :**

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy):

- Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley
- Grammar Made Easy by Darling Kindersley
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version**)**

REFERENCE BOOKS:

1 2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
2 Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3 Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4 Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5 Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22CS209ES) IT WORKSHOP

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, PowerPoint and Publisher

Course Outcomes(COs):

CO1 Gain the knowledge of computer hardware.
CO2 Install the system software in the specified hardware
CO3 Able to build the computer by assemble different parts and make sure of troubleshoots
CO4 Introduce different way of hooking the PC on to the internet from home and Workplace and effectively usage of the internet.
CO5 Make use of Web browsers, email and news groups. Craft professional word documents; excel spread sheet and power point presentations

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	1		2								2	
CO2	2	2	2	2	1				2					
CO3	2	2	2	2	2				1		2		2	
CO4	2	2	2						2		1		2	
CO5	3			2	2	3							3	

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

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 the student

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 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 or equivalent (FOSS) tool word: Importance of LaTeX and MS office or 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 a project certificate. Features to be covered:- Formatting Fonts in 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 or 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: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power point

Task 1: Students will be working on basic power point utilities and tools which help them create basic PowerPoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Task 3: 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 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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

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(22EC308PC) DIGITAL ELECTRONICS

Course Objectives:

- To understand common forms of number representation in logic circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
- To understand the concepts of combinational logic circuits and sequential circuits
- To understand the Realization of Logic Gates Using Diodes &Transistors

Course Outcomes (COs): Up on completing this course, the students will be able to

1 Apply concepts of numerical information in different forms and Boolean Algebra theorems
2 Analyze Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits
3 Analyze Combinational Circuits for various cyclic functions.
4 Design sequential circuits
5 Design of Programmable Devices.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	2	3	3	2	1	1	3	3	3	3	2	**2**
CO2	2	1	3	1	2	3	3	1	3	3	3	3		
CO3	1	1	2	1	1	3	3	1	3	3	3	3	2	**1**
CO4	1	1	2	1	1	3	3	1	3	3	3	3	2	
CO5	1	1	2	1	1	3	3	1	3	3	3	3	2	**1**

UNIT - I:

BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.

Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT - II:

GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function**.**

UNIT - III:

COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits

UNIT - IV:

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers, shift Registers, Ripple counters, synchronous counters, other counters

UNIT - V

MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access

Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.
Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

TEXT BOOKS:

1 Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
2 Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw Hill Edition.
3 Fundamentals of Logic Design, Roth, 5th Edition, Thomson

REFERENCE BOOKS:

1 Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill
2 Switching and Logic Design, C.V.S. Rao, Pearson Education
3 Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition
4 Fundamentals of Digital Logic and Microcomputer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

L	T	P	C
3	0	0	3

(22CS301PC) DATA STRUCTURES

Prerequisites: Programming for Problem Solving

Course Objectives:

- Exploring basic data structures such as stacks and queues
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, and graphs.
- Introduces sorting and pattern-matching algorithms.

Course Outcomes(COs):

CO1 Construct appropriate data structures to represent data items in real-world problems with linear data structures

CO2 Ability to apply the linear representations of skip lists and dictionaries and hash tables to overcome problems of sequential data structures.

CO3 Ability to design programs using a variety of non-linear data structures balanced trees.

CO4 Able to implement the principal algorithms graph traversal methods. and searching, and sorting

CO5 Implement and know the applications of pattern matching

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3				2								2	**1**
CO2	3	2	1	1									2	**1**
CO3	3	2	1	1	2				1				2	**1**
CO4	3	2	1	1	2				1				2	**1**
CO5	3				2				1				2	**1**

UNIT - I:

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

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, rehashing, extendible hashing**.**

UNIT - III:

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

UNIT - IV:

Graphs: Graph Implementation Methods. Graph Traversal Methods. Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort

UNIT - V

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

TEXT BOOKS:

1 Fundamentals of Data Structures in C, 2 nd 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, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22MA302BS) COMPUTER ORIENTED STATISTICAL METHODS

Prerequisites: Mathematics courses of first year of study

Course Objectives: To learn
- The theory of Probability, Probability distributions of single and multiple random variables
- The sampling theory, testing of hypothesis and making statistical inferences
- Stochastic process and Markov chains

Course Outcomes:
CO1: Apply the concepts of probability and distributions to case studies.
CO2: Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
CO3: Apply various concepts of distribution to find out continuous distribution values
CO4: Apply concept of estimation and testing of hypothesis to case studies.
CO5: Describe Stochastic Principles to simplify processes that satisfy Markov property.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1		2								2		
CO2	2	3			1							1		
CO3	2	2			2							1		
CO4	1	2			1									
CO5	2	2			1							1		

UNIT - I: Probability **10L**
Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Baye's Rule,
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions

UNIT - II: Expectation and discrete distributions **10L**
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, Poisson distribution.

UNIT - III: Continuous and Sampling Distributions **10L**
Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.
Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F-Distribution.

UNIT - IV: Sample Estimation & Tests of Hypotheses **10L**
Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating the mean, standard error of a point estimate, prediction interval. Two samples: Estimating the difference between two means, Single sample: Estimating a proportion.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Single sample: Tests concerning a single mean, Two samples: tests on two means

UNIT – V Stochastic Processes and Markov Chains **8L**

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.

TEXT BOOKS:

1 Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publisher
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 Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22IT301PC) COMPUTER ORGANIZATION AND MICROPROCESSOR

Course Objectives:

- To understand basic components of computers.
- To understand the architecture of the 8086 processor
- To understand the instruction sets, instruction formats and various addressing modes of 8086.
- To understand the representation of data at the machine level and how computations are performed at machine level
- To understand the memory organization and I/O organization
- To understand the parallelism both in terms of single and multiple processors

Course Outcomes:

CO1: Able to understand the basic components and the design of CPU, ALU and Control Unit
CO2: Ability to understand the advantage of instruction level parallelism and pipelining for high performance Processor design.
CO3: Ability to write assembly language programs to solve problems
CO4: Ability to apply different data representation formats and perform arithmetic operations
CO5: Ability to understand memory hierarchy and its impact on computer cost/performance.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	1	2										2	
CO2	3	2	1										2	
CO3	2	2		1									2	**1**
CO4	1	2		2									2	
CO5	2	2		3	1								1	**1**

UNIT - I:

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

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

UNIT - II:

Central Processing Unit: The 8086 Processor Architecture, Register organization, Physical memory organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum and Maximum mode system and timings.

UNIT - III:

Assembly Language Programming with 8086- Machine level programs, Machine coding the programs, Programming with an assembler, Assembly Language example programs. Stack structure of 8086, Interrupts and Interrupt service routines, Interrupt cycle of 8086, Interrupt programming, Passing parameters to procedures, Macros, Timings and Delays.

UNIT - IV:

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations. Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory

Access, Input –Output Processor (IOP), Intel 8089 IOP.

UNIT – V

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

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

TEXT BOOKS:

1 Computer System Architecture, M. Morris Mano, Third Edition, Pearson. (UNITS – I, IV, V)
2 Advanced Microprocessors and Peripherals, K M Bhurchandi, A. K Ray ,3rd edition, McGraw Hill India Education Private Ltd. (UNITS - II, III).

REFERENCE BOOKS:

1 Microprocessors and Interfacing, D V Hall, SSSP Rao, 3 rd edition, McGraw Hill India Education Private Ltd.
2 Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002
3 Computer Organization and Architecture, William Stallings, 9th Edition, Pearson
4 David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

L	T	P	C
2	0	0	2

(22IT302PC) INTRODUCTION TO IOT

Course Objectives: The objectives of the course are to:

- Understand the concepts of Internet of Things and able to build IoT applications
- Learn the programming and use of Arduino and Raspberry Pi boards
- Known about data handling and analytics in SDN.

Course Outcomes: Upon completing this course, the student will be able to:

CO1: Classify different protocols, models of communication in IoT
CO2: Apply the knowledge to sense the real world entities using different sensors by attaching to Arduino
CO3: Apply the knowledge to sense the real world entities using different sensors by attaching to Raspberry PI
CO4: Organise the data using data handling and analytics technique
CO5: Develop IoT applications with arduino, nodeMCU, raspberrypi programming using cloud services.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2					3			2	3				
CO2	2	3	3		3		3		3		3		3	
CO3	2	3	3		3		3		3		3		3	
CO4		2	1	3										
CO5		2	3	3	3				3	1	3	2		**3**

UNIT - I:

Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

UNIT - II:

Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT - III:

Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi, Case studies.

UNIT - IV:

Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics

UNIT – V

Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT. Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:

1 Pethuru Raj and Anupama C. Raman "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press).
2 Terokarvinen, kemo, karvinen and villey valtokari, “Make sensors”: 1st edition, maker media, 2014.

REFERENCE BOOKS:

1 Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”.
2 Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".
3 Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22EC309PC) DIGITAL ELECTRONICS LAB

Prerequisites: Analog Electronics & Digital Electronics

Course Objectives:

1 To learn basic techniques for the design of digital circuits and number conversion systems.
2 To implement simple logical operations using combinational logic circuits
3 To design combinational logic circuits, sequential logic circuits

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

1 Apply the concepts of logic families and logic gates.
2 Design of various code converters
3 Design and implement Combinational logic circuits.
4 Design and implement Sequential logic circuits
5 Design and realization different types of counters using flip-flops.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1											
CO2	3	2	2								1			
CO3	3	2	2		1				1	1	1	1		
CO4	3	2	2	2	1				1	1	1	1	1	**1**
CO5	3	2	2	2	1				1	1	1	1	2	**1**

List of Experiments:

1 Realization of Boolean Expressions using Gates.
2 Design and realization logic gates using universal gates
3 Generation of clock using NAND/NOR gates
4 Design a 4 – bit Adder / Subtractor
5 Design and realization a 4 – bit Gray to Binary and Binary to Gray Converter
6 Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7 Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8 Design and realization Asynchronous and Synchronous counters using flip-flops.
9 Design and realization 8x1 using 2x1 mux
10 Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder
11 Design and realization 2-bit comparator
12 Verification of truth tables and excitation tables.

TEXT BOOKS:

1 A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2 M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1 R. S. Sedha, “A Textbook of Digital Electronics”, S. Chand, 2005
2 R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

L	T	P	C
0	0	3	1.5

(22CS304PC) DATA STRUCTURES LAB

Prerequisites: A Course on Programming for Problem Solving with C

Course Objectives:

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues

Course Outcomes (COs):

CO1: Design programs using a variety of data structures such as stacks, queues
CO2: Implement hash table to solve various computing problems.
CO3: Analyse and implement different searching and sorting techniques.
CO4: Implement balanced search trees and graphs.
CO5: Implement and know the application of algorithms for pattern matching

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3				3	3							2	2
CO2	3	3	3	2	2								2	1
CO3		2	3	1	2	2							2	2
CO4	3	2	1	2	2	3							2	1
CO5	2				2								2	1

List of Experiments:

1 Write a program that uses functions to perform the following operations on singly linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal
2 Write a program that uses functions to perform the following operations on doubly linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal
3 Write a program that uses functions to perform the following operations on circular linked list.
i) Creation ii) Insertion iii) Deletion iv) Traversal
4 Write a program that implement stack (its operations) using
i) Arrays ii) Pointes
5 Write a program that implement Queue (its operations) using
i) Arrays ii) Pointers
6 Write a program that implements the following sorting methods to sort a given list of integers in ascending order:
i) Quick sort ii) Heap sort iii) Merge sort
7 Write a program to implement the tree traversal methods (Recursive and Non Recursive).
8 Write a program to implement
i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees
9 Write a program to implement the graph traversal methods
10 Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

L	T	P	C
0	0	3	1.5

(22IT303PC) INTERNET OF THINGS LAB

Course Objectives:

- To introduce the raspberry PI platform, that is widely used in IoT applications
- To introduce the raspberry PI platform, that is widely used in IoT applications

Course Outcomes (COs):

CO1: Experiment with distance sensors and LED by attaching to Raspberry Pi
CO2: Experiment with distance sensors, temperature sensor and LED by attaching to Arduino.
CO3: Experiment with distance sensors, temperature sensor and LED by attaching to Node MCU.
CO4: Make use of python programming language to access the GPIO pins.
CO5: Analyze the DHT sensor data by attaching to Raspberry Pi.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	3		3								2	
CO2	2	2	3		3								2	
CO3	2	2	3		3								2	
CO4		3	3											
CO5						2			2	3	3			2

List of Experiments:

1 Using raspberry pi
   a. Calculate the distance using a distance sensor
   b. Basic LED functionality.
2 Using Arduino
   a. Calculate the distance using a distance sensor
   b. Basic LED functionality
   c. Calculate temperature using a temperature sensor.
3 Using Node MCU
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality
   c. Calculate temperature using a temperature sensor.
4 Installing OS on Raspberry Pi
   a. Installation using PiImager
   b. Installation using image file
   - Downloading an Image
   - Writing the image to an SD card
   - Using Linux
   - using Windows
   - Booting up Follow the instructions given in the URL https://www.raspberrypi.com/documentation/computers/getting-started.html.

5 Accessing GPIO pins using Python
   a) Installing GPIO Zero library.
      First, update your repositories list:sudo apt update
      Then install the package for Python 3:
      Sudo apt install python3-gpiozero
   b) Blinking an LED connected to one of the GPIO pin
   c) Adjusting the brightness of an LED Adjust the brightness of an LED (0 to 100, where

100 means maximum brightness) using the in-built PWM wavelength

6 Collecting Sensor Data
   a) DHT Sensor interface
   - Connect the terminals of DHT GPIO pins of Raspberry Pi.
   - Import the DHT library using import Adafruit_DHT
   - Read sensor data and display it on screen

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.

REFERENCE BOOKS:

1 Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
2 N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

L	T	P	C
0	0	2	0

(22MC309) 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.

Objectives of the Course

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

Learning Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India
- 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.
- 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 labor and its relation to politics and economics.
- 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.
- 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.

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

1. Developed a better understanding of important issues related to gender in contemporary India.
2. Sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender.
3. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film
4. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
5. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
6. 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.

7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1						3						1		
CO2						2			1			2		
CO3						2						3		
CO4						2						1		
CO5						2			2			2		
CO6						2			2			1		
CO7						1						2		

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

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

- **Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender**
- **ESSENTIAL READING:** The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu

published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year I Sem

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(22CS306PC) SKILL DEVELOPMENT COURSE
(DATA VISUALIZATION- R PROGRAMMING/ POWER BI)

Course Objectives:

- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

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

- Understand How to import data into Tableau.
- Understand Tableau concepts of Dimensions and Measures.
- Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- Create a Dashboard that links multiple visualizations
- Use graphical user interfaces to create Frames for providing solutions to real world problems

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1		1		2	1					1	1		
CO2	2	1			1	1			1	1	2	1		
CO3	1	2	1		1	1				1	1			
CO4		1	1		2				1			1		
CO5	1	1	2	1	2	1					1	2		

Lab Problems:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?
2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel.
3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields
4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.
6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data
7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization
9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting
10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References
3. The Art of R Programming by Norman Matloff Cengage Learning India.

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B.Tech II Year II Sem

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(22MA401BS) DISCRETE MATHEMATICS

Course Objectives:

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

Course Outcomes (COs):

CO1 Understand and construct precise mathematical proofs
CO2 Apply logic and set theory to formulate precise statements.
CO3 Analyse and solve counting problems on finite and discrete structures
CO4 Describe and manipulate sequences
CO5 Apply graph theory in solving computing problems.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2			2							1		
CO2	3	1			1							2		
CO3	1	2										1		
CO4	1	2										1		
CO5	2	2			2							2		

UNIT - I:

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II:

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions

UNIT - III:

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

UNIT - IV:

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT – V :

Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem

TEXT BOOKS:

1 Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2 Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS:

1 Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition
2 Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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(22SM401MS) BUSINESS ECONOMICS & 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 (COs): At the end of the course a student should be able to

CO1 Understand and Learn the Business Economic Concepts in Micro and Macro Business firm.
CO2 Understand microeconomic factors in related to demand and supply analysis and its forecasting
CO3 Apply the theory of production function and Cost concepts to determine the Break-Even analysis. Remember different market structures, pricing.
CO4 Determine the financial statement by using Fundamental accounting concepts
CO5 Interpret the financial statement by using Fundamental accounting concepts and Ratio analysis

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2					2								
CO2	3					2								
CO3	2	1	1		2									
CO4		2			3									
CO5	1		1		3	2								

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 and 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 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 and Law of Supply

UNIT - III: Production, Cost, Market Structures & Pricing
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.
Cost analysis: Types of Costs, Short run and Long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT - IV: Financial Accounting:
Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts (Simple Problems).

UNIT – V : Financial Ratios Analysis:

Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (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 Mc –Graw Hill, 2011.
3 Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw 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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year II Sem **L T P C**
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(22CS401PC) OPERATING SYSTEMS

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

Course Objectives:
- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes (COs):

CO1 Understanding of basic system calls and processes in Operating system.
CO2 Getting Knowledge of process scheduling algorithms and mechanism for overcoming deadlocks
CO3 Understanding about process management, synchronization of process and how inter process communication is done among the processes.
CO4 Able to understand about the working mechanism of memory management and how virtual memory is used for handling multiple processes.
CO5 Knowing the file system interfaces and operations on files

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	1									2	2	2
CO2	2											2	2	1
CO3	2	2	3	4								3	2	1
CO4	3	2	3	4								3	3	1
CO5	3	2	3	4								2	2	2

UNIT - I:

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

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II:

CPU Scheduling- Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III:

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

Interprocess 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 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 creates, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year II Sem

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(22CS402PC) DATABASE MANAGEMENT SYSTEMS

Prerequisites: A course on "Data Structures".

Course Objectives:

- To understand the basic concepts and the applications of database systems
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques

Course Outcomes (COs):

CO1 Construct the E-R model to represent databases on real world problems.

CO2 Experiment with queries and nested queries on real world problems by using several operators like join, set, and aggregate

CO3 Plan and Relate the concept of data planning and database design is using normalization

CO4 Utilize the ACID properties in transaction management and interpret concurrency control mechanisms

CO5 Categorize various file organizations and indexing for faster retrieval of data, persistent storage of data.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1		2	3										3	
CO2		2	1	2									2	
CO3			3	2	1								2	
CO4				2	1				1				2	
CO5	1	2	2						3				3	

UNIT - I:

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II:

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

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 databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalve dependencies, Fourth normal form, Fifth normal form

UNIT - IV:

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

UNIT – V :

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

TEXT BOOKS:

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

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 Edition

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year II Sem **L T P C**
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(22IT401PC) JAVA PROGRAMMING

Course Objectives:

- To introduce object-oriented programming principles and apply them in solving problems.
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading
- To introduce the design of Graphical User Interface using swing controls.

Course Outcomes (COs):

CO1 Apply the basic concepts of OOPs including data hiding to develop Java Applications
CO2 Utilize the concepts of exception handling and Stream based IO to build java API.
CO3 Develop the applications using java collection framework
CO4 Implement the concepts of Multithreading and JDBC
CO5 Build GUI Applications using AWT Swing and Event Handling

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	3									3	2	3
CO2	3	3	3										3	
CO3	3	2	2		3			3				2	3	3
CO4	2	3	3	2					2			3	2	3
CO5	2	3	3	3	3							3	3	3

UNIT - I:

Foundations of Java: History of Java, Java Features, Variables, Data Types, Operators, Expressions, Control Statements. Elements of Java - Class, Object, Methods, Constructors and Access Modifiers, Generics, Inner classes, String class and Annotations.

OOP Principles: Encapsulation – concept, setter and getter method usage, this keyword. Inheritance - Concept, Inheritance Types, super keyword. Polymorphism – concept, Method Overriding usage and Type Casting. Abstraction – concept, abstract keyword and Interface.

UNIT - II:

Exception Handling: Exception and Error, Exception Types, Exception Handler, Exception Handling Clauses – try, catch, finally, throws and the throw statement, Built-in-Exceptions and Custom Exceptions.

Files and I/O Streams: The file class, Streams, The Byte Streams, Filtered Byte Streams, The Random Access File class

UNIT - III:

Packages- Defining a Package, CLASSPATH, Access Specifiers, importing packages. Few Utility Classes -String Tokenizer, BitSet, Date, Calendar, Random, Formatter, Scanner.

Collections: Collections overview, Collection Interfaces, Collections Implementation Classes, Sorting in Collections, Comparable and Comparator Interfaces.

UNIT - IV:

Multithreading: Process and Thread, Differences between thread-based multitasking and process- based multitasking, Java thread life cycle, creating threads, thread priorities, synchronizing threads, and inter thread communication.

Java Database Connectivity: Types of Drivers, JDBC architecture, JDBC Classes and Interfaces, Basic steps in Developing JDBC Application, Creating a New Database and Table with JDBC

UNIT – V :

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers, Layout Manager Classes, Simple Applications using AWT and Swing.

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

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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year II Sem

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(22CS404PC) OPERATING SYSTEMS LAB

Prerequisites: A course on "Programming for Problem Solving", A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes :

CO1 Simulate and implement operating system concepts such as scheduling and system calls
CO2 Illustrating the process of deadlock management, and semaphore
CO3 Understanding the working IPC mechanisms with an example.
CO4 Implement operating system concepts file management and memory management
CO5 Able to implement Page replacement policies.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	2	1							2	2	1
CO2	3	2	2	2	1							2	2	1
CO3	2	2	2	2	1							3	2	1
CO4	3	2	2	2	1							3	3	1
CO5	3	2	2	2	1							2	2	2

List of Experiments:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI.
2. Operating System - A Design Approach-Crowley, TMH.

3 Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI.
4 UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education.
5 UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education.

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(22CS405PC) DATABASE MANAGEMENT SYSTEMS LAB

Co-requisites: "Database Management Systems"

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes :

CO1 Design a database schema for given problem data.
CO2 Build a GUI application.
CO3 Apply the normalization techniques for development of application software to realistic problems.
CO4 Formulate queries using SQL DML/DDL/DCL commands
CO5 Implement triggers to raise as per real time data and also Implement concurrency control mechanisms.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1		2	2										2	
CO2		1	2										1	
CO3		3	2	2									1	
CO4		1	2	3									2	
CO5		1	2	2	1								2	

List of Experiments:

1 Concept design with E-R Model.
2 Relational Model.
3 Normalization.
4 Practicing DDL commands
5 Practicing DML commands.
6 A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
B. Nested, Correlated subqueries.
7 Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8 Triggers (Creation of insert trigger, delete trigger, update trigger).
9 Procedures.
10 Usage of Cursors

TEXT BOOKS:

1 Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata 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 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 Edition.

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B.Tech II Year II Sem **L T P C**
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(22IT402PC) JAVA PROGRAMMING LAB

Course Objectives:

- To understand OOP principles.
- To understand the Exception Handling mechanism.
- To understand Java collection framework
- To understand multithreaded programming.
- To understand swing controls in Java.

Course Outcomes (COs) :

CO1 Construct programs for given real world problems using java collection frame work.
CO2 Demonstrate the programs using abstract classes to solve the specified problems.
CO3 Make use the concept of multithreading to allow parallel processing in the given program
CO4 Develop GUI programs using Java swing controls for the given example program.
CO5 Develop GUI based applications using swings and applets.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2		1									1	
CO2	3	2	2										1	
CO3	3	2	2										1	1
CO4	3	2		2									1	
CO5	3	2											1	

List of Experiments:

1 Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2 Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction]
3 Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.
4 Write a Java program on Random Access File class to perform different read and write operations
5 Write a Java program to demonstrate the working of different collection classes. [Use package structure to store multiple classes].
6 Write a program to synchronize the threads acting on the same object. [Consider the example of any reservations like railway, bus, movie ticket booking, etc.]
7 Write a program to perform CRUD operations on the student table in a database using JDBC.
8 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.
9 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]

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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

(22MC410) CONSTITUTION OF INDIA

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution

Course Outcomes (COs) : Students will be able to:

CO1 Explain the background of the present constitution of India and features.
CO2 Utilize the fundamental rights and duties.
CO3 Understand the working of the union executive, parliament and judiciary
CO4 Understand the working of the state executive, legislature and judiciary.
CO5 Utilize the special provisions and statutory institutions.
CO6 Show national and patriotic spirit as responsible citizens of the country.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1						2	2	2		2			2	
CO2						3	3	3		3			2	
CO3						3	2	3		3			2	
CO4						3	2	3		3			3	
CO5						3	2	3		3			3	
CO6							3	3		2			3	

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.
Unit –2 Philosophy of the Indian Constitution- Preamble Salient Features
Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading

1 The Constitution of India, 1950 (Bare Act), Government Publication.
2 Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3 M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4 D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech II Year II Sem

L	T	P	C
0	0	2	1

(22CS406PC) SKILL DEVELOPMENT COURSE(NODE JS/ REACT JS/DJANGO)

Course Objectives: Object Oriented Programming through Java, HTML Basics

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming
- To experiment with single page application development using React

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

CO1 Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
CO2 Demonstrate Advanced features of JavaScript and learn about JDBC
CO3 Develop Server – side implementation using Java technologies like
CO4 Develop the server – side implementation using Node JS.
CO5 Design a Single Page Application using React.

COPO Mapping:

	PROGRAMME OUTCOMES													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1		1		2	1					1	1		
CO2	2	1			1	1			1	1	2	1		
CO3	1	2	1		1	1				1	1			
CO4		1	1		2				1			1		
CO5	1	1	2	1	2	1					1	2		

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.j

14. Create a TODO application in react with necessary components and deploy it into github.

REFERENCE BOOKS:

1 Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2 Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3 Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22IT501PC: 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:

CO1: Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
CO2: Identify and apply appropriate software architectures and patterns to carry out high level designof a system and be able to critically compare alternative choices.
CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.
CO4: Recognize the importance of software maintenance and complexities involved in software evolution
CO5: Able to learn various processes used in all the phases of the product.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	1	-	-	3	2	3	3	2	3
CO2	2	1	2	2	1	-	-	-	2	1	2	2	2	2
CO3	1	3	3	3	2	-	-	-	2	2	3	2	1	2
CO4	2	2	3	3	1	-	-	-	-	-	1	1	1	-
CO5	1	1	1	2	1	-	-	-	-	1	1	2	1	-

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, thecapability maturity model integration (CMMI).

Process models: The waterfall model, Spiral model and Agile methodology

UNIT - II:

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

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

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, sequencediagrams, 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. 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.

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

TEXT BOOKS:

1 Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	1	0	4

22IT502PC: DATA COMMUNICATIONS AND COMPUTER NETWORKS

Course Objectives

1 Explore basic concepts of data communication
2 Introduce students to TCP/IP and OSI models along with their merits and demerits.
3 Explore in detail services offered by various layers of OSI Model
4 Understand link layer protocols, UDP, TCP and application layer protocols.

Course Outcomes:

CO1: Understand and explore the basics of communication and computer networks
CO2: Understand data link, network and transport layers concepts of a computer network
CO3: Understand the working of application layer protocols
CO4: Demonstrate the services and features of TCP/UDP protocols in Transport Layer
CO5: Summarize the services and features of Application Layer with respect to WWW

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				2	1						1	3	2
CO2	3	3	2	2	1							2	1	2
CO3	2	3	2	3	1							2	2	3
CO4	1			1								1	1	3
CO5	3	3	3	3	2	2	2					3	3	2

UNIT - I

Data Communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN **Physical layer:** Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT - II:

Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC CRCHamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization

UNIT – III

Network layer: Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP,Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

UNIT - IV:

Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks

UNIT-V:

Application Layer: Domain name space, DNS in Internet, Electronic Mail, SMTP, FTP, WWW, HTTP,SNMP.

TEXT BOOKS:

1 Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition TMH.

REFERENCE BOOKS:

1 Computer Networks, Andrew S Tanenbaum, 6th Edition. Pearson Education.
2 Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W. Ross, 3 rd Edition, Pearson Education
3 Data communications and Computer Networks, P.C Gupta, PHI.
4 An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22AI501PC: MACHINE LEARNING

Course Objectives

1 To introduce students to the basic concepts and techniques of Machine Learning.

2 To have a thorough understanding of the Supervised and Unsupervised learning techniques.

3 To study the various probability-based learning techniques

Course Outcomes:

CO1: Distinguish between, supervised, unsupervised and semi-supervised learning

CO2: Understand algorithms for building classifiers applied on datasets of non-linearly separable classes.

CO3: Understand the principles of evolutionary computing algorithms.

CO4: Design an ensemble to increase the classification accuracy

CO5: Gain knowledge on Bayesian Networks, Reinforcement Algorithms & analytical learning.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1				1	1		1	2	1
CO2	3	2	3	2					2	2	1	2	2	2
CO3	2	2	3	2					1	1		1	2	1
CO4	2	2	2	2					1	1	1	2	2	1
CO5	2	2	3	2					2	1		2	2	1

UNIT – I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression

UNIT - II:

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT – III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT - IV:

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization. Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT-V:

Reinforcement Learning – Overview – Getting Lost Example Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – TrackingMethods.

TEXT BOOKS:

1 Stephen Marsland, ―Machine Learning — An Algorithmic Perspective, Second Edition,Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014

REFERENCE BOOKS:

1 Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2 Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖,First Edition, Cambridge University Press, 2012.
3 Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, FirstEdition, Wiley, 2014
4 Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and MachineLearning Series), Third Edition, MIT Press, 2014

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22IT511PE: BIOMETRICS
(Professional Elective – I)

Prerequisites:
1 Data structures

Course Objectives
1 Will learn the biometric technologies
2 Learn the computational methods involved in the biometric systems.
3 Learn methods for evaluation of the reliability and quality of the biometric systems.

Course Outcomes: After completion of the course, students will be able to:
1 Identify the various Biometric technologies.
2 Design of face recognition systems for the organization.
3 Design finger print, hand geometry applications
4 Develop simple applications for privacy.
5 Demonstrate the concepts of Cryptography & Multimodal

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1				1	1		1	2	1
CO2	3	2	3	2					2	2	1	2	2	2
CO3	2	2	3	2					1	1		1	2	1
CO4	2	2	2	2					1	1	1	2	2	1
CO5	2	2	3	2					2	1		2	2	1

UNIT – I
Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems, Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods

UNIT - II:
Face Biometrics & Retina and Iris Biometrics Introduction, Background of Face Recognition, Design ofFace Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics

UNIT – III
Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages.

UNIT - IV:
Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition For Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System,Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages

UNIT-V:

Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics: Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics - Introduction to Biometric Cryptography.

TEXT BOOKS:

1 G r Sinha and Sandeep B. Patil, Biometrics: concepts and applications, Wiley, 2013
2 Paul Reid, Biometrics for Network Security, Pearson Education.

REFERENCE BOOKS:

1 Samir Nanavathi, Micheal Thieme and Raj Nanavathi, Biometrics, Identity verification in a networked world, Wiley, dream Tech.
2 John D. Woodward and Jr. Wiley Dreamtech, Biometrics, The Ultimate Reference.

Online websites / Materials:

1 https://www.biometricsinstitute.org.
2 https://www.tutorialspoint.com/biometrics/biometrics_quick_guide.htm.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22CS512PE: ADVANCED COMPUTER ARCHITECTURE
(Professional Elective – I)

Prerequisites: Computer Organization

Course Objectives

1. To impart the concepts and principles of parallel and advanced computer architectures.
2. To develop the design techniques of Scalable and multithreaded Architectures.
3. To Apply the concepts and techniques of parallel and advanced computer architectures todesign modern computer systems

Course Outcomes:

1. Computational models and Computer Architectures.
2. Concepts of parallel computer models
3. Scalable Architectures, Pipelining, Superscalar processors.
4. Write about Multisector & SIMD computers
5. Demonstrate Multithreaded & Hybrid computers.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	3	-	-	-	3	2	3	2	2	3
CO2	2	2	1	2	2	-	-	-	2	2	2	2	2	2
CO3	3	3	3	2	3	-	-	-	-	2	3	2	1	2
CO4	2	2	2	3	2	-	-	-	2	2	3	2	1	1
CO5	3	2	3	2	3	-	-	-	3	2	1	2	1	1

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:

Principles 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

UNIT – III

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 Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers.

UNIT-V:

Vector Processing Principles, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5.

TEXT BOOKS:

1 Advanced Computer Architecture, Kai Hwang, 2nd Edition, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1 Computer Architecture, J.L. Hennessy and D.A. Patterson, 4th Edition, ELSEVIER
2 Advanced Computer Architectures, S.G.Shiva, Special Indian edition, CRC, Taylor &Francis.
3 Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G.Wellein, CRC Press, Taylor & Francis Group.
4 Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.
5 Computer Architecture, B. Parhami, Oxford Univ. Press.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22CS513PE: DATA ANALYTICS
(Professional Elective – I)

Prerequisites
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: After completion of this course students will be able to
1 Understand the impact of data analytics for business decisions and strategy.
2 Carry out data analysis/statistical analysis.
3 To carry out standard data visualization and formal inference procedures.
4 Design Data Architecture.
5 Understand various Data Sources.

COPO Matrix::

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2				1							2	3
CO2	1	1	1	1							1		2	3
CO3	1	2	1		2								2	
CO4	1	1	2								2		2	
CO5	2	1	1				2				1		2	

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

UNIT – II
Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, MissingImputations etc. Need for Business Modeling.

UNIT – III
Regression — Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.
Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications tovarious Business Domains etc.

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

UNIT-V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, VisualizingComplex Data and Relations

TEXT BOOKS:

1 Student's Handbook for Associate Analytics – II, III.
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 LabsJeffrey D Ullman Stanford Univ.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22CS514PE: IMAGE PROCESSING

(Professional Elective – I)

Prerequisites

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge ofdigital signal processing is desirable
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Course Objectives:

1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
2. The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes:

1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition,sampling, and quantization
2. Demonstrate the knowledge of filtering techniques
3. Demonstrate the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques
5. Interpret Image compression standards

COPO Matrix::

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	2	3	-	-	-	3	-	-	3	-	-
CO2	3	1	-	-	3	-	2	-	3	-	-	-	2	-
CO3	3	1	-	2	3	3	2	-	-	-	-	3	-	3
CO4	3	2	-	2	3	3	2	-	-	-	--	3	2	3
CO5	3	2	-	2	3	3	-	-	3	-	-	3	2	3

UNIT - I

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

UNIT - II

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

UNIT – III

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

UNIT - IV

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1 Fundamentals of Digital Image Processing: A. K. Jain, PHI
2 Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3 Digital Image Processing: William K. Pratt, John Wiley, 3rd Edition, 2004.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22CS515PE: PRINCIPLES OF PROGRAMMING LANGUAGES

(Professional Elective – I)

Prerequisites

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

Course Objectives:

1 Introduce important paradigms of programming languages
2 To provide conceptual understanding of high-level language design and implementation
3 Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logic programming languages; and scripting languages

Course Outcomes:

1 Acquire the skills for expressing syntax and semantics in formal notation
2 Identify and apply a suitable programming paradigm for a given computing application
3 Gain knowledge of the features of various programming languages and their comparison
4 Demonstrate the use of scripting Languages.
5 Finding various data types of different programming languages.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1	1		2							1	2	2
CO2	1	1	1	1	2				1			1	2	2
CO3	1	1	1	1	2				1			1	2	2
CO4	1	1	1	1	2		1		1			1	2	2
CO5	1	1	1	1	2		1		1			1	2	2

UNIT - I

Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT - II

Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence Expressions and Statements, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment Control Structures — Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT – III

Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local

Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

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

UNIT - IV

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

UNIT-V

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming. Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXT BOOKS:

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

REFERENCE BOOKS:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22CS521PE: COMPUTER GRAPHICS
(Professional Elective – II)

Prerequisites

1 Programming for problem solving and Data Structures

Course Objectives

- Provide the basics of graphics systems including Points and lines, line drawing algorithms, 2D,3D objective transformations

Course Outcomes:

1 Explore applications of computer graphics.
2 Understand 2D, 3D geometric transformations and clipping algorithms.
3 Understand 3D object representations, curves, surfaces, polygon rendering methods, colour models
4 Analyze animation sequence and visible surface detection methods.
5 Apply the knowledge, techniques, skills and modern tools to become successful professionals in communication and media industries.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	1	-	1	-	-	-	-	-	-	1	1	2
CO3	2	1	1	-	3	-	-	-	-	-	-	1	2	-
CO4	2	2	-	2	-	1	-	-	-	-	-	1	-	-
CO5	1	2	1	-	-	-	-	-	-	-	-	1	1	-

UNIT - I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random-scan systems, graphics monitors and work stations and input devices Output primitives: Points and lines, line drawing algorithms (DDA and Bradenham's Algorithm) circle-generating algorithms and ellipse - generating algorithms Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms.

UNIT - II

2-D geometric transformations: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems 2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, clipping operations, point clipping, Line clipping-Cohen Sutherland algorithms, Polygon clipping-Sutherland Hodgeman polygon clipping algorithm.

UNIT – III

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

UNIT - IV

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

viewing: Viewing pipeline, viewing coordinates, projections, view volume and general projection

transforms and clipping.

UNIT-V

Computer animation: Design of animation sequence, general computer animation functions, raster animations, computer animation languages, key frame systems, motion specifications. Visible surface detection methods: Classification, back-face detection, depth-buffer method, BSP-tree method, area sub-division method and octree method.

TEXT BOOKS:

1 "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education.

REFERENCE BOOKS:

1 Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2 Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
3 "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education
4 Computer Graphics, Steven Harrington, TMH.

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B.Tech III Year I Sem

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22IT521PE: QUANTUM COMPUTING
(Professional Elective – II)

Course Objectives

1 To introduce the fundamentals of quantum computing
2 The problem-solving approach using finite dimensional mathematics

Course Outcomes:

1 Understand basics of quantum computing.
2 Understand physical implementation of Qubit.
3 Understand Quantum algorithms and their implementation.
4 Understand The Impact of Quantum Computing on Cryptography.
5 Understand the Noise and error correction techniques

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	-	-	-	-	-	2	-	1	2	2
CO2	2	1	1	1	-	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	-	-	-	-	-	-	-	2	2	2
CO4	3	2	2	2	1	-	-	-	-	-	-	2	2	2
CO5	3	2	2	2	1	-	-	-	-	-	-	2	2	2

UNIT - I

History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II

Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT – III

Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states

UNIT - IV

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorizationalgorithm, Grover's search algorithm.

UNIT-V

Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

TEXT BOOKS:

1 Nielsen M. A., Quantum Computation and Quantum Information, Cambridge.

REFERENCE BOOKS:

1 Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2 Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II.
3 Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to QuantumComputing Algorithms

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B.Tech III Year I Sem

L	T	P	C
3	0	0	3

22IT522PE: ADVANCED OPERATING SYSTEMS
(Professional Elective – II)

Course Objectives

1 To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open-source operating systems), Hardware and software features that support these systems

Course Outcomes:

1 Understand the design approaches of advanced operating systems.
2 Analyse the design issues of distributed operating systems.
3 Evaluate design issues of multi-processor operating systems.
4 Identify the requirements Distributed File System and Distributed Shared Memory.
5 Formulate the solutions to schedule the real time applications.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1	3	-	-	-	-	-	-	-	-	2	3	1
CO2	2	2	3	-	-	-	-	-	-	-	-	2	2	1
CO3	2	2	3	-	-	-	-	-	-	-	-	2	2	-
CO4	2	3	3	1	-	-	-	-	-	-	-	2	2	1
CO5	2	3	2	-	-	-	-	-	-	-	-	2	2	1

UNIT - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token – Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm, Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT – III

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

UNIT - IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling.

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

UNIT-V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOKS:

1 Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition 2001

REFERENCE BOOKS:

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

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B.Tech III Year I Sem **L T P C**
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22CS524PE: DISTRIBUTED DATABASES

(Professional Elective – II)

Prerequisites

1 A course on "Database Management Systems"

Course Objectives:

1 The purpose of the course is to enrich the previous knowledge of database systems and expose the need for distributed database technology to confront the deficiencies of the centralized database systems.
2 Introduce basic principles and implementation techniques of distributed database systems.
3 Equip students with principles and knowledge of parallel and object-oriented databases.
4 Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database managementsystems.

Course Outcomes:

1 Understand theoretical and practical aspects of distributed database systems.
2 Study and identify various issues related to the development of distributed database systems.
3 Understand the design aspects of object-oriented database systems and related developments.
4 Interpret the concepts of Distributed DBMS and Parallel Database Systems.
5 Determine the various design aspects of an object-oriented database system

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	0	0	0	2	0	0	0	0	2	2	2
CO2	3	2	2	3	0	0	0	0	0	0	0	0	3	3
CO3	0	2	2	0	0	0	0	0	3	0	0	0	3	2
CO4	0	0	2	2	0	0	0	0	3	0	0	0	3	0
CO5	0	0	0	0	0	3	0	0	0	0	2	0	0	0

UNIT - I

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problemareas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture. Distributed Database Design: Alternative Design Strategies, Distribution

UNIT - II

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

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

UNIT – III

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

UNIT - IV

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

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

UNIT-V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing. Object Oriented Data Model: Inheritance, object identity, persistent programming languages,persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1 M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems
2 Stefano Ceri and Giuseppe Pelagatti: Distributed Databases

REFERENCE BOOKS:

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

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B.Tech III Year I Sem

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3	0	0	3

22IT523PE: PATTERN RECOGNITION

(Professional Elective – II)

Prerequisites

1 Programming for problem solving
2 Computer Oriented Statistical Methods

Course Objectives:

1 Introducing fundamental concepts, theories, and algorithms for pattern recognition and machine learning

Course Outcomes:

1 Understand the importance of pattern recognition and its representation.
2 Analyse the variants of NN algorithm.
3 Understand the necessity of Hidden Markov models, decision tree and SVM for classification.
4 Understand different types of clustering algorithms.
5 Implement simple Unsupervised Learning & Clustering techniques such as pattern classifiers, classifier combinations.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1		1		1	1						1	
CO2	2	2		2		2	1	1					2	
CO3		1	3	2	2	1	1						1	
CO4	2		2	2	1	1		1						
CO5	1	1	3	2	2	1		1					1	

UNIT - I

Introduction: Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT - II

Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm, use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT – III

Hidden Markov Models: Markov Models for Classification, Hidden Markov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction

UNIT - IV

Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensemblesof Classifiers, Methods for Combining Classifiers.

UNIT-V

Clustering: Importance of clustering, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessingof Data, Classification Algorithms, Selection of Representative Patterns, Results.

TEXT BOOKS:

1 Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub, 1st Ed.

REFERENCE BOOKS:

1 Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2 Fundamentals of Speech Recognition: Lawrence Rabiner and Bing- Hwang Juang. Prentice Hall Pub.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

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0	0	2	1

22IT503PC: SOFTWARE ENGINEERING LAB

Course Objectives:

1 To have hands-on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.
2 To understand the working principle of various communication protocols.

Course Outcomes:

1 Ability to translate end-user requirements into system and software requirements
2 Ability to generate a high-level design of the system from the software requirements
3 Implement data link layer farming methods
4 Analyse error detection and error correction codes.
5 Implement and analyse routing and congestion issues in network design.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3	1	-	-	3	2	3	3	2	3
CO2	2	1	2	2	1	-	-	-	2	1	2	2	2	2
CO3	1	3	3	3	2	-	-	-	2	2	3	2	1	2
CO4	2	2	3	3	1	-	-	-	-	-	1	1	1	-
CO5	1	1	1	2	1	-	-	-	-	1	1	2	1	-

Software EngineeringList of Experiments:

Do the following seven exercises for any two projects given in the list of sample projects or any otherProjects:

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

Sample Projects:

1 Passport automation System
2 Book Bank
3 Online Exam Registration

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year I Sem

L	T	P	C
0	0	2	1

22AI502PC: MACHINE LEARNING LAB

Course Objectives:

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

Course Outcomes:

1 Understand modern notions in predictive data analysis.
2 Select data, model selection, model complexity and identify the trends.
3 Understand a range of machine learning algorithms along with their strengths and weaknesses.
4 Build predictive models from data and analyze their performance.
5 Be capable of performing experiments in Machine Learning using real-world data.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2			2	-	-	-	-	-	-	3	3	1
CO2	2	3	1	3		-	-	-	-	-	-	3	2	1
CO3	2	3	2	3		-	-	-	-	-	-	3	2	1
CO4	2					-	-	-	-	-	-	3	2	1
CO5	2	3	2	3		-	-	-	-	-	-	2	2	1

List of Experiments

1 Write a python program to compute Central Tendency Measures: Mean, Median,Mode Measure of Dispersion: Variance, Standard Deviation
2 Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3 Study of Python Libraries for ML application such as Pandas and Matplotlib
4 Write a Python program to implement Simple Linear Regression
5 Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6 Implementation of Decision tree using sklearn and its parameter tuning
7 Implementation of KNN using sklearn
8 Implementation of Logistic Regression using sklearn
9 Implementation of K-Means Clustering
10 Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

TEXT BOOK:

1 Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOK:

1 Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

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B.Tech III Year I Sem

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0	0	2	1

20CS504PC: COMPUTER NETWORKS LAB

Course Objectives:

1 To have hands-on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.
2 To understand the working principle of various communication protocols.

Course Outcomes:

1 Ability to translate end-user requirements into system and software requirements
2 Ability to generate a high-level design of the system from the software requirements
3 Implement data link layer farming methods
4 Analyze error detection and error correction codes.
5 Implement and analyze routing and congestion issues in network design.

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	2										1	
CO2	2	2	2	2								1	1	2
CO3	2	1	3	3					2	1	2	2	2	2
CO4	1	2	2										1	
CO5	2	2	1	2	3	2	1	1				2	2	2

Computer NetworksList of Experiments:

1 Implement the data link layer farming 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 windowprotocol, 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

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B.Tech III Year I Sem

L	T	P	C
3	0	0	0

22MC510: INTELLECTUAL PROPERTY RIGHTS

Course Objectives:

1 Significance of intellectual property and its protection
2 Introduce various forms of intellectual property

Course Outcomes:

1 Distinguish and Explain various forms of IPRs.
2 Identify criteria to fit one's own intellectual work in particular form of IPRs.
3 Apply statutory provisions to protect particular form of IPRs.
4 Appraise of Trade secret law.
5 Appraise new developments in IPR laws at national and international level

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					2			1					
CO2	3					2							1	
CO3	2	1	1		2				1				2	1
CO4		2				2		2	1			3	2	2
CO5	3	1	1						2				2	2

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 copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, international copyright law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations oftrade secrets, protection for submission, trade secret litigation.
Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international — trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1 Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1 Intellectual property right — Unleashing the knowledge economy, prabuddha ganguli, TataMcGraw Hill Publishing company ltd.

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B.Tech III Year I Sem

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0	0	2	1

22CS506PC: UI DESIGN-FLUTTER

Course Objectives:

1 Learns to Implement Flutter Widgets and Layouts
2 Understands Responsive UI Design and with Navigation in Flutter
3 Knowledge on Widges and customize widgets for specific UI elements, Themes
4 Understand to include animation apart from fetching data

Course Outcomes:

1 Implements Flutter Widgets and Layouts
2 Responsive UI Design and with Navigation in Flutter
3 Create custom widgets for specific UI elements and also Apply styling using themes and customstyles.
4 Design a form with various input fields, along with validation and error handling
5 Fetches data and write code for unit Test for UI components and also animation

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	1	-	-	2	-	-	2	3	2
CO2	3	3	3	2	-	1	-	-	3	-	2	3	3	3
CO3	3	3	3	2	-	-	-	-	3	-	2	3	3	3
CO4	3	3	3	3	2	2	-	1	3	-	3	2	3	3
CO5	3	3	3	3	3	2	-	1	3	-	3	2	3	3

List of Experiments: Students need to implement the following experiments

1 a) Install Flutter and Dart SDK.
b) Write a simple Dart program to understand the language basics.

2 a) Explore various Flutter widgets (Text, Image, Container, etc.).
b) Implement different layout structures using Row, Column, and Stack widgets

3 a) Design a responsive UI that adapts to different screen sizes.
b) Implement media queries and breakpoints for responsiveness.

4 a) Set up navigation between different screens using Navigator.
b) Implement navigation with named routes.

5 a) Learn about stateful and stateless widgets.
b) Implement state management using set State and Provider.

6 a) Create custom widgets for specific UI elements.
b) Apply styling using themes and custom styles.

7 a) Design a form with various input fields.
b) Implement form validation and error handling

8 a) Add animations to UI elements using Flutter's animation framework.
b) Experiment with different types of animations (fade, slide, etc.).

9 a) Fetch data from a REST API.
b) Display the fetched data in a meaningful way in the UI.

10 a) Write unit tests for UI components.
b) Use Flutter's debugging tools to identify and fix issues.

TEXT BOOK:

1 Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.

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B.Tech III Year II Sem

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22IT601PC: AUTOMATA THEORY AND COMPILER DESIGN

Course Objectives:

1. To introduce the fundamental concepts of formal languages, grammars and automata theory.
2. To understand deterministic and non-deterministic machines and the differences betweendecidability and undesirability.
3. Introduce the major concepts of language translation and compiler design and impart theknowledge of practical skills necessary for constructing a compiler.
4. Topics include phases of compiler, parsing, syntax directed translation, type checking use ofsymbol tables, intermediate code generation

Course Outcomes:

1. Able to employ finite state machines for modeling and solving computing problems.
2. Able to design context free grammars for formal languages.
3. Able to distinguish between decidability and undesirability.
4. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
5. Acquire skills in using lex tool and design LR parsers

COPO Matrix:

	PROGRAMME OUTCOMES													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	2			1	1		1	2	2	1
CO2	2	1	3	2	3		1	1	1	3	2	1	1	3
CO3	3	1	1	1	3			1		1	1	1	1	1
CO4	2	3		3					1	1		2	1	2
CO5	2	3		3								1	1	2

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 ofDFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA.

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. Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages

UNIT – III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

UNIT – IV

Introduction: The structure of a compiler. Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex. Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

UNIT – V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax- Directed Translation Schemes, Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, HeapManagement.

TEXT BOOK:

1 Introduction to Automata Theory
2 Theory of Computer Science- Automata languages and computation

REFERENCE BOOK:

1 Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry
D. Ullman, 2nd Edition, Pearson.
2 Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan,Rama R, Pearson.
3 Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4 lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly

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B.Tech III Year II Sem

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22IT602PC: ALGORITHMS DESIGN AND ANALYSIS

Prerequisites: Programming for problem solving and Data Structures

Course Objectives:

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

Course Outcomes:

1. Analyse the performance of algorithms.
2. Choose appropriate data structures and algorithm design methods for a specified application.
3. Understand the choice of data structures and the algorithm design methods.
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.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	3		2			1		1		3	3
CO2	3	3	3	3		2			1		1		3	3
CO3	3	3	3	3		2			1		1		3	3
CO4	3	3	3	3		2			1		1		3	3
CO5	3	3	3	3		2			1		1		3	3

UNIT – I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, AsymptoticNotations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen'smatrix multiplication.

UNIT – II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graphColoring, Hamiltonian cycles

UNIT – III

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

UNIT – IV

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

and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Bi connected components

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 andNP-Complete classes, Cook's theorem.

TEXT BOOK:

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

REFERENCE BOOK:

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 C.Stein, PHI Pvt. Ltd./ Pearson Education.
3 Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich andR.Tamassia, John Wiley and sons.

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B.Tech III Year II Sem	**L**	**T**	**P**	**C**
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22IT603PC: EMBEDDED SYSTEMS

Pre-requisites:

1 A course on "Digital Logic Design and Microprocessors".
2 A course on "Computer Organization and Architecture

Course Objectives:

1 To provide an overview of principles of Embedded System
2 To provide a clear understanding of role of firmware, operating systems in correlation withhardware systems.

Course Outcomes:

1 Expected to understand the selection procedure of processors in the embedded domain.
2 Analyze to understand what a microcomputer, core of the embedded systems.
3 Design procedure of embedded firm ware.
4 Expected to visualize the role of realtime operating systems in embedded systems.
5 Expected to evaluate the correlation between task synchronization and latency issues

UNIT – I

Introduction to Embedded Systems: Processor embedded into a system, Embedded Hardware units and devices in a system, Embedded software in a system, Design process of an embedded system, classification of embedded systems, characteristics and quality attributes of an embedded systems

UNIT – II

Introduction to processor/microcontroller architecture, Real world interfacing, processor and memory organization, memory types, memory maps and addresses, interrupt sources and interrupt service mechanism.

UNIT – III

On board Communication Basics: serial; communication devices, Parallel devices, Wireless devices, Real time clock, Serial bus communication Protocols-I2C, SPI; Parallel buss communication-ISA, PCI.

UNIT – IV

Embedded Firmware Development: Overview of programming concepts - in assembly language andin high level language 'C', C Program elements- Heads, Source files, Processor Directives, Macros, Functions, Data types and Data Structures

UNIT – V

OS Based Embedded Systems: OS services - Process/Task Management, Memory Management, I/O subsystem manager, Inter Process/Task communications - Tasks, Task states, Shared data, Signals, Message Queues, Mailbox, Pipes and concepts of Semaphores.

TEXT BOOK:

1 Embedded Systems, Raj Kamal, 2nd edition, Tata Mc Graw Hill
2 Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill

REFERENCE BOOK:

1 Rajkamal, Embedded Systems Architecture, Programming and Design, Tata McGraw-Hill
2 Frank Vahid and Tony Givargis, "Embedded Systems Design" - A Unified Hardware/SoftwareIntroduction, John Wiley
3 Lyla, "Embedded Systems" –Pearson
4 David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint2000.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year II Sem **L T P C**
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22IT604PC: COMPILER DESIGN LAB

Pre-Requisites:

1 A Course on "Object Oriented Programming through Java".

Co-requisites:

1 A course on "Web Technologies".

Course Objectives:

1 To understand the various phases in the design of a compiler.
2 To understand the design of top-down and bottom-up parsers.
3 To understand syntax directed translation schemes.
4 To introduce lex and yacc tools.

Course Outcomes:

1 Design, develop, and implement a compiler for any language.
2 Use lex and yacc tools for developing a scanner and a parser.
3 Ability to design, develop, and implement a compiler for any language.
4 Able to use lex and yacc tools for developing a scanner and a parser.
5 Able to design and implement LL and LR parsers.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	2			1	1		1	2	2	1
CO2	2	1	3	2	3		1	1	1	3	2	1	1	3
CO3	3	1	1	1	3			1		1	1	1	1	1
CO4	2	3		3					1	1		2	1	2
CO5	2	3		3								1	1	2

List of Experiments

1 Implementation of symbol table.
2 Develop a lexical analyzer to recognize a few patterns inc (ex. Identifiers, constants, comments, operators etc.)
3 Implementation of lexical analyzer using lex tool.
4 Generate yacc specification for a few syntactic categories.
Program to recognize a valid arithmetic expression that uses operator +,-, * and /.
Program to recognize a valid variable which starts with a letter followed by any numberof letter or digits.
Implementation of calculator using lex and yacc.
5 Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
6 Implement type checking
7 Implement any one storage allocation strategies (heap, stack, static)
8 Write a lex program to count the number of words and number of lines in a given file or program.
9 Write a 'C' program to implement lexical analyzer using c program.
10 write recursive descent parser for the grammar E->E+T E->T T->T*F T->FF->(E)/id.
11 write recursive descent parser for the grammar S->(L) S->aL->L,S L->S
12 Write a C program to calculate first function for the grammarE->E+T E->T T->T*F

T->F

F->(E)/id

13 Write a YACC program to implement a top down parser for the given grammar.

14 Write a YACC program to evaluate algebraic expression.

TEXT BOOK:

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

REFERENCE BOOK:

1 Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly

2 Compiler Construction, Louden, Thomson.

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B.Tech III Year II Sem

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22CS631PE: FULL STACK DEVELOPMENT
(Professional Elective – III)

Pre-Requisites:
1 Object Oriented Programming
2 Web Technologies

Course Objectives:
1 Students will become familiar to implement fast, efficient, interactive and scalable webapplications using run time environment provided by the full stack components.

Course Outcomes:
1 Understand Full stack components for developing web application.
2 Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.
3 Use MongoDB data base for storing and processing huge data and connects with NodeJSapplication.
4 Design faster and effective single page applications using Express and Angular.
5 Create interactive user interfaces with react components

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	0	0	0	1	1	0	2	2	1
CO2	3	3	2	2	2	0	0	0	1	0	0	2	2	1
CO3	2	2	2	1	1	0	0	0	1	1	0	3	2	1
CO4	3	3	2	1	1	0	0	0	1	0	0	3	2	1
CO5	3	3	2	1	1	0	0	0	1	0	0	3	2	1

UNIT – I

Introduction to Full Stack Development: Understanding the Basic Web Development Framework- User, Browser, Webserver, Backend Services, Full Stack Components - Node.js, MongoDB, Express, React, Angular. Java Script Fundamentals, NodeJS- Understanding Node.js, Installing Node.js, Working with Node Packages, creating a Node.js Application, Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks

UNIT – II

Node.js: Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Accessing the File System from Node.js- Opening, Closing, Writing, Reading Files and other File System Tasks. Implementing HTTP Services in Node.js- Processing URLs, Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients. Using Additional Node.js Modules-Using the os Module, Using the util Module, Using the dns Module, Using the crypto Module.

UNIT – III

MongoDB: Need of NoSQL, Understanding MongoDB, MongoDB Data Types, Planning Your Data Model, Buildingthe MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections, Adding the MongoDB Driver to Node.js, Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and

Manipulating Collections

UNIT – IV

Express and Angular: Getting Started with Express, Configuring Routes, Using Requests Objects, Using Response Objects. Angular: importance of Angular, Understanding Angular, creating a Basic Angular Application, AngularComponents, Expressions, Data Binding, Built-in Directives, Custom Directives, Implementing AngularServices in Web Applications.

UNIT – V

React: Need of React, Simple React Structure, The Virtual DOM, React Components, Introducing React Components, Creating Components in React, Data and Data Flow in React, Rendering and Life Cycle Methods in React, Working with forms in React, integrating third party libraries, Routing in React.

TEXT BOOK:

1 Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular WebDevelopment, 2nd Edition, Addison-Wesley, 2019.

2 Mark Tielens Thomas, React in Action, 1st Edition, Manning Publications.

REFERENCE BOOK:

1 Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.

2 Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday SkillsExpected of a Modern Full Stack Web Developer', 1st edition, Apress, 2018.

3 Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications UsingReact and Redux, 2nd edition, Addison-Wesley Professional, 2018.

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22IT631PE: DATA MINING

(Professional Elective – III)

Pre-Requisites:

1 Database Management System
2 Probability and Statistics

Course Objectives:

1 Students will become acquainted with both the strengths and limitations of various data miningtechniques like Association, Classification, Cluster and Outlier analysis.

Course Outcomes:

1 Understand the need of data mining and pre-processing techniques.
2 Perform market basket analysis using association rule mining.
3 Utilize classification techniques for analysis and interpretation of data.
4 Identify appropriate clustering and outlier detection techniques to handle complex data.
5 Understand the mining of data from web, text and time series data

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2				1							2	3
CO2	1	1	1	1							1		2	3
CO3	1	2	1		2								2	
CO4	1	1	2								2		2	
CO5	2	1	1				2				1		2	

UNIT – I

Introduction to Data Mining:

What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing: Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformationand Data Discretization

UNIT – II

Association Analysis: Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

UNIT – III

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer Feed- Forward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.

UNIT – IV

Cluster Analysis: Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density- Based Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier

Detection, and Overview of Outlier Detection Methods

UNIT – V

Advanced Concepts: Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

TEXT BOOK:

1 Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann/Elsevier, 2012.
2 Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition, Pearson Education, India, 2006.

REFERENCE BOOK:

1 Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2 Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to DataMining, 2nd Edition, Pearson Education India, 2021.
3 Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

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22CS633PE: SCRIPTING LANGUAGES

(Professional Elective – III)

Pre-Requisites:

1 A course on "Computer Programming and Data Structures".
2 A course on "Object Oriented Programming Concepts".

Course Objectives:

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

Course Outcomes:

1 Comprehend the differences between typical scripting languages and typical system and application programming languages.
2 Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3 Acquire programming skills in scripting language.
4 Demonstrate the use of scripting languages.
5 Demonstrate various data types of different programming languages.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	3	3				2	1		2	2	2
CO2	2	2	2	2	2				2	1		3	2	2
CO3	2	2	2	2	2				2	1		2	2	2
CO4	3	2	2	2	2				2	1		3	2	2
CO5	3	2	2	2	2				2	1		2	2	2

UNIT – I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services, RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT – II

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System,Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT – III

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT – IV

Advanced perl Finer points of looping, pack and unpack, filesystem, 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 Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOK:

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 BOOK:

1 Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Leeand 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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22CS634PE: MOBILE APPLICATION DEVELOPMENT

(Professional Elective – III)

Pre-Requisites:

1 Acquaintance with JAVA programming
2 A Course on DBMS

Course Objectives:

1 To demonstrate their understanding of the fundamentals of Android operating systems
2 To improves 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:

1 Understand the working of Android OS Practically.
2 Develop Android user interfaces.
3 Develop, deploy and maintain the Android Applications.
4 Create a mobile Application by using various components like activity, views, services, content providers and receivers.
5 Develop and design apps for mobile devices using SQLite Database.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	2	-	-	-	-	-	-	1	2	1
CO2	1	3	-	-	2	-	-	-	-	-	-	1	2	1
CO3	1	3	1	-	2	-	-	-	-	-	-	1	2	1
CO4	1	-	3	-	2	-	-	-	-	-	-	1	2	1
CO5	3	1	-	-	2	-	-	-	-	-	-	1	2	1

UNIT – I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes, Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT – II

Android User Interface: Measurements – Device and pixel density independent measuring unit - s Layouts – Linear, Relative, Grid and Table Layouts, User Interface (UI) Components –Editable and non-editable TextViews, 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 andusing 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 andretrieving data using Shared Preference.

UNIT – V

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOK:

1 Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

REFERENCE BOOK:

1 Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013.
2 Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox),

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B.Tech III Year II Sem

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22CS635PE: SOFTWARE TESTING METHODOLOGIES

(Professional Elective – III)

Pre-Requisites:

1 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 the latest tools.

Course Outcomes:

1 Understand purpose of testing and path testing.
2 Understand strategies in data flow testing and domain testing.
3 Develop logic-based test strategies.
4 Understand graph matrices and its applications.
5 Implement test cases using any testing automation tool.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	1	3	-	-	-	2	2	2	2	2	1
CO2	2	2	2	2	3	-	-	-	2	2	3	2	2	2
CO3	3	1	2	2	3	-	-	-	1	2	2	2	2	2
CO4	2	1	3	1	2	-	-	-	2	2	3	2	2	1
CO5	2	2	1	1	3	-	-	-	1	2	2	2	2	1

UNIT – I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT – II

Transaction Flow Testing: transaction flows, transaction flow testing techniques. Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfacestesting, 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/selenium/soapUI/Catalon).

TEXT BOOK:

1 Software Testing techniques - Baris Beizer, Dreamtech, second edition.

2 Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOK:

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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L	T	P	C
3	0	0	3

22IT611OE: JAVA PROGRAMMING
(Open Elective – I)

Course Objectives:

1. To introduce object-oriented programming principles and apply them in solving problems.
2. To introduce the implementation of packages and interfaces.
3. To introduce the concepts of exception handling and multithreading.
4. To introduce the design of Graphical User Interface using swing controls.

Course Outcomes:

CO1 Able to solve real world problems using OOP techniques.
CO2 Able to solve problems using java collection framework and I/O classes.
CO3 Able to develop multithreaded applications with synchronization
CO4 Able to design GUI based applications.
CO5 Build GUI Applications using AWT Swing and Event Handling.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3									3	2	3
CO2	3	3	3										3	
CO3	3	2	2		3			3				2	3	3
CO4	2	3	3	2					2			3	2	3
CO5	2	3	3	3	3							3	3	3

UNIT – I

Foundations of Java: History of Java, Java Features, Variables, Data Types, Operators, Expressions, Control Statements. Elements of Java - Class, Object, Methods, Constructors and Access Modifiers, Generics, Inner classes, String class and Annotations.

OOP Principles: Encapsulation – concept, setter and getter method usage, this keyword. Inheritance
concept, Inheritance Types, super keyword. Polymorphism – concept, Method Overriding usage and Type Casting. Abstraction – concept, abstract keyword and Interface.

UNIT – II

Exception Handling: Exception and Error, Exception Types, Exception Handler, Exception Handling Clauses — try, catch, finally, throws and the throw statement, Built-in-Exceptions and Custom Exceptions.

Files and I/O Streams: The file class, Streams, The Byte Streams, Filtered Byte Streams, The Random Access File class.

UNIT – III

Packages- Defining a Package, CLASSPATH, Access Specifiers, importing packages. Few Utility Classes - String Tokenizer, BitSet, Date, Calendar, Random, Formatter, Scanner.

Collections: Collections overview, Collection Interfaces, Collections Implementation Classes, Sortingin Collections, Comparable and Comparator Interfaces.

UNIT – IV

Multithreading: Process and Thread, Differences between thread-based multitasking and process- based multitasking, Java thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

Java Database Connectivity: Types of Drivers, JDBC architecture, JDBC Classes and Interfaces, Basic steps in Developing JDBC Application, Creating a New Database and Table with JDBC.

UNIT – V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers, Layout Manager Classes, Simple Applications using AWT and Swing.

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

TEXT BOOK:

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, PearsonEducation.

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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22IT612OE: OBJECT ORIENTED PROGRAMMING USING C++

(Open Elective – I)

Course Objectives:

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

Course Outcomes:

CO1 Develop programs with reusability and understand OO functions.
CO2 Develop programs for file handling, data abstraction, data hiding.
CO3 Develop inheritance, overloading and exceptions in programming.
CO4 Implement I/O operations and file handling.
CO5 Develop applications for a range of problems using object-oriented programming techniques.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3									3	2	3
CO2	3	3	3										3	
CO3	3	2	2		3			3				2	3	3
CO4	2	3	3	2					2			3	2	3
CO5	2	3	3	3	3							3	3	3

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 and 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 deallocation 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, Virtualbase 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.

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.

TEXT BOOK:

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, PearsonEducation.

REFERENCE BOOKS:

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

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22EN601HS: ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

Course Outcomes:

The student should be able to:

1 Develop Listening and Reading skills, with a focus on vocabulary.
2 Build written communication skills to meet the needs of their academic and career endeavors.
3 Choose appropriate language in their oral communications in various social and professional contexts.
4 Demonstrate the nuances of language and body language through group activities.
5 Take part in interviews with confidence thereby enhancing their employability skills

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					2				2	3		2		
CO2					2	2			2	3		2		
CO3					2	2			3	3		2		
CO4						2			3	3		2		
CO5									3	3		2		

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1 **Activities on Listening and Reading Comprehension:** Active Listening – Development of Listening Skills Through Audio clips - Benefits of Reading – Methods and Techniques of Reading – Basic Steps to Effective Reading – Common Obstacles – Discourse Markers or Linkers - Sub-skills of reading - Reading for facts, negative factsand Specific Details-Guessing Meanings from Context, Inferring Meaning - Critical Reading — Reading Comprehension – Exercises for Practice.

2 **Activities on Writing Skills:** Vocabulary for Competitive Examinations - Planning for Writing – Improving Writing Skills -Structure and presentation of different types of writing– Free Writing and Structured Writing -Letter Writing –Writing a Letter of Application – Resume vs. Curriculum Vitae – Writing a Résumé – Styles of Résumé - e-Correspondence – Emails – Blog Writing - (N) etiquette –Report Writing – Importance of Reports – Types and Formats of Reports–Technical Report Writing– Exercises for Practice.

3 **Activities on Presentation Skills** - Starting a conversation – responding appropriately and relevantly – using the right language and body language – Role Play in different situations including Seeking Clarification, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk – Oral presentations (individual and group) through JAM sessions-PPTs – Importance of Presentation Skills – Planning, Preparing, Rehearsing and Making a Presentation – Dealing with Glossophobia or Stage Fear – Understanding Nuances of Delivery - Presentations through Posters/Projects/Reports – Checklist for Making a Presentation and Rubrics of Evaluation

4 **Activities on Group Discussion (GD):** Types of GD and GD as a part of a Selection Procedure - Dynamics of Group Discussion- Myths of GD - Intervention, Summarizing - Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas – Do's and Don'ts - GD Strategies – Exercises for Practice.

5 **Interview Skills:** Concept and Process -Interview Preparation Techniques - Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies - Interview Through Tele-conference &Video-conference - Mock Interviews.

BOOKS RECOMMENDED:

1 Rizvi, M. Ashraf (2018). *Effective Technical Communication*. (2nded.). McGraw Hill Education (India) Pvt. Ltd.

2 Suresh Kumar, E. (2015). *Engineering English.* Orient BlackSwan Pvt. Ltd.

3 Bailey, Stephen. (2018). Academic *Writing: A Handbook for International Students.* (5th Edition). Routledge.

4 Koneru, Aruna. (2016). *Professional Communication*. McGraw Hill Education (India) Pvt. Ltd.

5 Raman, Meenakshi & Sharma, Sangeeta. (2015). *Technical Communication, 3E: Principles and Practice*. Oxford University Press.

6 Anderson, Paul V. (2007). *Technical Communication***.** Cengage Learning Pvt. Ltd. New Delhi.

7 McCarthy, Michael; O'Dell, Felicity & Redman, Stuart. (2017). *English Vocabulary in Use* Series. Cambridge University Press

8 Sen, Leela. (2009). *Communication Skills.* PHI Learning Pvt Ltd., New Delhi.

9 Elbow, Peter. (1998). *Writing with Power*. Oxford University Press.

10 Goleman, Daniel. (2013). *Emotional Intelligence*: *Why it can matter more than IQ.* Bloomsbury Publishing.

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22CS636PE: FULL STACK DEVELOPMENT LAB

(Professional Elective – III)

Pre-Requisites:

1 Object Oriented Programming
2 Web Technologies

Course Objectives:

1 Introduce fast, efficient, interactive and scalable web applications using run time environmentprovided by the full stack components

Course Outcomes:

1 Design flexible and responsive Web applications using Node JS, React, Express and Angular.
2 Perform CRUD operations with MongoDB on huge amount of data.
3 Develop real time applications using react components.
4 Use various full stack modules to handle http requests and responses.
5 Create interactive user interfaces with react components.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	0	0	0	1	1	0	2	2	1
CO2	3	3	2	2	2	0	0	0	1	0	0	2	2	1
CO3	2	2	2	1	1	0	0	0	1	1	0	3	2	1
CO4	3	3	2	1	1	0	0	0	1	0	0	3	2	1
CO5	3	3	2	1	1	0	0	0	1	0	0	3	2	1

List of Experiments

1 Create an application to setup node JS environment and display “Hello World”.
2 Create a Node JS application for user login system.
3 Write a Node JS program to perform read, write and other operations on a file.
4 Write a Node JS program to read form data from query string and generate response usingNodeJS.
5 Create a food delivery website where users can order food from a particular restaurant listed inthe website for handling http requests and responses using NodeJS.
6 Implement a program with basic commands on databases and collections using MongoDB.
7 Implement CRUD operations on the given dataset using MongoDB.
8 Perform Count, Limit, Sort, and Skip operations on the given collections using MongoDB
9 Develop an angular JS form to apply CSS and Events.
10 Develop a Job Registration form and validate it using angular JS.
11 Write an angular JS application to access JSON file data of an employee from a server using $http service.
12 Develop a web application to manage student information using Express and Angular JS.
13 Write a program to create a simple calculator Application using React JS.
14 Write a program to create a voting application using React JS
15 Develop a leave management system for an organization where users can apply different

typesof leaves such as casual leave and medical leave. They also can view the available number ofdays using react application.

16 Build a music store application using react components and provide routing among the web pages.

17 Create a react application for an online store which consist of registration, login, product information pages and implement routing to navigate through these pages

TEXT BOOK:

1 Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular Web Development, 2nd Edition, Addison-Wesley, 2019.

2 Mark Tielens Thomas., React in Action, 1st Edition, Manning Publications.

REFERENCE BOOK:

1 Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.

2 Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday SkillsExpected of a Modern Full Stack Web Developer', 1st edition, Apress, 2018.

3 Brad Green& Seshadri. Angular JS. 1st Edition. O'Reilly Media, 2013.

4 Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications UsingReact and Redux, 2nd edition, Addison-Wesley Professional, 2018.

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22IT632PE: DATA MINING LAB

(Professional Elective – III)

Pre-Requisites:

1 A course on "Database Management System

Course Objectives:

1 The course is intended to obtain hands-on experience using data mining software.
2 Intended to provide practical exposure of the concepts in data mining algorithms

Course Outcomes:

1 Apply preprocessing statistical methods for any given raw data.
2 Gain practical experience of constructing a data warehouse.
3 Implement various algorithms for data mining in order to discover interesting patternsfrom large amounts of data.
4 Apply OLAP operations on data cube construction.
5 Understand the mining of data from web, text and time series data.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2				1							2	3
CO2	1	1	1	1							1		2	3
CO3	1	2	1		2								2	
CO4	1	1	2								2		2	
CO5	2	1	1				2				1		2	

List of Experiments: Experiments using Weka/ Pentaho/Python

1 Data Processing Techniques:
(i)Data cleaning (ii) Data transformation – Normalization (iii) Data integration
2 Data cleaning (ii) Data transformation – Normalization (iii) Data integration
3 Partitioning - Horizontal, Vertical, Round Robin, Hash based
4 Data Warehouse schemas – star, snowflake, fact constellation
5 Data cube construction – OLAP operations
6 Data Extraction, Transformations & Loading operations
7 Implementation of Attribute oriented induction algorithm
8 Implementation of apriori algorithm
9 Implementation of FP – Growth algorithm
10 Implementation of Decision Tree Induction
11 Calculating Information gain measures
12 Classification of data using K – nearest neighbour approach
13 Implementation of K – means algorithm
14 Implementation of BIRCH algorithm
15 Implementation of PAM algorithm
16 Implementation of DBSCAN algorithm

TEXT BOOK:

1 Data Mining – Concepts and Techniques - JIAWEI HAN &MICHELINE KAMBER, Elsevier.
2 Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-HillEdition, Tenth reprint 2007

REFERENCE BOOK:

1 Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Anuj Karpatne, Introduction to Data Mining,Pearson Education

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22CS638PE: SCRIPTING LANGUAGES LAB

(Professional Elective – III)

Pre-Requisites: Any High-level programming language (C, C++)

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 Ability to understand the differences between Scripting languages and programming languages
2 Acquire the knowledge of ruby programming.
3 Make use of perl programming for given problems.
4 Gain some fluency programming in Ruby, Perl, TCL.
5 Develop application using scripting languages.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	-	-	-	-	-	-	2	2	1
CO2	3	2	2	2	2	-	-	-	-	-	-	2	2	1
CO3	2	3	2	2	3	-	-	-	-	-	-	3	2	1
CO4	2	2	2	1	2	-	-	-	-	-	-	3	3	1
CO5	2	1	3	2	1	-	-	-	-	-	-	2	2	2

List of Experiments:

1 Write a Ruby script to create a new string which is n copies of a given string where n is a non-negativeinteger.
2 Write a Ruby script which accept the radius of a circle from the user and compute the parameter andarea.
3 Write a Ruby script which accept the users first and last name and print them in reverse order with aspace 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 theirsum.
8 Write a Ruby script to check two temperatures and return true if one is less than 0 and the other isgreater 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 storedin 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 BOOK:

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 Progammers guide by Dabve Thomas Second edition.

REFERENCE BOOK:

1	Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Leeand 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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22CS639PE: MOBILE APPLICATION DEVELOPMENT LAB

(Professional Elective – III)

Prerequisites: --- NIL---

Course Objectives:

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

Course Outcomes:

1 Understand the working of Android OS Practically.
2 Develop user interfaces.
3 Create application and linking with database.
4 Develop application with CRUD operations.
5 Develop, deploy and maintain the Android Applications

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	2	-	-	-	-	-	-	1	2	-
CO2	1	3	-	-	2	-	-	-	-	-	-	1	2	-
CO3	1	3	1	-	2	-	-	-	-	-	-	1	2	-
CO4	1	-	3	-	2	-	-	-	-	-	-	1	2	-
CO5	3	1	-	-	2	-	-	-	-	-	-	1	2	-

LIST OF EXPERIMENTS:

1 a. 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 thename entered in the 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 (Datepicker), 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 the right fragment instead of the second screen with the back button. Use Fragment transactions and Rotation event listeners.

4 Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

5 Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

6 Create an application that uses a text file to store usernames and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, thedetails should be verified with the text file data and if they

match, show a dialog saying that login issuccessful. Otherwise, show the dialog with a 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 preferenceand 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.

TEXT BOOK:

1 Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.

2 Android Application Development for Java Programmers, James C Sheusi, Cengage, 2013

REFERENCE BOOK:

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

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22CS63APE: SOFTWARE TESTING METHODOLOGIES LAB

(Professional Elective – III)

Pre-Requisites:

1 A basic knowledge of programming

Course Objectives:

1 To provide knowledge of software testing methods.

2 To develop skills in automation of software testing and software test automation managementusing the latest tools.

Course Outcomes:

1 Design and develop the best test strategies in accordance with the development model.
2 Design and develop GUI, Bitmap and database checkpoints.
3 Develop database checkpoints for different checks.
4 Perform batch testing with and without parameter passing
5 Implementation of interrupt execution.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	3	-	-	-	2	2	3	2	2	2
CO2	2	2	2	3	3	-	-	-	1	3	2	2	2	2
CO3	2	1	1	3	3	-	-	-	1	2	3	2	2	2
CO4	2	2	2	2	3	-	-	-	2	3	2	2	2	2
CO5	2	1	3	2	3	-	-	-	2	2	2	2	3	3

LIST OF EXPERIMENTS:

1 Recording in context sensitive mode and analog mode
2 GUI checkpoint for single property
3 GUI checkpoint for single object/window
4 GUI checkpoint for multiple objects
5 a. Bitmap checkpoint for object/window
  b. Bitmap checkpoint for screen area
6 Database checkpoint for Default check
7 Database checkpoint for custom check
8 Database checkpoint for runtime record checks
9 a. Data driven test for dynamic test data submission
  b. Data driven test through flat files
  c. Data driven test through front grids
  d. Data driven test through excel test
10 a. Batch testing without parameter passing
  b. Batch testing with parameter passing
11 Data driven batch
12 Silent mode test execution without any interruption
13 Test case for calculator in windows application

TEXT BOOK:

1 Software Testing techniques, Baris Beizer, 2nd Edition, Dreamtech.
2 Software Testing Tools, Dr. K.V.K.K.Prasad, Dreamtech.

REFERENCE BOOK:

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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year II Sem **L T P C**
0 0 4 2

22IT601PW: BIG DATA-SPARK

Course Objectives:

1 The main objective of the course is to process Big Data with advance architecture like spark and streaming data in Spark.

Course Objectives:

1 Develop MapReduce Programs to analyze large dataset Using Hadoop and Spark
2 Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components
3 Perform the filter, count, distinct, map, flatMap RDD Operations in Spark.
4 Build Queries using Spark SQL
5 Apply Spark joins on Sample Data Sets

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	1	-	-	2	-	-	2	3	2
CO2	3	3	3	2	-	1	-	-	3	-	2	3	3	3
CO3	3	3	3	2	-	-	-	-	3	-	2	3	3	3
CO4	3	3	3	3	2	2	-	1	3	-	3	2	3	3
CO5	3	3	3	3	3	2	-	1	3	-	3	2	3	3

LIST OF EXPERIMENTS:

1 To Study of Big Data Analytics and Hadoop Architecture
   i. know the concept of big data architecture
   ii. know the concept of Hadoop architecture
2 Loading DataSet in to HDFS for Spark AnalysisInstallation of Hadoop and cluster management
   i. Installing Hadoop single node cluster in ubuntu environment
   ii. Knowing the differencing between single node clusters and multi-node clusters
   iii. Accessing WEB-UI and the port number
   iv. Installing and accessing the environments such as hive and sqoop
3 File management tasks & Basic linux commands
   i. Creating a directory in HDFS
   ii. Moving forth and back to directories
   iii. Listing directory contents
   iv. Uploading and downloading a file in HDFS
   v. Checking the contents of the file
   vi. Copying and moving files
   vii. Copying and moving files between local to HDFS environment
   viii. Removing files and paths
   ix. Displaying few lines of a file
   x. Display the aggregate length of a file
   xi. Checking the permissions of a file
   xii. Zipping and unzipping the files with & without permission pasting it to a location
   xiii. Copy, Paste commands
4 Map-reducing
   i. Definition of Map-reduce
   ii. Its stages and terminologies
   iii. Word-count program to understand map-reduce (Mapper phase, Reducer phase, Drivercode)
5 Implementing Matrix-Multiplication with Hadoop Map-reduce
6 Compute Average Salary and Total Salary by Gender for an Enterprise.

7	i.	Creating hive tables (External and internal)
	ii.	Loading data to external hive tables from sql tables(or)Structured c.s.v using scoop
	iii.	Performing operations like filterations and updations
	iv.	Performing Join (inner, outer etc)
	v.	Writing User defined function on hive tables
8	Create a sql table of employees Employee table with id,designation Salary table (salary ,dept id) Create external table in hive with similar schema of above tables,Move data to hive using scoop and load the contents into tables,filter a new table and write a UDF to encrypt the table with AES-algorithm, Decrypt it with key to show contents	
9	Pyspark Definition(Apache Pyspark) and difference between Pyspark, Scala, pandas	
	i.	Pyspark files and class methods
	ii.	get(file name)
	iii.	get root directory()
10	Pyspark -RDD'S	
	i.	what is RDD's?
	ii.	ways to Create RDD
	iii.	parallelized collections
	iv.	external dataset
	v.	existing RDD's
	vi.	Spark RDD's operations (Count, foreach(), Collect, join,Cache()
11	Perform pyspark transformations	
	i.	map and flatMap
	ii.	to remove the words, which are not necessary to analyze this text.
	iii.	groupBy
	iv.	What if we want to calculate how many times each word is coming in corpus?
	v.	How do I perform a task (say count the words 'spark' and 'apache' in rdd3) separatly oneach partition and get the output of the task performed in these partition?
	vi.	unions of RDD
	vii.	join two pairs of RDD Based upon their key
12	Pyspark sparkconf-Attributes and applications	
	i.	What is Pyspark spark conf ()
	ii.	Using spark conf create a spark session to write a dataframe to read details in a c.s.v andlater move that c.s.v to another location

TEXT BOOK:

1 Spark in Action, Marko Bonaci and Petar Zecevic, Manning.

2 PySpark SQL Recipes: With HiveQL, Dataframe and Graphframes, Raju Kumar Mishra and Sundar Rajan Raman, Apress Media.

WEB LINKS:

1 https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013301505844518912251 8 shared/overview

2 https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01258388119638835242_s hared/overview

3 https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605268423008256169 2 _shared/overview

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech III Year II Sem

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22MC610: 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: The Student will learn

CO1 Know basic concept of ecological perspective and the value of the environment.
CO2 Understand the significance of various natural resources and its management
CO3 Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation
CO4 Identify different types of pollution and their control measures, Discover effective methods of waste management and come out with best possible solutions.
CO5 Raise awareness about environmental laws and sustainable development.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		1	2			3	3	2			1	1		
CO2						1	3	2				1		
CO3		2	3			2	2	2				1		
CO4		1	1			3	3	2			1	2		
CO5						2	2	3				2		

UNIT – I

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

UNIT – II

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

UNIT – III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and cosystem 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-situconservation. National Biodiversity act.

UNIT – IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of

pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

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

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

Biomedicalwaste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Low carbon life style.

TEXT BOOK:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

REFERENCE BOOK:

1 Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL LearningPrivate Ltd. New Delhi.
2 Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3 Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4 Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

22IT701PC: INFORMATION SECURITY

Pre-Requisites:
1 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 datanetworks
4 To apply algorithms used for secure transactions in real world applications

Course Outcomes:
CO1 Demonstrate the knowledge of cryptography, network security concepts and applications.
CO2 Ability to apply security principles in system design.
CO3 Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.
CO4 Ability to Understand security issues in Wireless LAN and web.
CO5 Ability to Understand cyber security and need of cyber-Laws.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1	2		2	2		2				2	
CO2	3	2		3		3			2			3	2	2
CO3	3	2		2		2			3			3	2	3
CO4	3											3	3	2
CO5	3											2		2

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, TrafficConfidentiality, 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 BOOK:

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

REFERENCE BOOK:

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

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech IV Year I Sem

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22IT702PC: CLOUD COMPUTING

Prerequisites

A course on "Computer Networks".
A course on " Operating System

Course Objectives:

1 This course provides an insight in to cloud computing
2 Topics covered include- Cloud Computing Architecture, Deployment Models, Service Models, Technological Drivers for Cloud Computing, Networking for Cloud Computing and Security in Cloud Computing

Course Outcomes: : The student will learn

CO1: Understand different computing paradigms and potential of the paradigms and specifically cloud computing

CO2: Understand cloud service types, cloud deployment models and technologies supporting and driving the cloud

CO3: Acquire the knowledge of programming models for cloud and development of software application that runs the cloud and various services available from major cloud providers

CO4: Understand the security concerns and issues in cloud computing

CO5: Acquire the knowledge of advances in cloud computing.

CO's	PROGRAM OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					2	1							
CO2	3					2							1	
CO3	2	1	1		2		1						2	1
CO4		2					1						2	2
CO5	1		1		3	2	2				3		1	1

UNIT - I

Computing Paradigms, Cloud Computing Fundamentals, Cloud Computing Architecture and Management

UNIT - II

Cloud Deployment Models, Cloud Service Models, Technological Drivers for Cloud Computing: SOA and Cloud, Multicore Technology, Web 2.0 and Web 3.0, Pervasive Computing, Operating System, Application Environment

UNIT – III

Virtualization, Programming Models for Cloud Computing: Map Reduce, Cloud Haskell, Software Development in Cloud

UNIT - IV

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, Cloud Service Providers

UNIT - V

Security in Cloud Computing, and Advanced Concepts in Cloud Computing

TEXT BOOKS:

1 Chandrasekaran K. *Essentials of cloud computing*. CRC Press, 2014

REFERENCE BOOKS:

1 Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya ,James Broberg, Andrzej M. Goscinski, Wiley, 2011

2 Enterprise Cloud Computing- Technology ,Architecture ,Applications, Gautam Shroff, Cambridge University Press, 2010

3 Cloud Computing Bible, Barrie Sosinsky, Wiley-India,2010

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech IV Year I Sem

L	T	P	C
3	0	0	3

22IT741PE: HUMAN COMPUTER INTERACTION
(Professional Elective - IV)

Course Objectives:

1 To gain an overview of Human-Computer Interaction (HCI).
2 Understanding the alternatives to traditional "keyboard and mouse" computing.
3 Getting familiarity with the vocabulary associated with sensory and cognitive systems.
4 Be able to apply models from cognitive psychology to predicting user performance.
5 Working in small groups on a product design with invaluable team-work experience

Course Outcomes:

CO1 Apply HCI and principles to interaction design.
CO2 Design certain tools for blind or PH people
CO3 Understand the social implications of technology and ethical responsibilities as engineers.
CO4 Understand the importance of a design and evaluation methodology.
CO5 Describe how testing is applied in computer interaction.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2		2	2					2	2	2
CO2	3	2	2	2		2	2					3	2	2
CO3	2	2	2	2		2	2					2	2	3
CO4	3	2	2	2			2					3	2	2
CO5	3	2	2	2			2					2	3	2

UNIT – I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design, A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphicalsystem, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT – II

Design process – Human interaction with computers, importance of human characteristics, human consideration, Human interaction speeds, understanding business junctions.

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT – III

Windows – New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, usesproblems, choosing colors.

UNIT – IV

HCI in the software process- The software life cycle, Usability engineering, Iterative design and prototyping, Design Focus: Prototyping in practice, Design rationale, Design rules, Principles to supportusability Standards, Golden rules and heuristics, HCI patterns, Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method, Universal design, Universal design principles Multimodal interaction

UNIT – V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money, Linguistic models, The challenge of display-based systems, Physical and device models, Cognitive architectures, Ubiquitous computing and augmented realities, Ubiquitous computing applications research, Design Focus: Ambient Wood – augmenting the physical, Virtual and augmented reality, Design Focus: Sharedexperience Design Focus: Applications of augmented reality Information and data visualization

TEXT BOOK:

1 The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.

2 Human – Computer Interaction. Alan Dix, Janet Fincay, Gregory's, Abowd, Russell Bealg,Pearson Education.

REFERENCE BOOKS:

1 Designing the user interface. 3rd Edition Ben Schneiderman, Pearson Education Asia.
2 Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3 User Interface Design, Soren Lauesen, Pearson Education.
4 Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5 Human –Computer Interaction, Smith - Atakan, Cengage Learning.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech IV Year I Sem

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3	0	0	3

22IT742PE: HIGH PERFORMANCE COMPUTING
(Professional Elective - IV)

Pre-Requisites:
1. Computer Organization & Architecture
2. Operating Systems
3. Algorithms and Data Structures
4. Programming Language(C/C++)

Course Objectives:
1. To teach students to become good at parallel computing algorithm design
2. To teach students to become good at modeling and solving problems using different types ofparallel computing architectures
3. To teach students the ability to measure the performance of parallel algorithms and arrive atreasonable estimates of cost trade-offs.
4. To teach students the various paradigms in algorithm design for computationally intensiveapplications.
5. To teach students to become good at understanding and using modern multi-processor andmulti-core architectures.

Course Outcomes:
- **CO1** Understand different parallel computing architectures and networks
- **CO2** Design parallel algorithms and measure their performance.
- **CO3** Understand vector processing, memory bottlenecks, data and thread-level parallelism
- **CO4** Understand the various programming frameworks like MPI, Open MP and CUDA.
- **CO5** Gain knowledge of writing efficient parallel programs.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2		2	2					2	2	2
CO2	3	2	2	2		2	2					3	2	2
CO3	2	2	2	2		2	2					2	2	3
CO4	3	2	2	2			2					3	2	2
CO5	3	2	2	2			2					2	3	2

UNIT – I

Modern Processors: Stored-Program Computer Architecture, General-Purpose cache-based Microprocessor Architecture, Memory Hierarchies, Multicore processors, Multithreaded processors, Vector processors.

Basic optimization techniques for serial code: Scalar profiling, Common sense optimizations, Simple measures, large impact, The role of compilers, Data access optimization.

UNIT – II

Parallel computers: Taxonomy of parallel computing paradigms, Shared-memory computers, Distributed-memory computers, Hierarchical (hybrid) systems, Networks.

Basics of parallelization: Need for Parallelism, Parallel scalability

UNIT – III

Shared-memory parallel programming with OpenMP: Introduction to OpenMP, Profiling OpenMP programs, Performance pitfalls, Case study: OpenMP-parallel Jacobi algorithm.

UNIT – IV

Distributed-memory parallel programming with MPI: Message passing, Introduction to MPI, MPI performance tools, Communication parameters, Synchronization, serialization, contention, Reducing communication overhead, Case study: Parallel sparse matrix-vector multiply

UNIT – V

CUDA: Understanding the CUDA computing model and the API using nvcc compiler, Introduction to modern supercomputing architectures featuring NVIDIA processors

TEXT BOOK:

1 Introduction to Parallel Computing, Second Edition, Ananth Grama, George Karypis, VipinKumar, Anshul Gupta, Addison-Wesley, 2003, ISBN: 0201648652.
2 Georg Hager, Gerhard Wellein, Introduction to High Performance Computing for Scientists andEngineers, Chapman & Hall / CRC Computational Science series, 2011.

REFERENCE BOOKS:

1 CUDA Programming A Developer's Guide to Parallel Computing with GPUs by Shane Cook,Morgan Kaufman Publishers.
2 Parallel Computing – Theory and Practice, Second Edition, Michaek J. Quinn, Tata McGraw-Hill Edition
3 Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy,PHI.
4 Parallel Programming in C with MPI and OpenMP by Michael Quinn, McGraw-Hill Publisher.
5 Computer Architecture A Quantitative Approach by John Hennessey and David Patterson,Morgan Kaufman Publishers.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

22IT743PE: ARTIFICIAL INTELLIGENCE
(Professional Elective –IV)

Pre-Requisites:
1 Programming for problem solving, Data Structures

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 machinelearning.

Course Outcomes:
CO1 Understand search strategies and intelligent agents.
CO2 Understand different adversarial search techniques.
CO3 Apply propositional logic, predicate logic for knowledge representation
CO4 Apply AI techniques to solve problems of game playing, and machine learning
CO5 Ability to design Expert system.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		3		2			3	3		3	1	2
CO2	2			2		2						2	2	2
CO3		2	2						2			2	2	2
CO4	3	3		3		2			3				2	1
CO5	2	2	2			2				2		2	2	2

UNIT – I

Introduction to AI, Intelligent Agents, problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT – II

Problem Solving by Search-II and Propositional Logic

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems. Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT – III

Logic and Knowledge Representation

First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.
Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting,Forward Chaining, Backward Chaining, Resolution**.**

UNIT – IV
Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.
Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

UNIT – V
Uncertain knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use **Probabilistic Reasoning:** Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning;Dempster-Shafer theory.

TEXT BOOK:
1 Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig,Pearson Education.

REFERENCE BOOKS:
1 Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2 Artificial Intelligence, 3rd Edn., Patrick Henry Winston, Pearson Education.
3 Artificial Intelligence, Shivani Goel, Pearson Education.
4 Artificial Intelligence and Expert systems – Patterson, Pearson Education.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

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

22IT744PE: INFORMATION RETRIEVAL SYSTEMS
(Professional Elective – IV)

Pre-Requisites:
1 Data Structures

Course Objectives:
1 To learn the concepts and algorithms in Information Retrieval Systems.
2 To understand the data/file structures that are necessary to design, and implement informationretrieval (IR) systems

Course Outcomes:
CO1 Ability to apply IR principles to locate relevant information large collections of data
CO2 Ability to design different document clustering algorithms.
CO3 Implement retrieval systems for web search tasks.
CO4 Design an Information Retrieval System for web search tasks
CO5 Ability to imply text search techniques.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			3				2	2	2		3	2	
CO2		3						1		2				3
CO3		3	3			2			2	2		1	3	2
CO4	2	2	2				1	2	1					
CO5	3	3		3	1			2				1	2	3

UNIT – I
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities,Browse Capabilities, Miscellaneous Capabilities.

UNIT – II
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT – III
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.
Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item

UNIT – IV
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of BooleanSystems, Searching the INTERNET and Hypertext.
Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

UNIT – V

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

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

TEXT BOOK:

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

REFERENCE BOOKS:

1 Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms,Prentice Hall, 1992

2 Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.

3 Modern Information Retrieval by Yates and Neto Pearson Education

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22CS745PE: AD HOC & SENSOR NETWORKS

(Professional Elective – IV)

Pre-Requisites:

1 Computer Networks
2 Distributed Systems
3 Mobile Computing

Course Objectives:

1 To understand the challenges of routing in ad-hoc and sensor networks.
2 To understand various broadcast, mutlicast and geocasting protocols in ad hoc and sensornetworks
3 To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN.

Course Outcomes:

CO1 Understand the concepts of sensor networks and applications.
CO2 Understand and compare the MAC and routing protocols for adhoc networks.
CO3 Understand the transport protocols of sensor networks.
CO4 Discuss the sensor characteristics and WSN layer protocols.
CO5 Illustrate the issues of routing in WSN and Security of WSN.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2						1		3	3	3
CO2	3	3	3	3								3	2	1
CO3	3	2	3	1						1		3	2	2
CO4	3	2										2	2	2
CO5	3	3	2	1	1	3	1					2	3	2

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, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; *Position-based* routing algorithms- Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR

UNIT – II

Data Transmission

Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area- based Methods, Neighbour 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.

TEXT BOOK:

1 Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P.Aggarwal*, WorldScientific 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)

REFERENCE BOOKS:

1 C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2 Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols andApplications, Wiley.

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22IT751PE: INTRUSION DETECTION SYSTEMS

(Professional Elective – V)

Pre-Requisites:

1 Computer Networks, Computer Programming

Course Objectives:

1 Compare alternative tools and approaches for Intrusion Detection through quantitative analysis to determine the best tool or approach to reduce risk from intrusion.

2 Identify and describe the parts of all intrusion detection systems and characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share.

Course Outcomes:

CO1 Understand fundamental knowledge of intrusion detection and prevention
CO2 Understand different types of attacks in network layer and code injection human layer
CO3 Analyze different anomaly detection algorithms.
CO4 Write personal letter, official letter, email and articles.
CO5 Participate in the conversation in order to acquire oral & listening skills

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1									2	
CO2	3	2	1	1									2	
CO3	2	1											1	
CO4	2	1											1	
CO5	3	3	2	2									3	

UNIT – I

The state of threats against computers, and networked systems-Overview of computer security solutions and why they fail-Vulnerability assessment, firewalls, VPN's -Overview of Intrusion Detectionand Intrusion Prevention, Network and Host-based IDS

UNIT – II

Classes of attacks - Network layer: scans, denial of service, penetration Application layer: software exploits, code injection-Human layer: identity theft, root access-Classes of attackers-Kids/hackers/sopHesitated groups-Automated: Drones, Worms, Viruses

UNIT – III

A General IDS model and taxonomy, Signature-based Solutions, Snort, Snort rules, Evaluation of IDS,Cost sensitive IDS

UNIT – IV

Anomaly Detection Systems and Algorithms-Network Behavior Based Anomaly Detectors (rate based)- Host-based Anomaly Detectors-Software Vulnerabilities-State transition, Immunology, Payload Anomaly Detection

UNIT – V

Attack trees and Correlation of alerts- Autopsy of Worms and Botnets-Malware detection - Obfuscation, polymorphism- Document vectors, Email/IM security issues-Viruses/Spam-From

signatures to thumbprints to zero-day detection-Insider, Threat issues-Taxonomy-Masquerade and Impersonation Traitors, Decoys and Deception-Future: Collaborative Security

TEXT BOOK:

1 Peter Szor, The Art of Computer Virus Research and Defense, Symantec Press ISBN 0-321- 30545-3.
2 Markus Jakobsson and Zulfikar Ramzan, Crimeware, Understanding New Attacks and Defenses.

REFERENCE BOOKS:

1 Saiful Hasan, Intrusion Detection System, Kindle Edition.
2 Ankit Fadia, Intrusion Alert: An Ethical Hacking Guide to Intrusion Detection.

ONLINE WEBSITES/MATERIALS:

1 https://www.intechopen.com/books/intrusion-detection-systems/

ONLINE COURSES:

1 https://www.sans.org/course/intrusion-detection-in-depth
https://www.cybrary.it/skill-certification-course/ids-ips-certification-training-course

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22IT752PE: REAL TIME SYSTEMS

(Professional Elective – V)

Pre-Requisites:

1 Basic Programming/C/C++ Programming, Computer Organization and OperatingSystem

Course Objectives:

1 To provide a broad understanding of the requirements of Real Time Operating Systems.
2 To make the student understand, applications of these Real Time features using case studies.

Course Outcomes:

CO1 Understand the key concepts of Real-Time systems.
CO2 To facilitate task scheduling and designing concurrency within an application using Semaphores, Message queues.
CO3 . Explore other kernel objects common to embedded system development.
CO4 Attain knowledge of exception and interrupt handling in real time systems.
CO5 Understand real time operating systems like RT Linux, VxWorks, MicroC /OSII, TinyOs

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1		3	1	1	1						1	
CO2	2	1	1	3	1								1	
CO3	1		3	2	1	1		1						
CO4	1	3	1	2		2	1						3	
CO5		1	1	2	1	2		1					1	

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close,lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT – II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT – III

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT – IV

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR),Soft Timers, Operations.

UNIT – V

Case Studies of RTOS: RT Linux, MicroC/OS-II, VxWorks, Embedded Linux, and Tiny OS

TEXT BOOK:

1 Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011.

2 Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.

REFERENCE BOOKS:

1 Advanced UNIX Programming, Richard Stevens

2 Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh.

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22IT753PE: DEEP LEARNING

(Professional Elective – V)

Course Objectives:

1 To understand deep Learning algorithms and their applications in real-world data.

Course Outcomes:

CO1 Understand machine learning basics and neural networks.
CO2 Understand optimal usage of data for training deep models.
CO3 Apply CNN and RNN models for real-world data.
CO4 Evaluate deep models.
CO5 Develop deep models for real-world problems.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	1		1				2	3	2	2
CO2	2	2	2	2	2		1				2	3	2	2
CO3	2	2	2	2	2		1				2	3	2	2
CO4	2	2	2	2	2		1				2	3	2	2
CO5	2	2	2	2	2		1				2	3	2	2

UNIT – I

Machine Learning Basics

Learning Algorithms, Capacity, Over fitting and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning

Deep Feed forward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms.

UNIT – II

Regularization for Deep Learning

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under- Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi- Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates.

UNIT – III

Convolutional Networks

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features.

UNIT – IV

Recurrent and Recursive Nets

Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-

Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long- Term Dependencies, Explicit Memory

UNIT – V

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition.

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural LanguageProcessing, Other Applications.

TEXT BOOK:

1 Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

REFERENCE BOOKS:

1 The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2 Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3 Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
4 Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009
5 Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Educat.

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22CS754PE: BLOCKCHAIN TECHNOLOGY

(Professional Elective – V)

Pre-Requisites:

1 Knowledge in information security and applied cryptography.
2 Knowledge in Computer Networks

Course Objectives:

1 To learn the fundamentals of Blockchain and various types of block chain and consensusmechanisms.
2 To understand the public block chain system, Private block chain system and consortium blockchain.
3 Able to know the security issues of blockchain technology.

Course Outcomes:

CO1 Understanding concepts behind crypto currency.
CO2 Applications of smart contracts in decentralized application development.
CO3 Understand frameworks related to public, private and hybrid blockchain
CO4 Create blockchain for different application case studies.
CO5 Deploying and maintaining the block chain code and creating the BOTs.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	2	2	1						3	2	2
CO2	2	1		2	2					2			2	2
CO3	2		2	2			2		1	2	2	3		2
CO4	2	1	3	2	2		2	1		2	3	2	2	-
CO5	1	1			2	2	2		1	2	2	3	2	2

UNIT – I

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.

Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Typesof Blockchain, Consensus Protocol.

Crypto currency — Bitcoin, Altcoin and Token: Introduction, Bit coin and the Crypto currency,Crypto currency Basics, Types of Crypto currencies, Crypto currency Usage.

UNIT – II

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bit coin, Blockchain Ethereum Blockchain.

Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

UNIT – III

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned

Blockchain, Byzantine Fault, Multichain.

Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda.

Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in anICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT – IV

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.

Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain In Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT – V

Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services,Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities.

Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, BasicProgramming Using Python, Python Packages for Blockchain.

Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK

TEXT BOOK:

1 "Blockchain Technology", Chandramouli Subramanian, Asha A. George, Abhilasj K A andMeena Karthikeyan, Universities Press.

REFERENCE BOOKS:

1 Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2 Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3 Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.

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22CS755PE: 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:

CO1 Understand the software process change, assessment, project plans and Quality Standards
CO2 Examine the life cycle phases, artifacts, workflows and checkpoints of a process.
CO3 Design and develop software products using conventional and modern principles of softwareproject management
CO4 Identify the new project management process and practices.
CO5 To analyze the case study and future project management.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	3				2		2		1	1
CO2	3	2	2	2	3				1	1	2		2	1
CO3	3	1	3	2	3				1	2	2		2	1
CO4	3	2	3	2	3				2	2	2		3	1
CO5	3	1	3	2	3				2	1	2		2	1

UNIT – I

Software Process Maturity

Software maturity Framework, Principles of Software Process Change, Software Process Assessment,The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process, Process Reference Models Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT – II

Software Project Management Renaissance

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, 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-basedsoftware architectures

UNIT – III

Workflows and Checkpoints of process

Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments, Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT – IV

Project Organizations

Line-of- business organizations, project organizations, evolution of organizations, process automation.Project Control and process instrumentation, The seven-core metrics, management

indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT – V

CCPDS-R Case Study and Future Software Project Management Practices, Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOK:

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 Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition,Wiley India, 2004
6 Agile Project Management, Jim Highsmith, Pearson education, 2004.

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22IT721OE: FULL STACK DEVELOPMENT
(Open Elective – II)

Pre-Requisites:

1 Object Oriented Programming & Web Technologies

Course Objectives:

1 Students will become familiar to implement fast, efficient, interactive and scalable web applications using run time environment provided by the full stack components.

Course Outcomes:

1 Understand Full stack components for developing web application.
2 Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.
3 Use Mongo DB data base for storing and processing huge data and connects with NodeJ Sapplication.
4 Design faster and effective single page applications using Express and Angular.
5 Create interactive user interfaces with react components.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	0	0	0	1	1	0	2	2	1
CO2	3	3	2	2	2	0	0	0	1	0	0	2	2	1
CO3	2	2	2	1	1	0	0	0	1	1	0	3	2	1
CO4	3	3	2	1	1	0	0	0	1	0	0	3	2	1
CO5	3	3	2	1	1	0	0	0	1	0	0	3	2	1

UNIT – I

Introduction to Full Stack Development:

Understanding the Basic Web Development Framework- User, Browser, Webserver, Backend Services, Full Stack Components - Node.js, MongoDB, Express, React, Angular. Java Script Fundamentals, NodeJS- Understanding Node.js, Installing Node.js, Working with Node Packages, creating a Node.js Application, Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks

UNIT – II

Node.js:

Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Accessing the File System from Node.js- Opening, Closing, Writing, Reading Files and other File System Tasks. Implementing HTTP Services in Node.js- Processing URLs, Processing Query Stringsand Form Parameters, Understanding Request, Response, and Server Objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients. Using Additional Node.js Modules-Using the os Module, Using the util Module, Using the dns Module, Using the crypto Module.

UNIT – III

MongoDB:

Need of NoSQL, Understanding MongoDB, MongoDB Data Types, Planning Your Data Model, Building the MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections, Adding the MongoDB Driver to Node.js, Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and

Manipulating Collections

UNIT – IV

Express and Angular:

Getting Started with Express, Configuring Routes, Using Requests Objects, Using Response Objects. Angular: importance of Angular, Understanding Angular, creating a Basic Angular Application, Angular Components, Expressions, Data Binding, Built-in Directives, Custom Directives, Implementing AngularServices in Web Applications.

UNIT – V

React:

Need of React, Simple React Structure, The Virtual DOM, React Components, Introducing React Components, Creating Components in React, Data and Data Flow in React, Rendering and Life CycleMethods in React, Working with forms in React, integrating third party libraries, Routing in React.

TEXT BOOK:

1 Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular WebDevelopment, 2nd Edition, Addison-Wesley, 2019.

2 Mark Tielens Thomas, React in Action, 1st Edition, Manning Publications.

REFERENCE BOOKS:

1 Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.

2 Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday SkillsExpected of a Modern Full Stack Web Developer', 1st edition, Apress, 2018.

3 Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications UsingReact and Redux, 2nd edition, Addison-Wesley Professional, 2018.

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22IT722OE: SCRIPTING LANGUAGES

(Open Elective – II)

Pre-Requisites:
1 A course on "Computer Programming and Data Structures".
2 A course on "Object Oriented Programming Concepts".

Course Objectives:
1 This course introduces the script programming paradigm
2 Introduces scripting languages such as Perl, Ruby and TCL.
3 Learning TCL

Course Outcomes:
1 Comprehend the differences between typical scripting languages and typical system and application programming languages.
2 Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3 Acquire programming skills in scripting language.
4 Demonstrate the use of scripting languages.
5 Demonstrate various data types of different programming languages

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	3	3				2	1		2	2	2
CO2	2	2	2	2	2				2	1		3	2	2
CO3	2	2	2	2	2				2	1		2	2	2
CO4	3	2	2	2	2				2	1		3	2	2
CO5	3	2	2	2	2				2	1		2	2	2

UNIT – I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services
RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT – II

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System,Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT – III

Introduction to PERL and Scripting

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Namesand Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern andregular expressions, subroutines.

UNIT – IV

Advanced perl

Finer points of looping, pack and unpack, filesystem, 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

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOK:

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 Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1 Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Leeand 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.

TEEGALA KRISHNA REDDY ENGINEERING COLLEGE

B.Tech IV Year I Sem **L T P C**
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22IT703PC: INFORMATION SECURITY LAB

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 datanetworks
4 To apply algorithms used for secure transactions in real world applications

Course Outcomes:

CO1 Demonstrate the knowledge of cryptography, network security concepts and applications.
CO2 Ability to apply security principles in system design.
CO3 Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.
CO4 Ability to Understand various applications of cryptography and security issues practically
CO5 Ability to Explore the knowledge of key exchange protocols.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2	2	2	2		2			2	3	2
CO2	3	3	2		2	2						3		3
CO3	3	2			1		2		2			3	3	3
CO4	3	3	2									3		3
CO5				2						1				

List of Experiments:

1 Implementation of symmetric cipher algorithm (AES and RC4)
2 Random number generation using a subset of digits and alphabets.
3 Implementation of RSA based signature system
4 Implementation of Subset sum
5 Authenticating the given signature using the MD5 hash algorithm.
6 Implementation of Diffie-Hellman algorithm
7 Implementation of the ELGAMAL cryptosystem.
8 Implementation of Gold wasser- Micali probabilistic public key system
9 Implementation of Rabin Cryptosystem. (Optional).
10 Implementation of Kerberos cryptosystem
11 Implementation of a trusted secure web transaction.
12 Digital Certificates and Hybrid (ASSY/SY) encryption, PKI.
13 Message Authentication Codes.
14 Elliptic Curve cryptosystems (Optional)

TEXT BOOK:

1 Cryptography and Network Security (principles and approaches) by William Stallings PearsonEducation, 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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22IT704PC: CLOUD COMPUTING LAB

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:

- CO1 Understand various service types, delivery models and technologies of a cloud computingenvironment.
- CO2 Understand the ways in which the cloud can be programmed and deployed.
- CO3 Understand cloud service providers like Cloud Sim, Globus Toolkit etc.
- CO4 Examine various programming paradigms suitable to solve real world and scientific problemsusing cloud services.
- CO5 Acquire the knowledge of advances in cloud computing.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3								1		1		
CO2	3	3										2	2	
CO3	3	3							1			1		
CO4	3	3		2								2		
CO5	3	3			2	1						1		

List of Experiments:

1. Install Virtualbox/VMware Workstation with different flavors of Linux or windows OS on top ofwindows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute SimplePrograms
3. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IPaddress with the instance.
4. Install Google App Engine. Create a hello world app and other simple web applications usingpython/java.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not presentin Cloud Sim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count
9. Create a database instance in the cloud using Amazon RDS.
10. Create a database instance in the cloud using Google Cloud SQL

TEXT BOOK:

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

REFERENCE BOOKS:

1 Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2 Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3 Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010.

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B.Tech IV Year II Sem **L T P C**
3 0 0 3

22HS801MS: ORGANIZATIONAL BEHAVIOUR

Course Objectives:

1 This course demonstrates individual, group behaviour aspects: The dynamics of organizationalclimate, structure and its impact on Organizations.

Course Outcomes:

CO1 Apply the key factors to estimate the behaviour of individuals and groups in organizations.
CO2 Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.
CO3 Analyse organizational behavioural issues in the context of organizational behaviour Theories, models and concepts.
CO4 Evaluate the different aspects related to Decision Making and Controlling Process.
CO5 Describe the different theories related to Individual behaviour in the Organization.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	2												
CO3	3	2	1											
CO4	3	3	2	1										
CO5	3	3	3	1	1							1		

UNIT – I

Organizational Behavior

Definition, need and importance of organizational behavior – Nature and scope – Frame work – Organizational behavior models.

UNIT – II

Individual Behavior

Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behavior modification, Misbehavior – Types – Management Intervention. Emotions - Emotional Labor – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

UNIT – III

Group Behavior

Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

UNIT – IV

Leadership and Power

Meaning – Importance – Leadership styles – Theories of leadership – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

UNIT – V

Dynamics of Organizational Behavior

Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness.

TEXT BOOK:

1 Stephen P. Robins, Organisational Behaviour, PHI Learning / Pearson Education, 11th edition,2008.

2 Fred Luthans, Organisational Behaviour, McGraw Hill, 11th Edition, 2001.

REFERENCE BOOKS:

1 Schermerhorn, Hunt and Osborn, Organisational behaviour, John Wiley, 9th Edition, 2008.

2 Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education,2004.

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22IT861PE: NATURAL LANGUAGE PROCESSING

(Professional Elective – VI)

Pre-Requisites:

1 Data structures and compiler design.

Course Objectives:

1 Introduction to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

Course Outcomes:

CO1 Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.

CO2 Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems.

CO3 Manipulate probabilities, construct statistical models over strings and trees, and estimateparameters using supervised and unsupervised training methods.

CO4 Design, implement, and analyse NLP algorithms; and design different language modelingTechniques.

CO5 Introduce Speech Production and Related Parameters Of Speech.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	2		1	1	2		1	2	1	1	
CO2	1	3	1	1		1	1	2		1	1	1		2
CO3	2	1	2	1		1	2	2		2	2	1		2
CO4	1	1	1	1	2	3	1	2		1	1	2		
CO5	1	1	1	1		1	3	2		1	1	1		

UNIT – I

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

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

UNIT – II

Syntax I: Parsing Natural Language, Treebanks: A Data

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues.

UNIT – IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems.

UNIT – V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling.

TEXT BOOK:

1 Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication.

REFERENCE BOOKS:

1 Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, PearsonPublications.
2 Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

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B.Tech IV Year II Sem **L T P C**
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22CS862PE: DISTRIBUTED SYSTEMS

(Professional Elective – VI)

Pre-Requisites:
1 A course on "Operating Systems".
2 A course on "Computer Organization & Architecture".

Course Objectives:
1 To provide an insight into Distributed systems.
2 To introduce concepts related to Peer to Peer Systems, Transactions and Concurrency control,Security and Distributed shared memory.

Course Outcomes:
CO1 Understand Transactions and Concurrency control.
CO2 Understand distributed shared memory.
CO3 Design a protocol for a given distributed application
CO4 Distributed System Models.
CO5 Concurrency Control and Distributed Transactions.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	1						2	2	2
CO2	1	1	1	1	1	1						2	2	2
CO3	1	1	1	1	1	1						2	2	2
CO4	1	1	1	1	1	1						2	2	2
CO5	1	1	1	1	1	1						2	2	2

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

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

UNIT – III
Peer to Peer Systems– Napster and its legacy, Peer to Peer middleware.
Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physicalclocks, logical time and logical clocks, global states, distributed debugging.
Coordination and Agreement- Distributed mutual exclusion, Elections, Multicast communication,consensus and related problems.

UNIT – IV
Transactions and Concurrency Control- Introduction, Transactions, Nested Transactions,

Locks,and Optimistic concurrency control, Timestamp ordering.
Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols Concurrency control in distributed transactions.
Distributed deadlocks: Transaction recovery.

UNIT – V
Replication: Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.
Distributed shared memory: Design and Implementation issues, Consistency models.

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

REFERENCE BOOKS:
1 Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, PearsonEducation.
2 Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani andMukesh Singhal, Cambridge, rp 2010.

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22IT862PE: AUGMENTED REALITY & VIRTUAL REALITY
(Professional Elective –VI)

Course Objectives:

1. Provide a foundation to the fast growing field of AR and make the students aware of thevarious AR concepts**.**
2. To give historical and modern overviews and perspectives on virtual reality. It describes thefundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

Course Outcomes:

CO1 Describe how AR systems work and list the applications of AR.
CO2 Understand the software architectures of AR.
CO3 Understand the Visual perception and rendering in VR.
CO4 Understand the interaction, auditory perception and rendering in VR.
CO5 Design engineering solutions for solving complex engineering problems.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1		1			3	1	1	1	2	
CO2	2	2	1	1		1			3	2	2	2	2	
CO3	2	3	2	2		1			3	2	2	2	2	1
CO4	2	1	3	2	3	1	1	2	3	2	2	2	2	
CO5	2	2	3	3	1	1		1	2	2	1	2	3	3

UNIT – I

Introduction to Augmented Reality: Augmented Reality - Defining augmented reality, history ofaugmented reality, Examples, Related fields

Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial DisplayModel, Visual Displays

Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of TrackingTechnology, Stationary Tracking Systems, Mobile Sensors

UNIT – II

Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking,Natural Feature Tracking by Detection, Outdoor Tracking.

Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on RealSurfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction

Software Architectures: AR Application Requirements, Software Engineering Requirements,Distributed Object Systems, Dataflow, Scene Graphs

UNIT – III

Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology andPerception

The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations

Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras,Displays

UNIT – IV

The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR
Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color **Visual Rendering:** Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

UNIT – V
Motion in Real and Virtual Worlds: Velocities and Accelerations, The Vestibular System, Physics inthe Virtual World, Mismatched Motion and Vection
Interaction: Motor Programs and Remapping, Locomotion, Social Interaction
Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, AuditoryRendering

TEXT BOOK:

1 Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India;First edition (12 October 2016),ISBN-10: 9332578494
2 Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

REFERENCE BOOKS:

1 Allan Fowler-AR Game Development, 1st Edition, A press Publications, 2018, ISBN 978- 1484236178
2 Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3 Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, WilliamR Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4 Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381
5 Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija — Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
6 Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005

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22IT863PE: WEB SECURITY
(Professional Elective –VI)

Course Objectives:

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

Course Outcomes: Students should be able to

CO1 Understand the Web architecture and applications.
CO2 Understand client side and service side programming.
CO3 Understand how common mistakes can be bypassed and exploit the application.
CO4 Identify common application vulnerabilities.
CO5 Demonstrate the network security system using open source tools.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										2	2
CO2	3	2	2										2	
CO3	3	2	2										2	
CO4	3	2	2										2	
CO5	2	1	1										2	

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 andProtocols, 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 DataProcessing 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 BOOK:

1 Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly

2 Handbook on Database security applications and trends Michael Gertz

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22CS865PE: CYBER FORENSICS

(Professional Elective –VI)

Prerequisites: Network Security.

Course Objectives:

1. A brief explanation of the objective is to provide digital evidence which is obtained from digitalmedia.
2. . In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computers play in a certain crime. According to a snippet from the United States Security Service, the computer functions indifferent kinds of crimes.

Course Outcomes:

- CO1 Students will understand the usage of computers in forensic, and how to use various forensictools for a wide variety of investigations.
- CO2 It gives an opportunity to students to continue their zeal in research in computer forensics.
- CO3 Formulate about the different types of crimes, to dramatize the usage of computers in forensic.
- CO4 Implementation of various forensic tools for a wide variety of investigations.
- CO5 Ability to use of virtual machines in cyber forensics.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	3				3	2	3	2	2	3
CO2	2	2	1	2	2				2	2	2	2	2	2
CO3	3	3	3	2	3					2	3	2	1	2
CO4	2	2	2	3	2				2	2	3	2	1	1
CO5	3	2	3	2	3				3	2	1	2	1	1

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 forensicdata, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT – IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices

UNIT – V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoftstartup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOK:

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, NewDelhi.
3 Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGELearning

REFERENCE BOOKS:

1 Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison-WesleyPearson Education
2 Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, SpringerInternational edition.

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B.Tech IV Year II Sem

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22IT831OE: BIG DATA TECHNOLOGIES
(Open Elective –III)

Course Objectives:

1. The purpose of this course is to provide the students with knowledge of Big data Analyticsprinciples and techniques.
2. This course is also designed to give an exposure of the frontiers of Big data Analytics

Course Outcomes:

1. Ability to explain the foundations, definitions, and challenges of Big Data and various Analytical tools.
2. Ability to program using HADOOP and Map reduce, NOSQL.
3. Ability to understand the importance of Big Data in Social Media and Mining.
4. Build Queries using Spark SQL
5. Apply Spark joins on Sample Data Sets

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	1	-	-	2	-	-	2	3	2
CO2	3	3	3	2	-	1	-	-	3	-	2	3	3	3
CO3	3	3	3	2	-	-	-	-	3	-	2	3	3	3
CO4	3	3	3	3	2	2	-	1	3	-	3	2	3	3
CO5	3	3	3	3	3	2	-	1	3	-	3	2	3	3

UNIT – I

Getting an Overview of Big Data

Big Data, History of Data Management – Evolution of Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics, Careers in Big Data, Future of Big Data

Technologies for Handling Big Data

Distributed and Parallel Computing for Big Data, Introducing Hadoop, Cloud Computing and Big Data,In-Memory Computing Technology for Big Data.

UNIT – II

Understanding Hadoop Ecosystem

Hadoop Ecosystem, Hadoop Distributed File System, MapReduce, Hadoop YARN, Hbase, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie

Understanding MapReduce Fundamentals and HBase

The MapReduce Framework, Techniques to Optimize MapReduce Jobs, Uses of MapReduce, Role ofHBase in Big Data Processing

UNIT – III

Exploring Hive

Introducing Hive, Getting Started with Hive, Data Types in Hive, Built-In Functions in Hive, Hive DDL, Data Manipulation in Hive, Data Retrieval Queries, Using JOINS in Hive

Analyzing Data with Pig

Introducing Pig, Running Pig, Getting Started with Pig Latin, Working with Operators in Pig, Working with Functions in Pig

UNIT – IV

Using Oozie

Introducing Oozie, Installing and Configuring Oozie, Understanding the Oozie Workflow,

Oozie Coordinator, Oozie Bundle, Oozie Parameterization with EL, Oozie Job Execution Model, Accessing Oozie, Oozie SLA

No SQL Data Management

Introduction to NoSQL, Aggregate Data Models, Key Value Data Model, Document Databases, Relationships, Graph Databases, Schema-Less Databases, Materialized Views, Distribution Models, Sharding, MapReduce Partitioning and Combining, Composing MapReduce Calculations

UNIT – V

ZooKeeper: Installing and Running ZooKeeper, An Example, Group Membership in ZooKeeper,Creating the Group, Joining a Group, Listing Members in a Group, The ZooKeeper Service, Data Model, Operations, Implementation, Consistency, Sessions, Building Applications with ZooKeeper, AConfiguration, Service, The Resilient ZooKeeper Application, A Lock Service, More Distributed DataStructures and Protocols, ZooKeeper in Production

Sqoop: Getting Sqoop, Sqoop Connectors, A Sample Import, Generated Code, Imports: A Deeper Look, Working with Imported Data, Importing Large Objects, Performing an Export, Exports: A DeeperLook.

TEXT BOOK:

1 Big data, blackbook, DreamTech Press, 2015

2 Hadoop: The Definitive Guide, Tom White, 3rd Edition, O'Reilly Media, 2012.

REFERENCE BOOKS:

1 Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.

2 Simon Walkowiak, Big Data Analytics with R, Packt Publishing, ISBN: 9781786466457

3 Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiley CIO Series, 2013.

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B.Tech IV Year II Sem

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22IT832OE: DEVOPS
(Open Elective –III)

Pre-Requisites:
1 Software Engineering
2 Software Project Management

Course Objectives:
1 Understand the skill sets and high-functioning teams involved in Agile, DevOps and relatedmethods to reach a continuous delivery capability.
2 Implement automated system update and DevOps lifecycle

Course Outcomes:
1 Understand the various components of DevOps environment.
2 Identify Software development models and architectures of DevOps
3 Use different project management and integration tools.
4 Select an appropriate testing tool and deployment model for project.
5 Collaborate and adopt Devops in real-time projects.

COPO Matrix:

Cos	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	0	2	0	0	3	0	0	0	2	2	0	1	2	2
CO2	2	2	2	0	3	0	0	0	2	2	2	1	2	2
CO3	0	0	2	0	3	0	0	0	2	2	2	1	2	2
CO4	0	0	2	0	3	0	0	0	1	2	1	1	2	2
CO5	2	0	2	0	3	0	0	0	2	2	2	1	2	2

UNIT – I
Introduction to DevOps:
Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

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, Micro services 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 buildservers, Collating quality measures.

UNIT – V

Testing Tools and Deployment:

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 Stacka nd Docker

TEXT BOOK:

1 Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1 Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wileypublications.
2 Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. AddisonWesley.

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)