ACADEMIC REGULATIONS AND COURSE STRUCTURE

CHOICE BASED CREDIT SYSTEM

R22
Computer Science & Engineering
(DATA SCIENCE)

Bachelor of Technology (B.Tech)

B. Tech. - Regular Four Year Degree Programme

(For batches admitted from the academic year 2022-2023)

&

(For batches admitted Lateral Entry Scheme from the academic year 2023-2024)

MLRInstitute of Technology

(Autonomous)
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COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

VISION

Achieve global recognition through innovation, interdisciplinary research and excellence in Data Science. Empower students with professional competence to excel in industry, higher studies and entrepreneurship.

MISSION

- **M1**: To foster a culture of innovation and interdisciplinary research that addresses real-world challenges through the application of advanced Data Science techniques and emerging technologies.

- **M2**: To equip students with strong analytical, technical and professional skills, enabling them to excel in industry, pursue higher education and engage in entrepreneurial ventures.

- **M3**: To promote collaboration with academia, industry and research organizations globally, ensuring continuous learning, ethical practice and societal impact through Data Science.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO 1: To enable the graduates of the program to have a globally competent professional career in Data Science domain.

PEO 2: To prepare the students to excel in Data Science with the technical skills and competency to carry out research and address the basic needs of the society.

PEO 3: To empower the graduates of the program to have entrepreneurial skills with a lifelong learning attitude in order to support the growth of the economy of a country.

PROGRAM OUTCOMES

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B.Tech – CSE(DS) : PROGRAM SPECIFIC OUTCOMES

PSO 1: Analyse and visualize data in the context of real world problems, communicate findings, and interpret results using data analytics for decision making.

PSO 2: Students of the Data Science will explore interdisciplinary research and applications to solve industry problems and sustainable development goals.

FOREWORD

The autonomy is conferred on MLR Institute of Technology by UGC, based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

MLR Institute of Technology is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

CONTENTS

B. Tech. - Regular Four Year Degree Programme
(For batches admitted from the academic year 2022-23)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the academic year 2023-24)

For pursuing four year U̲nder G̲raduate Degree P̲rogramme of study in Engineering & Technology (UGP in E&T) offered by MLR Institute of Technology under Autonomous status is herein referred to as MLRIT (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2022-23 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for M L R Institute of Technology (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, M L R Institute of Technology shall be the chairman Academic Council.

1. ADMISSION

1.1. **Admission into first year of four year B. Tech. degree programmes of study in Engineering**

1.1.1. **Eligibility:**

A candidate seeking admission into the first year of four year B. Tech. degree Programmes should have:

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

(ii) Secured a rank in the EAMCET examination conducted by TSCHE for allotment of a seat by the Convener, EAMCET, for admission.

1.1.2.   **Admission Procedure:**

Admissions are made into the first year of four year B. Tech. Degree Programmes as per the stipulations of the TSCHE.
(a) Category A seats are filled by the Convener, TSEAMCET.

(b) Category B seats are filled by the Management.

1.2.   **Admission into the second year of four year B. Tech. degree Program in Engineering**

1.2.1   **Eligibility**:

A candidate seeking admission under lateral entry into the II year I Semester B. Tech. degree Programmes should have passed the qualifying exam (B.Sc. Mathematics or Diploma in concerned course) and based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

1.2.2 **Admission Procedure**:

Admissions are made into the II year of four year B. Tech. degree Programmes through Convener, ECET (FDH) against the sanctioned strength in each Programmes of study as lateral entry students.

2. PROGRAMMES OFFERED

MLR Institute of Technology, an autonomous college affiliated to JNTUH, offers the following B.Tech. Programmes of study leading to the award of B. Tech. degree under the autonomous scheme.

1) B.Tech. - Aeronautical Engineering
2) B.Tech. - Computer Science and Engineering
3) B.Tech - CSE (Artificial Intelligence & Machine Learning)
4) B.Tech - CSE (Data Science)
5) B.Tech - CSE (Cyber Security)
6) B.Tech - Computer Science & Information Technology
7) B.Tech. - Electronics and Communication Engineering
8) B.Tech - Electrical & Electronics Engineering
9) B.Tech. - Information Technology
10) B.Tech. - Mechanical Engineering

3. DURATION OF THE PROGRAMMES

3.1 Normal Duration

3.1.1 B. Tech. degree programme extends over a period of four academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.1.2 For students admitted under lateral entry scheme, B. Tech. degree programme extends over a period of three academic years leading to the Degree of Bachelor of Technology (B. Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.2 Maximum Duration

3.2.1 The maximum period within which a student must complete a full-time academic programme is 8 years for B. Tech. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.2 For students admitted under lateral entry scheme in B. Tech. degree programme, the maximum period within which a student must complete a full-time academic programme is 6 years. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.3 The period is reckoned from the academic year in which the student is admitted first time into the degree Programme.

4. AWARD OF B.Tech. DEGREE

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

4.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight years.

4.2   The candidate shall register for 160 credits and secure 160 credits.

4.3   The degree will be conferred and awarded by Jawaharlal Nehru Technological University Hyderabad on the recommendations of the Chairman, Academic Council.

5.   PROGRAMME STRUCTURE

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

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

5.1.2   The B.Tech. Programme of MLR Institute of Technology are of Semester pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 15-18 Weeks duration with a minimum of 90 Instructional Days per Semester.

5.1.3   Credit Courses:
a) All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods : Credits) Structure, based on the following general pattern ..
   • One Credit - for One hour/Week/Semester for Theory/Lecture(L)/Tutorial)T)Courses; and
   • One Credit - for Two hours/Week/Semester for Laboratory/Practical (P) Courses, Mini Project...
   • Mandatory Courses will not carry any Credits.

5.1.4   **Course Classification:**
All Courses offered for the UGP are broadly classified as:
   - **Basic Science Courses (BSC)** include Mathematics, Physics, Chemistry, Biology etc.

   - **Engineering Science Courses (ESC)** courses include Materials, Workshop, Basics of Electrical/Electronics/ Mechanical/Computer Science & Engineering, Engineering Graphics, Instrumentation, Engineering Mechanics, Instrumentation etc.

   - **Humanities and Social Science including Management Courses (HSMC)** courses include English, Communication skills, Management etc.

   - **Professional Core Courses (PCC)** are core courses relevant to the chosen specialization/branch.

   - **Professional Elective Courses (PEC)** are courses relevant to the chosen specialization/ branch offered as electives.
   - **Open Elective Courses (OEC)** courses from other technical and/or emerging subject areas offered in the College by the Departments of Engineering, Science and Humanities.

- **Mandatory Course:** Course work on peripheral subjects in a programme, wherein familiarity considered mandatory. To be included as non-Credit, Mandatory Courses, with only a pass in each required to qualify for the award of degree from the concerned institution.

- **Project Work** and/or internship in industry or elsewhere, seminar.

- **MOOCS –** Massive Open Online Courses in a variety of disciplines available at both introductory and advanced levels, accessible from e-resources in India and abroad. .

5.1.5 **Course Nomenclature:**

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

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1)	BSC,ESC & HSMC	BSC - Basic Sciences Courses	Includes - Mathematics, Physics and Chemistry Subjects
2)		ESC - Engineering Sciences Courses	Includes fundamental engineering subjects.
3)		HSMC - Humanities and Social Sciences including Management	Includes subjects related to Humanities, Social Sciences and Management.
4)	PCC	PCC - Professional Core Courses	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.
5)	PEC	PEC- Professional Elective Courses	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.
6)	OEC	OEC - Open Elective Courses	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.
7)	PWC	Project Work	Major Project.
8)		Industrial Training/ Mini- Project	Industrial Training/ Internship/ Mini-Project.
9)		Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.
10)	MC	Mandatory Courses	Mandatory Courses (non-credit)
Total Credits for UGP (B. Tech.)Programme			

- Minor variations as per AICTE guidelines

6.   COURSE REGISTRATION

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

6.2   Academic Section of the College invites 'Registration Forms' from students prior (before the beginning of the Semester), ensuring 'DATE and TIME Stamping'. The Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

6.3   A Student can apply for Registration, which includes approval from his faculty advisor, and then should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).

6.4   A student may be permitted to register for his/her course of CHOICE with a Total of prescribed credits per Semester (permitted deviation being±12%), based on his PROGRESS and SGPA/CGPA, and completion of the 'PRE-REQUISITES' as indicated for various courses in the Department Course Structure and Syllabus contents.

6.5   Choice for 'additional Courses' must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counsellor.

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

6.7   Dropping of Courses or changing of options may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor, 'within 15 Days of Time' from the commencement of that Semester. Course Options exercised through Registration are final and CAN NOT be changed, and CAN NOT be inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

7.   COURSES TO BE OFFERED

7.1   A typical section (or class) strength for each semester shall be 60.

7.2   courses may be offered to the Students, only if minimum of 20 students (1/3rd of the section strength) opt for it.

7.2   More than ONE TEACHER may offer the SAME SUBJECT (Lab/Practical's may be included with the corresponding Theory Subject in the same Semester) in any Semester. However, selection choice for students will be based on - 'CGPA Basis Criterion' (i.e., the first focus shall be on early Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).

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

7.4   OPEN ELECTIVES will be offered by a department to the students of other departments.

8.   B.Tech. (HONOURS) DEGREE

A new academic programme B.Tech. (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area.

8.1.   B.Tech. Students in regular stream can opt for B.Tech. (Hons.), provided they have a CGPA of .0 and above up to the end of IVth semester without any history of arrears and attempting of betterment.

8.2   For B. Tech (Honors), a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). Student to opt for the courses from NPTEL/ SWAYAM / Coursera /other MOOC platform as recommended by concern BOS relevant to her/his discipline through MOOCs as recommended by the BOS.

8.3   If the credits of NPTEL/ SWAYAM/ Coursera /other MOOC platform courses do not match with the existing subject proper scaling will be done by the college.

8.4   After registering for the B.Tech (Honours) programme, if a student fails in any course he/she will not be eligible for B.Tech(Honours).

8.7   Students who have obtained "C grade " or "reappear" or "Repeat Course" / "Re Admitted" or "Detained" category in any course, including the MOOCs courses, are not eligible for B.Tech(Honours)degree. Up to 8 semesters without any history of arrears and attempting of betterment is not eligible to get B.Tech (Hons.).

8.8   Those who opted for B. Tech (Honours) but unable to earn the required additional credits in 8 semesters or whose final CGPA is less than 8 shall automatically fall back to the B.Tech. Programme. However, additional course credits and the grades thus far earned by them will be shown in the grade card but not included for the CGPA.

8.9   The students have to pay the requisite fee for the additional courses.

Table: Assigned Credits

Online Course Duration	Assigned Credits
04 Weeks	01 Credit
08 Weeks	03 Credits
12 Weeks	04 Credits

9.   B.Tech. (MINOR) DEGREE

This concept is introduced in the curriculum of all conventional B. Tech. programmes offering a major degree. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying any seven theory subjects from the programme core & professional elective courses of

the minor discipline or equivalent MOOC courses available under SWAYAM platform. The list of courses to be studied either in MOOCs or conventional type will be decided by the department at the time of registration for Minor degree.

a. B.Tech. students in regular stream can opt for B.Tech.(Minor.), provided they have a CGPA of 8.0 and above up to the end of IVth semester without any history of arrears and attempting of betterment.
b. Students aspiring for a Minor must register from **V** semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor Discipline registrations are not allowed before V semester and after VI semester.
c. Students will not be allowed to register and pursue more than two subjects in any semester.
d. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. That is, Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.
e. A student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor degree programme. No class/division (i.e., second class, fist class and distinction, etc.) shall be awarded for Minor degree programme.

10.   ATTENDANCE REQUIREMENTS

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

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

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

d. Shortage of Attendance below 65% in aggregate shall in No case be condoned.

e. A student shall not be promoted to the next Semester unless he/she satisfies the attendance requirements of the current Semester. The student may seek readmission for the Semester when offered next. He / She shall not be allowed to register for the subjects of the Semester while he/she is in detention. A student detained due to shortage of attendance, will have to repeat that Semester when offered next. The academic regulations under which the student has been readmitted shall be applicable.

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

g. Students whose attendance is less than 75% are not entitled to get the scholarship / fee reimbursement in any case as per the TS Govt. Rules in force.

11.   ACADEMIC REQUIREMENTS FOR PROMOTION/COMPLETION OF REGULAR B.TECH PROGRAMME COURSE STUDY.

11.1   A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Course, if he secures not less than 35% marks in the End Semester Examination, and a minimum of 40% of marks in the sum Total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Course.

11.2   A Student will not be promoted from I Year to II Year, unless he/she fulfils the Attendance requirements.

11.3   A Student will not be promoted from II Year to III Year, unless he/she fulfils the Attendance and Academic Requirements and (i) secures a Total 50% of Credits up to II Year II Semester from all the relevant regular and supplementary examinations.

11.4   A Student will not be promoted from III Year to IV Year, unless he/she fulfils the attendanceand Academic Requirements and (i) secures a Total 50% of Credits up to III Year II Semester, from all the regular and supplementary examinations.

11.5   After securing the necessary 160 Credits as specified for the successful completion of the entire UGP, resulting in 160 Credits for UGP performance evaluation, i.e., the performance of the Student in these 160 Credits shall alone be taken into account for the calculation of the final CGPA.
       If a Student registers for some more 'extra courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed courses Totalling to 160 Credits as specified in the Course Structure of his/her Department, the performances in those 'extra courses' (although evaluated and graded using the same procedure as that of the required 160 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra courses' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items 8 and 9.1-9.5.

11.6   Students who fail to earn minimum of 160 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled.
       When a Student is detained due to shortage of attendance/lack of credits in any Semester, he may be re-admitted into that Semester, as and when offered. However the regulations at the time of admissions hold good.

12.   EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

12.1   The performance of a student in each Semester shall be evaluated Course-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory. The B.Tech Project Work (Major Project) will be evaluated for 100 marks in Phase-I and 200 Marks in Phase-II.

12.2   For all Theory Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE.

12.3   a) For Theory Subjects (inclusive of Minor Courses), during the semester, there shall be two Continues Internal Evaluations (CIE) examinations for 40 marks each. Each CIE examination consists of one subjective paper for 35 marks, and assignment for 5 marks for each subject. Question paper contains two Parts (Part-A and Part-B.) The distribution of marks for PART-A and PART-B will be 10 marks & 15 marks respectively for UG programme.

       Pattern of the question paper is as follows:

       PART–A

       Consists of *one compulsory question* with five sub questions each carrying two mark. For the I-Mid examinations the sub question would be from first 2 ½ units and for the II-Mid

examination the sub question would be from the remaining 2 ½ units.
PART-B

Consists of five questions (out of which students have to answer three questions) carrying five marks each. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question). The questions can consist of sub questions also.

b) The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

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

d) If any candidate is absent for the CIE examinations or those who want to improve their internal marks in any subject can opt for improvement exam as and when offered. The improvement exam is a 45 minutes duration and consisting of 30 objective questions from the entire syllabus of the subject. Best marks is consider as a final marks from the average of two mid examinations or improvement examination marks. The improvement can be taken after the payment of prescribed fee. There is no Internal Improvement for the courses Machine Drawing, Production Drawing, Engineering Drawing, Engineering Graphics and practical, mandatory courses.

12.4 For Practical Courses, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 40 internal marks, and 60 marks are assigned for Lab/Practical End Semester Examination (SEE). Out of the 40 marks for internals, day-to-day work in the laboratory shall be evaluated for 20 marks; and for the remaining 20 marks - two internal practical tests (each of 20 marks) shall be conducted by the concerned laboratory teacher and the average of the two tests is taken into account. The SEE for Practical's shall be conducted at the end of the Semester by Two Examiners appointed by the Chief Controller of Examinations in consultation with the Head of the Department.

12.5 For the Subjects having Design and/or Drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 30 marks for CIE (10 marks for day-to-day work and 30 marks for internal tests) and 60 marks for SEE. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

12.6 Open Elective Course: Students can choose one open elective course (OE-I) during III-B.Tech I-semester, one (OE-II) during III-B.Tech II-semesterr, one (OE-III) in IV-B.Tech I-semester, and one (OE-IV) in IV-B.Tech II-semester from the list of open elective courses given. However, students cannot opt for an open elective courses offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any Semester.

12.7 There shall be a mini project to be taken up during the vacation after II-B.Tech. II-Semester examination. However, the mini project and its report shall be evaluated in III-B.Tech I- Semester SEE & CIE. The mini project shall be submitted in a report form and presented

before the committee. There is an internal marks of 30, the evaluation should be done by the supervisor. The There is an external marks of 70 and the same evaluated by the external examiner appointed by the Chief Controller of Examinations and he secures a minimum of 35% of marks in the Semester End Examination and a minimum aggregate of 40% of the total marks in the Semester End Examination and Continuous Internal Evaluation taken together.

12.8   There shall be a independent study in III-B.Tech II-Semester and will be conducted SEE by through a test or a committee consisting of One External Examiner, Head of the Department and two Senior faculty members of the Department. The independent study is intended to assess the student's understanding of the subjects he/she studied during the B.Tech course of study and evaluated for 100 marks. There shall be no CIE for independent study.

12.9   Each Student shall start the Project Work Phase-I during the IV B.Tech I Semester(VII Semester), as per the instructions of the Project Guide/Project Supervisor assigned by the Head of Department. Total 100 marks allotted for the Project Work Stage-I. 40% of marks shall be evaluated Project Guide/Project supervisor CIE (Continuous Internal Evaluation) based on the reports submitted and conduct presentations. Remaining 60% of marks shall be evaluated by committee comprising of the Head of the Department, project supervisor and senior faculty member from concerned department based on Viva/Seminar Presentation. He/She must secure the 40% of the marks from CIE. For Project work Phase-II in IV Year II Sem. There is an internal marks of 50, the evaluation should be done by the supervisor. The There is an external marks of 150 and the same evaluated by the external examiner appointed by the Chief Controller of Examinations and he secures a minimum of 35% of marks in the Semester End Examination and a minimum aggregate of 40% of the total marks in the Semester End Examination and Continuous Internal Evaluation taken together.

12.10. **Semester End Examination:**
   a) Question paper contains 2 Parts (Part-A and Part-B) having the questions distributed equally among all units.
   b) The distribution of marks for i) PART-A for 20 marks ii) PART-B for 50 marks. Pattern of the question paper is as follows:

   PART–A
   Consists of one question which are compulsory. The question consists of ten sub-questions one from each unit and carry 2 marks each.
   PART-B
   Consists of 5 questions carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question).

12.11   For Mandatory Non-Credit Courses offered in a Semester, after securing ⬜ 65% attendance and has secured not less than 35% marks in the SEE, and a minimum of 40% of marks in the sum Total of the CIE and SEE taken together in such a course, then the student is **PASS** and will be qualified for the award of the degree. No marks or Letter Grade shall be allotted for these courses/activities.However, for non credit courses '**Satisfactory'** or "**Unsatisfactory'** shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

12.12   SWAYAM: College intends to encourage the students to do a minimum of one MOOC in discipline and open elective during third year. The respective departments shall give a list of **s**tandard MOOCs providers including SWAYAM whose credentials are endorsed by

the BoS chairperson. In general, MOOCs providers provide the result in percentage. In such case, the college shall follow the grade table mentioned in 14.2. The Credits for MOOC(s) shall be transferred same as given for the respective discipline or open electives. In case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. Still if a student fails to clear the course/s, or in case a provider fails to offer a MOOC in any semester, then in all such cases the college shall conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs. There shall be no internal assessment however the marks obtained out of 70 shall be scaled up to 100 marks and the respective letter grade shall be allotted. The details of MOOC(s) shall be displayed in Memorandum of Grades of a student, provided he/she submits the proof of completion of it or them to the examination branch through the Coordinator/Mentor, before the end semester examination of the particular semester.

13.   AWARD OF DEGREE

After a student has satisfied the requirement prescribed for the completion of the Programme and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes Shown in Table.

Table: **Declaration of Class based on CGPA (Cumulative Grade Point Average)**

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA ≥ 8.00
First Class	≥ 6.50 to < 8.00 CGPA
Second Class	≥ 5.50 to < 6.50 CGPA
Pass Class	≥ 5.00 to < 5.50 CGPA
FAIL	CGPA < 5

a) **Improvement of Grades and Completion of the Course**
   i) Candidates who have passed in a theory course in a Semester are allowed to appear for improvement of Grade in the next immediate supplementary examination for a maximum of three subjects only. Candidates will not be allowed to improve grade in the Laboratory, Seminars, Internships and Project Work.

   ii) Improved grade will not be counted for the award of prizes/medals and Rank. However the previous grade will be considered for the award of prizes/medals and rank in case of toppers.

   iii) If the candidate does not show improvement in the grade, his/her previous grade will be taken into consideration.

14.   LETTER GRADE AND GRADE POINT

14.1   Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practical's, or Seminar, or Project, or Internship*/Mini-Project, Minor Course etc., based on the %marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together), and a corresponding Letter Grade shall be given.

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

% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
90% and above (≥ 90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (≥ 80% , < 90%)	A+ (Excellent)	9
Below 80% but not less than 70% (≥ 70% , < 80%)	A (Very Good)	8
Below 70% but not less than 60% (≥ 60% , < 70%)	B+ (Good)	7
Below 60% but not less than 50% (≥ 50% , < 60%)	B (above Average)	6
Below 50% but not less than 40% (≥ 40% , < 50%)	C (Average)	5
Below 40% (< 40%)	F (FAIL)	0
Absent	AB	0

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

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

14.5 In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.

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

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

14.7 The Student passes the Subject/Course only when he gets GP ≥ 4 (P Grade or above).

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

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

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

Illustration of Computation of SGPA Computation

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	3	A	8	3 x 8 = 24
Course2	4	B+	7	4 x 7 = 28

Course3	3	B	6	3 x 6 = 18
Course4	3	O	10	3 x10= 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

Thus, **SGPA =139/20 =6.95**

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

$$\textbf{CGPA} \ = \ \{\sum_{j=1}^{M} C_j G_j\}/\{\sum_{j=1}^{M} C_j \} \ \textbf{... for all S Semesters registered}$$

(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' from the 1st Semester onwards up to and inclusive of the Semester S (obviously M > N), 'j' is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), C_j is the no. of Credits allotted to the jth Subject, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

For CGPA Computation

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits : 20	Credits : 22	Credits : 25	Credits : 26	Credits : 26	Credits : 25
SGPA : 6.9	SGPA : 7.8	SGPA : 5.6	SGPA : 6.0	SGPA : 6.3	SGPA : 8.0

Thus, **CGPA =** $\dfrac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144}$ = 6.73

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

14.11 For Calculations listed in Item 12.6-12.10, performance in failed Subjects/Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

14.12 Conversion formula for the conversion of GPA into indicative percentage is

% of marks scored = (final CGPA -0.50) x 10

15. DECLARATION OF RESULTS

Computation of SGPA and CGPA are done using the procedure listed in 12.6- 2.10.

No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given Semester.

16. WITH HOLDING OF RESULTS

If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason what so ever, or if any case of indiscipline is pending against him, the result

of the student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

17. REVALUATION

Students shall be permitted for revaluation after the declaration of end Semester examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

18. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even Semester and vice versa, for those who appeared and failed or absent in regular examinations. Such candidates writing supplementary examinations may have to write more than one examination per day.

ADVANCED SUPPLEMENTARY EXAMINATION

Advanced supplementary examinations will be conducted for IV year II Semester after announcement of regular results.

19. TRANSCRIPTS

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

20. RULES OF DISCIPLINE

20.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

20.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that course(s) and grading is done accordingly.

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

20.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

21. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who involve in malpractice / indiscipline in examinations. The committee shall consist of:

a) Controller of examinations - Chairman
b) Addl. Controller of examinations.- Member Convenor
c) Subject expert - member
d) Head of the department of which the student belongs to. - Member
e) The invigilator concerned - member

The committee shall conduct the meeting after taking explanation of the student and punishment will be awarded by following the malpractice rules meticulously.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice

to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

22. TRANSITORY REGULATIONS

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

23. AMENDMENTS TO REGULATIONS

The Academic Council of MLR Institute of Technology reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

24. STUDENT TRANSFERS

There shall be no Branch transfers after the completion of Admission Process. Transfer of students from other colleges or universities are permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

25. GRADUATION DAY

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

26. AWARD OF MEDALS

Institute will award Medals to the outstanding students who complete the entire course in the first attempt within the stipulated time.

27. SCOPE

i) Where the words "he", "him", "his", occur in the write-up of regulations, they include "she", "her".
ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".
iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

Academic Regulations for B. Tech. (Lateral Entry Scheme)

**(Effective for the students getting admitted into II year
from the Academic Year 2023-2024 on wards)**

1. The Students have to acquire 124 credits from II to IV year of B.Tech Programme (Regular) for the award of the degree.

2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3. The same attendance regulations are to be adopted as that of B. Tech. (Regular)

Promotion Rule:

A Student will not be promoted from III Year to IV Year, unless he/she fulfils the Attendance and Academic Requirements and (i) secures a Total of 50% Credits up to III Year II Semester, from all the regular and supplementary examinations.

Award of Class:

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes: The marks obtained for 124 credits will be considered for the calculation of CGPA and award of class shall be shown separately.

Table: **Declaration of Class based on CGPA (Cumulative Grade Point Average)**

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA ≥ 8.00
First Class	≥ 6.50 to < 8.00 CGPA
Second Class	≥ 5.50 to < 6.50 CGPA
Pass Class	≥ 5.00 to < 5.50 CGPA
FAIL	CGPA < 5

All other regulations as applicable for B. Tech. Four-year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme).

MALPRACTICES RULES - DISCIPLINARY ACTION FOR /IMPROPER CONDUCT IN EXAMINATIONS

S. No	Nature of Malpractices / Improper Conduct	Punishment
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Principal.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Addl. Controller of examinations / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the addl. Controller of examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the addl. Controller of examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

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

COURSE STRUCTURE

Course Structure
B. TECH – Computer Science and Engineering (Data Science)
Regulations: R22

I B.Tech.- I Semester

Induction program for one weeks

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6BS01	Linear Algebra and Calculus	BSC	3	1	0	4	40	60	100
A6CS02	Programming for Problem Solving	ESC	3	0	0	3	40	60	100
A6HS01	English for Skill Enhancement	HSMC	3	0	0	3	40	60	100
A6BS09	Engineering Chemistry	BSC	3	1	0	4	40	60	100
A6EC03	Electronic Devices and Applications	ESC	2	0	0	2	40	60	100
A6CS03	Programming for Problem Solving Lab	ESC	0	0	3	1.5	40	60	100
A6HS02	English Language and Communication Skills Lab	HSMC	0	0	3	1.5	40	60	100
A6HS04	Seminar	HSMC	0	0	2	1	50	-	50
A6BS11	Environmental Science	MC	3	0	0	-	50	-	50
	TOTAL		**17**	**2**	**8**	**20**	**380**	**420**	**800**

I B.Tech.- II Semester

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6BS02	Numerical Methods and Integral Transforms	BSC	3	1	0	4	40	60	100
A6BS07	Applied Physics	BSC	3	1	0	4	40	60	100
A6EE60	Basic Electrical and Electronics Engineering	BSC	3	1	0	4	40	60	100
A6ME02	Engineering Drawing	ESC	1	0	3	2.5	40	60	100
A6BS08	Applied Physics Lab	BSC	0	0	3	1.5	40	60	100
A6CS04	Python Programming Lab	ESC	0	0	3	1.5	40	60	100
A6ME04	Engineering Work Shop	ESC	0	0	3	1.5	40	60	100
A6DS01	Data Handling and Interpretation	ESC	0	1	2	1	50	-	50
	TOTAL		**10**	**4**	**14**	**20**	**330**	**420**	**750**

II B.Tech.- I Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6CS08	Discrete Mathematics	BSC	3	0	0	3	40	60	100
A6CS11	Operating Systems	PCC	3	0	0	3	40	60	100
A6CS28	Digital Electronics And Computer Organization	ESC	3	0	0	3	40	60	100
A6CS09	Database Management Systems	PCC	3	0	0	3	40	60	100
A6CS05	Data structures	PCC	3	0	0	3	40	60	100
A6CS10	Database Management Systems Lab	PCC	0	0	3	1.5	40	60	100
A6CS06	Data Structures Lab	PCC	0	0	3	1.5	40	60	100
A6DS04	Skill Development Course (Data Wrangling)	PCC	0	0	4	2	100	-	100
A6HS05	Gender Sensitization	MC	-	-	2	-	40	60	100
Total			15	00	12	20	420	480	900

II B.Tech.- II Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6BS03	Computer Oriented Statistical Methods	BSC	3	1	0	4	40	60	100
A6HS08	Business Economics and Financial Analysis	HSC	3	0	0	3	40	60	100
A6DS02	Data Analytics using R	PCC	2	0	0	2	40	60	100
A6IT02	Object Oriented Programming through Java	ESC	3	0	0	3	40	60	100
A6CS15	Design and Analysis of Algorithms	PCC	3	0	0	3	40	60	100
A6DS03	Data Analytics using R Lab	PCC	0	0	3	1.5	40	60	100
A6IT03	Object Oriented Programming through Java Lab	ESC	0	0	3	1.5	40	60	100
A6DS05	Mini Project (Research/Soceital)	PWC	0	0	2	2	40	60	100
A6HS06	Constitution of India	MC	-	-	2	-	40	60	100
Total			14	01	10	20	360	540	900

III B.Tech.- I Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6DS06	Big Data Analytics	PCC	3	0	0	3	40	60	100
A6IT11	Automata and Compiler Design	PCC	3	0	0	4	40	60	100
A6AI07	Web Programming	PCC	3	0	0	3	40	60	100
	Professional Elective-I	PEC	3	0	0	3	40	60	100
A6CS07	Software Engineering	PCC	3	0	0	3	40	60	100
A6AI08	Web Programming Lab	PCC	0	0	3	1.5	40	60	100
A6DS07	Big Data Analytics Lab	PCC	0	0	3	1.5	40	60	100
A6DS08	Skill Development(NoSQL Databases)	PCC	0	0	0	1	40	60	100
A6HS13	Intellectual property rights	MC	0	0	2	-	40	60	100
Total			15	00	08	20	360	540	900

III B.Tech.- II Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6AI02	Artificial Intelligence	PCC	3	1	0	4	40	60	100
A6CS07	Computer Networks	PCC	3	0	0	3	40	60	100
	Professional Elective-II	PEC	3	0	0	3	40	60	100
	Professional Elective-III	PEC	3	0	0	3	40	60	100
	Open Elective-I	OEC	3	0	0	3	40	60	100
A6AI03	Artificial Intelligence Lab	PCC	0	0	3	1.5	40	60	100
	Professional Elective-II Lab	PEC	0	0	3	1.5	40	60	100
A6DS12	Independent Study/MOOCs/Certification	MC	0	0	2	1	40	60	100
Total			15	01	08	20	320	480	800

IV B.Tech.- I Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6A117	Deep Learning	PCC	3	0	0	3	40	60	100
A6DS15	Web and Social Media Analytics	PCC	3	0	0	3	40	60	100
	Professional Elective-IV	PEC	3	0	0	3	40	60	100
	Professional Elective-V	PEC	3	0	0	3	40	60	100
	Open Elective-II	OEC	3	0	0	3	40	60	100
A6A119	Deep Learning Lab	PCC	0	0	2	1	40	60	100
A6DS29	Major Project Phase - 1	PCC	0	0	8	4	40	60	100
Total			15	00	10	20	280	420	700

IV B.Tech. - II Semester

Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A6HS15	Organizational Behaviour	HSMC	3	0	0	3	40	60	100
	Professional Elective-VI	PEC	3	0	0	3	40	60	100
	Open Elective - III	OEC	3	0	0	3	40	60	100
A6DS30	Major Project Phase - 2 + Seminars	PCC	0	0	16	9 + 2	40	60	100
Total			09	00	16	20	160	240	400

SEM	I	II	III	IV	V	VI	VII	VIII	**Total**
Credits	20	20	20	20	20	20	20	20	**160**

PROFESSIONAL ELECTIVES			
PE - I		**PE – II**	
A6AI11	Data Mining Techniques	A6AI02	Artificial Intelligence
A6DS09	Exploratory Data Analytics	A6DS23	Internet Of Things(IOT)
A6DS10	ETL Tools	A6DS13	Data Wrangling
A6DS11	Python for Data Science	A6DS25	Object Oriented Analysis and Design(OOAD)
PE - III		**PE - IV**	
A6CS29	Cloud Computing	A6AI14	Natural Language Processing
A6DS28	Predictive Analytics	A6DS16	Data Base Security
A6AI29	Devops	A6DS17	Time Series Analysis and Forecasting
A6IT10	Full Stack Development	A6DS18	Edge Analytics
PE - V		**PE - VI**	
A61T26	IRS	A6DS21	Data Visualization using Tableau
A6DS19	Video Analytics	A6DS22	Business Intelligence and Analytics
A6CY25	Block Chain Technology	A6IT33	E-Commerce
A6DS20	Data Collection and Analysis with IOT	A6DS27	BigData Management
PE – II LAB			
A6AI03	Artificial Intelligence Lab		
A6DS24	Internet Of Things(IOT) Lab		
A6DS14	Data Wrangling Lab		
A6DS26	Object Oriented Analysis and Design(OOAD) Lab		

Academic Guidelines

Professional Electives:
    a. Professional Electives are streamed to either Data Science / AIML / Block Chain / Cyber Security
    b. Students must choose the same stream in all Professional Electives.

Skill Development:
- Skill development courses will be conducted as practical hours and evaluated for one credit.

Summer Internship / Research Project in II-II semester

Summer Internship / Internship
    a. Student can either do internship from AICTE approved Internships or in any Industry.
    b. In case of Internship from Industry, two supervisors will be supporting the students.

    Supervisors: 1. One Internal supervisor and 2. One Industry Personnel (External)
    c. Evaluation will be done in III-I

Rubrics - Internship

	Internal Supervisor	External Supervisor	Total
Marks	40 Mid – 20; Final 20;	60	100

Research Project:
    a. Student can carry out project with respect to research question.
    b. Students can carry out projects in team of three or individually.
    c. One supervisor per student / team will supervise a research project and the supervisor shall be internal supervisor or external supervisor from JNTU / IIIT / IIT.
    d. Evaluation will be done in III-I.

Rubrics

S.No.	Tasks	Marks	Review
1	Research Problem / Question	5	Review-I
2	Research Design	5	
3	Methodology	5	
4	Implementation	40	Review-II
5	Results and Discussion	20	
6	Deployment	10	Review-III
7	Publish / Patent	10	
8	Viva / Presentation	5	

Mini Project in III-II
Student can carry out mini project based on the courses learned in II and III years.

    a. Student can carry out project in guidance of a internal supervisor.
    b. Students can carry out projects in team of three or individually.
    c. One supervisor per student / team will supervise a project and the supervisor shall be internal supervisor.
    d. Evaluation will be done in III-II itself.

Massive Open Online Courses (MOOCs)

    a. Student can undergo one MOOC course from NPTEL / INFOSYS Springboard / any platform which permits credit transfer as per AICTE.
    b. It is purely self paced / self study course.
    c. Certificate should be produced by student to the department / exam cell for considering the credit at the end of semester.
    d. Evaluation will be done in III-II itself for 100%

Global Certification

    a.   Student can undergo Global Certification on their own or in support of Placement cell or department.

    b.   Student can choose a course in such way that the course must have minimum 40 hours of duration and certificate must be directly from company.

    c.   Ex: Computer Networks and Security [CISCO], AWS Certification [AWS Academy]

    d.   Evaluation will be done in III-II itself for 100%

I B.TECH I SEMESTER
SYLLABUS

LINEAR ALGEBRA AND CALCULUS

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
A6BS01	**BSC**	3	1	-	4	40	60	100

Contact Classes: 44	Tutorial Classes: 08	Practical Classes: Nil	Total Classes: 52

COURSE OBJECTIVES

1. Concept of Rank of a matrix, Consistency and solving system of linear equations.
2. Concept of eigen values, eigen vectors and diagonalization of the matrix.
3. The concept of differential equations and solve them using appropriate methods.
4. Evaluate multiple integrals and improper integrals
5. The partial derivatives of several variable functions.

COURSE OUTCOMES
At the end of the course, student will be able to:
1. Solve the system of linear equations using rank of the matrices.
2. Find the Eigen values and Eigen vectors of a matrix
3. Identify the different types of differential equations and solve them using appropriate methods.
4. Evaluate the improper integrals using beta and gamma functions.
5. Find the Maxima and Minima of several variable functions.

UNIT - I	**MATRICES AND THEIR APPLICATIONS**	**CLASSES: 08**

Real matrices: Symmetric-skew-symmetric and orthogonal matrices -Complex matrices: Hermitian, Skew – Hermitian and Unitary matrices -Elementary row and column transformations -Elementary matrix-Finding rank of a matrix by reducing to Echelon form and Normal form-Finding the inverse of a matrix using elementary row/column transformations (Gauss-Jordan method)-Consistency of system of linear equations (homogeneous and non-homogeneous) using the rank of a matrix -Solving m n and n n linear system of equations by Gauss Elimination, Gauss siedel Method

UNIT - II	**EIGEN VALUES, EIGEN VECTORS**	**CLASSES: 08**

Eigen values and Eigen vectors and its properties (without proof), Cayley-Hamilton theorem (Statement and verification)-Finding inverse and powers of a matrix by Cayley-Hamilton theorem, Diagonalization of matrices. Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to Canonical forms by Orthogonal Transformation.

UNIT - III	**ORDINARY DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS**	**CLASSES: 10**

Introduction- Exact and reducible to Exact differential equations-Newton's Law of cooling-Law of Growth and Decay. Linear differential equations of second and higher order with constant coefficients - Non-Homogeneous term of the type $Q(x) = e^{ax}$, Sin ax, Cosax, $e^{ax}v(x)$, $x^nv(x)$ - Method of variation of parameters L-C-R Circuits.

UNIT - IV	**MULTIPLE INTEGRALS, BETA AND GAMMA FUNCTIONS**	**CLASSES: 10**

Double and triple integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar) in double integrals. Finding the area and volume of a region using double and triple integral.
Beta- Gamma Functions and their Properties-Relation between them- Evaluation of improper integrals using Gamma and Beta functions.

UNIT - V	CALCULUS OF SEVERAL VARIABLES	CLASSES: 08

Limit, Continuity - Partial derivative- Partial derivatives of higher order -Total derivative - Chain rule,Jacobians-functional dependence & independence. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

TEXT BOOKS

1. Ervin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna publishers, 36th Edition, 2010.

REFERENCE BOOKS

1. G.B.Thomas, calculus and analytical geometry, 9th Edition, Pearson Reprint 2006.
2. N.P Bali and Manish Goyal ,A Text of Engineering Mathematics,Laxmi publications,2008.
3. E.L.Ince, Ordinary differential Equations,Dover publications,1958.

WEB REFERENCES

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/details.php?ebook=10166

MOOCS COURSE

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

PROGRAMMING FOR PROBLEM SOLVING

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS02	ESC	3	-	-	3	40	60	100

Contact Classes: 64	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 64

COURSE OBJECTIVES

1. To familiarize with the syntax and semantics of C programming language.
2. To learn the usage of structured programming approach in solving problems.
3. To use arrays, pointers, strings and structures in solving problems.
4. To understand how to solve problems related to matrices, Searching and sorting.
5. To understand how to use files to perform read and write operations.

COURSE OUTCOMES

At the end of the course, student will be able to:
1. Apply algorithmic thinking to understand, define and solve problems
2. Develop computer programs using programming constructs and control structures and to use arrays to develop C programs
3. Decompose a problem into functions to develop modular reusable code and to use pointers to solve complex problems.
4. Use Strings and structures to formulate algorithms and programs.
5. Use FILE to perform read and write operations.

UNIT - I	INTRODUCTION - PROBLEM SOLVING AND ALGORITHMIC THINKING& INTRODUCTION TO C LANGUAGE	CLASSES: 12

Algorithm -Definition, Characteristics of Algorithm. Constituents of algorithms**: -** Sequence, Selection and Repetition. Algorithm with Example: Roots Of a Quadratic Equations, Minimum and Maximum Numbers of a Given Set, Given number is prime number or not, given integer is palindrome or not, etc. Flowchart/Pseudo Code with examples.
Introduction To C Language: Structure of C Program, Data Types, Input and Output statements, Operators, Precedence and Associativity of operators , Evaluation of Expressions, Type Conversions In Expressions.

UNIT - II	CONTROL STRUCTURES AND ARRAYS	CLASSES: 15

Control structures: Decision statements; if and switch statement; **Loop control statements:** while, for and do while loops, Jump statements: break, continue, goto statements.
Arrays: Concepts, One dimensional array, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi dimensional arrays.

UNIT - III	FUNCTIONS AND POINTERS	CLASSES: 17

Functions: Function definition, Types of Functions: User defined and built-in Functions, Advantages of User Defined Functions. Parameter passing in functions**:** Call by value, Call by reference, Passing arrays to functions, Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Towers of Hanoi etc.. Storage classes.
Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, Functions returning pointers, Dynamic memory allocation.

UNIT - IV	STRINGS AND USER DEFINED DATA TYPES	CLASSES: 10

Strings: Array of characters, variable length character strings, inputting character strings, character library functions, String Handling Functions, Arrays Of Strings
Structures and Unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, Structures and functions, Self-referential structures, unions, typedef, enumerations.

UNIT - V	FILE HANDLING,SEARCHING AND SORTING	CLASSES: 10

File Handling: Command Line Arguments, File Modes, Basic File Operations Read, Write and Append, Example Programs. Random Access Using fseek, ftell and rewind Functions.
Basic Searching And Sorting Algorithms: Linear and Binary Search, Bubble Sort,Insertion Sort, Quick Sort.

TEXT BOOKS

1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
2. Byron Gottfried, "Programming with C", Schaum's Outlines Series, McGraw Hill Education, 3rdedition, 2017.
3. Programming in C E. Balagurusamy Edition   3 Publisher Tata McGraw-Hill Publishing, 1990

REFERENCE BOOKS

1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
2. YashavantKanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
3. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.4. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
4. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.
5. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Computational_thinking
2. https://nptel.ac.in/courses/106/104/106104128/
3. https://en.cppreference.com/w/c/language
4. https://www.learn-c.org/

E-TEXT BOOKS

1. https://slidelegend.com/queue/computational-thinking-for-the-modern-problem solver_59d6f01e1723ddb0c7a0df47.html
2. http://flowgorithm.altervista.org/#elf_l1_Lw
3. http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm
4.

MOOC COURSE

1. https://www.coursera.org/learn/computational-thinking-problem-solving
2. https://onlinecourses.nptel.ac.in/noc18_cs33/preview
3. https://www.alison.com/courses/Introduction-to-Programming-in-c
4. http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective programming-in-c-and-c-january-iap-2014/index.html

ENGLISH FOR SKILL ENHANCEMENT

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6HS01	HSMC	3	-	-	3	40	60	100

Contact Classes: 46	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 46

COURSE OBJECTIVES

1. Develop language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
3. Analyze a variety of texts and interpret them to demonstrate in writing or speech.
4. Write/ compose clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
5. Develop language components to communicate effectively in formal and informal situations.

COURSE OUTCOMES

At the end of the course, student will be able to:
1. Will be able to acquire language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
3. Analyze a variety of texts and interpret them to demonstrate in writing or speech.
4. Write/ compose clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
5. Use language components to communicate effectively in formal and informal situations

UNIT - I	'Toasted English' by R. K. Narayan	CLASSES: 08
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	**'Appro JRD' by Sudha Murthy**	**CLASSES: 09**
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	**'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al**	**CLASSES: 09**
Vocabulary	: Words Often Confused- Words from Foreign Languages and their Use in English.	
Grammar	:Identifying Common Errorsin 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	**Art and Literature**	**CLASSES: 08**
Vocabulary	: Standard Abbreviations in English	
Grammar	: Redundancies and Clichés in Oral and Written Communication	
Reading	:Survey, Question, Read, Recite and Review (SQ3RMethod) – Exercises for Practice	
Writing	:Writing Practices- Essay Writing-Writing Introduction and Conclusion-Précis Writing	
UNIT - V	**Go, Kiss the World' by Subroto Bagchi**	**CLASSES: 08**
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	

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,JackC.(2022)InterchangeSeries.Introduction,1,2,3.CambridgeUniversityPress
3. Wood,F.T.(2007). Remedial English Grammar.Macmillan.
4. Chaudhuri,SantanuSinha.(2018).LearnEnglish:AFunBookofFunctionalLanguage,GrammarandV ocabulary.(2nded.,).SagePublicationsIndiaPvt.Ltd.
5. (2019).Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan,Aysha.(2013).EnglishforTechnicalCommunicationforEngineeringStudents.McGraw-Hill Education India Pvt.Ltd.
7. Swan,Michael.(2016).PracticalEnglishUsage.OxfordUniversityPress.FourthEdition

WEB REFERENCES

1. http//www.bbc.co.uk/learningenglish
2. http//learnenglish.britishcouncil.org
3. https//www.cambridgeenglish.org/learning-english/
4. https//study.com/academy/subj/english.html

E-TEXT BOOKS

1. https//www.pdfdrive.com/advanced-english-books.html

MOOC COURSES
1.   http//nptel.ac.in/courses/109/106/109106067   2.   https//www.britishcouncil.org.tr/en/english/mooc

ELECTRONIC DEVICES AND APPLICATIONS

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6EC03	ESC	2	-	-	2	40	60	100

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.

COURSEOUTCOMES
At the end of the course, student will be able to:
1. Acquire the knowledge of various electronic devices and the iruse on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.

UNIT - I	DIODES	

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	

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

UNIT - III	BIPOLAR JUNCTION TRANSISTOR (BJT)	

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, Need for Biasing, BJT as Amplifier.

UNIT - IV	JUNCTION FIELD EFFECT TRANSISTOR (FET)	

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, FET as amplifier.

UNIT - V	SPECIAL PURPOSE DEVICES	

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

TEXT BOOKS

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, LouisNashelsky 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.

PROGRAMMING FOR PROBLEM SOLVING LAB

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS03	ESC	-	-	3	1.5	40	60	100

Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36	Total Classes: 36

COURSE OBJECTIVES

1. To be familiarize with flowgorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings pointers and structures.

COURSE OUTCOMES

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

1. Solve simple mathematical problems using Flowgorithm.
2. Correct syntax errors as reported by the compilers and logical errors encountered at run time Develop programs by using decision making and looping constructs.
3. Implement real time applications using the concept of array, pointers, functions and structures.
4. Solve real world problems using matrices, searching and sorting.

LIST OF EXPERIMENTS

WEEK - 1	INTRODUCTION TO FLOGORITHM

1. Installation and working of Flowgorithm Software.
2. Write and implement basic arithmetic operations using Flowgorithm – sum, average, product, difference, quotient and remainder of given numbers etc.
3. Draw a flowchart to calculate area of Shapes (Square, Rectangle, Circle and Triangle).
4. Draw a flowchart to find the sum of individual digits of a 3 digit number
5. Draw a flowchart to read input name, marks of 5 subjects of a student and display the name of the student, the total marks scored, percentage scored.
6. Draw a flowchart to find roots of a quadratic equation.
7. Draw a flowchart to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd
8. Draw a flowchart to check whether the triangle is equilateral, isosceles or scalene triangle
9. Draw a flowchart to check whether a given number is palindrome or not.

WEEK - 2	BASIC DATA TYPES

1. Write a C program to find division of 1 integer 1 float numbers.
2. Write a C program to find division of 2 integer numbers.
3. Write a C program to find average of (1int,1float) numbers.
4. Write a C Program to Swap Numbers without Using Temporary Variable
5. Write a C Program to Swap two Numbers Using Temporary Variable
6. Write a C Write a program to read the values of x, y and z and print the results of the following expressions in one line.
   a) (x+y+z) / (x-y-z)
   b) (x+y+z) / 3
   c) (x+y) * (x-y) * (y-z)

WEEK - 3	**OPERATORS**

1. Write a C program to convert temperature from Fahrenheit to Celsius and vice versa (c=(fh-32)/1.8
2. Write a C program to find area and perimeter of a circle. (area=∏r2 perimeter=2∏r)
3. Write a C program to calculate area and perimeter of a right angled triangle.
   a. (Area=1/2*b*h perimeter=w+h+sqrt(w*w+h*h)
4. Find the sum of natural numbers 1 to n.(read n as input) (Use formula sum=n(n+1)/2
5. Write a C program to calculate Simple interest (SI=PTR/100)
6. Write a C program to calculate area and perimeter of a rectangle. Area=l*b Perimeter=2* (l+b)
7. Write a C program to calculate the value of the third angle of a triangle if two angles are given as input.(a+b+c=180)
8. Write a C program to read the consumer number and number of units consumed and the cost per unit and print the amount to be paid. (Amt=num of units*cost)
9. Write a C Program to calculate area and perimeter of a triangle.
   b. Perimeter=(a+b+c)
   c. s=(a+b+c)/2
   d. Area=sqrt(s*(s-a)(s-b)*(s-c))
10. Write a C program to read five Subject marks and find the average.
11. Write a C program to Calculate Compound interest (CI=p(1+r/100)n

WEEK - 4	**CONDITIONAL STATEMENTS**

1. Write a C program to find largest and smallest of given numbers.
2. Write a C program which takes two integer operands and one operator form the user(+,-,*,/,% use switch)
3. Write a program to compute grade of students using if else adder. The grades are assigned as followed:
   > marks<50 F
   > 50≤marks< 60 C
   > 60≤marks<70 B
   > 70≤marks B+
   > 80≤marks<90 A
   > 90≤mars≤ 100 A+
4. Write a C program to whether given year leap year or not.
5. Write a C program to find whether given triangle is scalene or isosceles or equilateral.

WEEK - 5	**LOOPING STATEMENTS**

1. Write a C program to find Sum of individual digits of given integer
2. Write a C program to generate first n terms of Fibonacci series
3. Write a C Program to find the Sum of Series SUM=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
4. Write a C program to print the Fibonacci sequence up to given value of n.
5. Write a C program to print the multiplication table to the given value of n.
6. Write a C program to check whether given number is palindrome or not
7. Write a C program to check whether given number is perfect or not

WEEK - 6	**NESTED LOOPING STATEMENTS**

1. Write a C program to generate prime numbers between 1 and n
2. Write a C program to generate Pascal's triangle.
3. Write a C program to generate the following pyramid of numbers.

```
            1
        1   3   1
    1   3   5   3
```

4. Write a C program to generate the pattern

```
*****
****
***
**
```

WEEK - 7	ARRAYS

1. Write a C Program to implement following searching methods
   - i. Binary Search
   - ii. Linear Search
2. Write a C program to find largest and smallest number in a list of integers
3. Write a C program
   - iii. To add two matrices
   - iv. To multiply two matrices
4. Write a C program to find Transpose of a given matrix

WEEK - 8	FUNCTIONS

1. Write a C program to find the factorial of a given integer using non recursive functions
2. Write a C program to find GCD of given integers using non recursive functions
3. Write a C Program to find the power of a given number using non recursive functions
4. Write a C program to find sum of natural numbers using non recursive function.
5. Write a C program to reverse a given integer number using non recursive functions
6. Write a C Program to find binary equivalent of a given decimal number using recursive functions.
7. Write a C Program to print Fibonacci sequence using recursive functions.
8. Write a C Program to find LCM of 3 given numbers using recursive functions
9. Write a C program to find the factorial of a given integer using recursive functions
10. Write a C program to print fibonocci series till n terms using recursion.

WEEK - 9	STRINGS

1. Write a C program using to Insert a sub string into a given main string from a given position
2. Write a C program using to Delete n characters from a given position in a string
3. Write a C program to determine if given string is palindrome or not
4. Write C Programs to demonstrate the following string handling functions.
   - a. strcat()
   - b. strcmp()
   - c. strrev()
   - d. strcpy()
   - e. strlen()
   - f. strstr()
   - g. strncpy()
   - h. strncat()
   - i. strncmp()

WEEK - 10	POINTERS

1. Write a C program to read the elements of 1-d array using pointers and print them in reverse order using pointers.
2. Write a C Program to read two elements dynamically using malloc() function and interchange the two numbers using call by reference.
3. Write a C Program to read and print the elements of 1-D array using calloc() memory allocation function and reallocate memory for the array by increasing the size of the array, read and print the elements of reallocated array.
4. Write a C Program to print 2-D array using pointers.

WEEK - 11	STRUCTURES

1. Write a C Program using functions to
   - a) Reading a complex number
   - b) Writing a complex number
   - c) Add two complex numbers
   - d) Multiply two complex numbers

   Note: represent complex number using structure
2. Write a C program to read employee details employee number, employee name, basic salary, hra and da of n employees using structures and print employee number, employee name and gross salary of n employees.

WEEK - 12	FILES

1. Write a C program to read and print the content of a file.
2. Write a C program copy the content of one file to another file
3. Write a C program to merge two file into third file.
4. Write a C Program to find the number of lines in a text file

TEXT BOOKS

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition) YashavantKanetkar, "Let Us C", BPB Publications, New Delhi, 13th Edition, 2012.

REFERENCE BOOKS

1. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer; 2018
2. King KN, "C Programming: A Modern Approach", Atlantic Publishers, 2nd Edition, 2015.
3. Kochan Stephen G, "Programming in C: A Complete Introduction to the C Programming Language", Sam's Publishers, 3rd Edition, 2004.
4. Linden Peter V, "Expert C Programming: Deep C Secrets", Pearson India, 1st Edition, 1994.

WEB REFERENCES

1. http://www.flowgorithm.org/documentation/
2. http://www.sanfoundry.com/c-programming-examples
3. http://www.geeksforgeeks.org/c
4. http://www.cprogramming.com/tutorial/c

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6HS02	HSMC	-	-	3	1.5	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes:36		

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

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

1. Acquire the skill of independent language learning
2. Overcome with the nuances of English speech sounds, word accent, intonation and rhythm.
3. Obtain the consistent accent and intelligibility in pronunciation.
4. Neutralize the impact of dialects.
5. Apply language appropriately public speaking, group discussions and interviews

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

 Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
  • Listening for general content
  • Listening to fill up information
  • Intensive listening
  • Listening for specific information

Speaking Skills
Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
  • Oral practice
  • Describing objects/situations/people
  • Role play - Individual/Group activities
  • Just A Minute (JAM) Sessions

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

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

WEBSITES

1. https://www. britishcouncil.org
2. https://www. bbc.co.uk
3. https://www. grammarly.com
4. https://www. fluentu.com
5. https://www.cambridgeenglish.org/exams-and-tests/business-preliminary
6. https://www.cambridgeenglish.org/exams-and-tests/business-vantage

SEMINAR

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6HS04	**HSMC**	-	-	2	1	50	-	50

COURSE OBJECTIVES

Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

PERIODICITY / FREQUENCY OF EVALUATION : Twice

PARAMETERS OF EVALUATION:

1. The seminar shall have topic allotted and approved by the faculty.
2. The seminar is evaluated for 50 marks for internal only.
3. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
4. Faculty shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
5. Presentation schedules will be prepared by Department in line with the academic calendar.

THE SEMINARS SHALL BE EVALUATED IN TWO STAGES AS FOLLOWS:

A. ROUGH DRAFT

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He/ She may take the help of the concerned faculty.

The report should be typed in "MS-Word" file with "calibri" font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 10 to 15 slides, consisting of the followings:

1.	Topic, name of the student & faculty	1 Slide
2.	List of contents	1 Slide
3.	Introduction	1Slides
4.	Descriptions of the topic (point-wise)	6 - 10 Slides
5.	Conclusion	1 - 2 Slides
6.	References/Bibliography	1 Slide

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft report should be submitted to the concerned faculty, with a copy to the concerned HOD within stipulated time.

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

The evaluation of the rough draft shall generally be based upon the following.

1	Punctuality in submission of rough draft	2
2	Dress Code	3
3	Resources from which the seminar have been based	2
4	Report , and content of Presentation	5
5	Depth of the students knowledge in the subject	5

6	Reception from Questions	5	
7	Time Management, Classroom Dynamic	3	
	Total Marks	**25**	

After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work. Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the faculty.

ENVIRONMENTAL SCIENCE

Course Code:	Category	Hours/Week				Credits	Maximum Marks		
A6BS11	MC	L	T	P	C		CIE	SEE	Total
		3	-	-	-		50	-	50

Contact Classes: 30	Tutorial Classes:Nil	Practical Classes:Nil	Total Classes:30

COURSE OUTCOMES

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

1. Identify the consequences of human actions on the web of life, global economy and quality of human life.
2. Evaluate the strategies for scientific, social, economic and legal environmental protection.
3. Study the impact of conservation of biodiversity.
4. Analyze the reasons for environmental pollution.
5. Assess the environmental impact of air, water, biological and socio-economical aspects and risk assessment towards sustainable future.

UNIT - I	ECOSYSTEMS	CLASSES:7

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food web and ecological pyramids.
Flow of energy, Biogeochemical cycles, Bio accumulation, Bio magnification, eco system value, services and carrying capacity.

UNIT - II	NATURAL RESOURCES	CLASSES: 8

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-case studies. 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	CLASSES: 5

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

UNIT - IV	ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES	CLASSES:5

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution, Water Pollution drinking water quality standards. Soil Pollution Impacts of modern agriculture, Noise Pollution Health hazards, standards. Concepts of bioremediation.
Global Environmental Problems and Global Efforts: Ozone depletion and Ozone depleting substances (ODS) Concepts of Bioremediation International conventions /Protocols: Earth summit, Kyoto protocol and Montréal Protocol; NAPCC-GoI Initiatives, COP 24, COP25.

UNIT - V	ENVIRONMENTAL POLICY, LEGISLATION & EIA	CLASSES:5

Environmental Policy, Legislation & Environmental Impact Assessment (EIA): Environmental Protection act, Legal aspects Air Act1981, Water Act, Forest Act, Wildlife Act, Municipal solid waste management, biomedical waste management hazardous waste management and handling rules.

Environmental Impact Assessment: EIA structure, methods of baseline data acquisition. Strategies for risk assessment, Towards Sustainable Future: Concept of Sustainable Development, Urban Sprawl, Concept of Green Building.

TEXT BOOKS

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

I B.TECH II SEMESTER SYLLABUS

NUMERICAL METHODS AND INTEGRAL TRANSFORMS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6BS02	BSC	3	1	-	4	40	60	100

Contact Classes: 46	Tutorial Classes: 08	Practical Classes: Nil	Total Classes: 54

COURSE OBJECTIVES
1. Curve fitting and Interpolation techniques.
2. Numerical techniques.
3. Fourier series for periodic function
4. Laplace transforms
5. Concept and application of Fourier Transforms and Vector differentiation.

COURSE OUTCOMES
At the end of the course, student will be able to:
1. Apply Curve fitting and Interpolation techniques.
2. Apply various numerical techniques
3. Find the Fourier series of the periodic functions.
4. Obtain the Laplace tranforms of functions
5. Find Fourier transforms and apply vector differentiation techniques.

UNIT - I	INTERPOLATION AND CURVE FITTING	CLASSES: 08

INTERPOLATION: Finite differences: Forward, Backward and Central differences - Other difference operators and relations between them - Difference of a polynomial – Missing terms - Newton's forward interpolation, Newton's backward interpolation, Gauss's forward and backward interpolation formulae. Interpolation with unequal intervals – Lagrange's interpolation.
CURVE FITTING: Method of least squares - Fitting a straight line, second degree parabola and non-linear curves of theform $y= a e^{bx}$, $y= a x^{b}$, $y = a b^{x}$ by the method of least squares.

UNIT - II	NUMERICAL TECHNIQUES	CLASSES: 08

ROOT FINDING TECHNIQUES:
Bisection method Regulafalsimethod,Iteration method and Newton Raphson method.
NUMERICAL INTEGRATION :
 Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth rule.
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:
Taylor's series method – Euler's - modified Euler's Method – Runge-Kutta method.

UNIT - III	FOURIER SERIES	CLASSES:10

Periodic function-Determination of Fourier Coefficients-Fourier Series-Even and Odd functions-Fourier series in arbitrary interval-Half range Fourier sine and cosine expansions.

UNIT - IV	LAPLACE TRANSFORMS	CLASSES: 10

Laplace transforms of elementary functions- First shifting theorem - Change of scale property - Multiplication by t^n- Division by t – Laplace transforms of derivatives and integrals – Unit step function – Second shifting theorem - Periodic function - Evaluation of integrals by Laplace transforms - Inverse Laplace transforms- Method of partial fractions - Other methods of finding inverse transforms - Convolution theorem - Applications of Laplace transforms to ordinary differential equations.

UNIT - V	FOURIER TRANSFORMS AND VECTOR DIFERENTIATION	CLASSES: 10

Fourier Integral theorem (Statement only)-Fourier Sine and Cosine Integrals, Fourier Transforms, Cosine and Sine transforms, properties, Inverse transforms.
Vector functions, vector differentiation, gradient, directional derivative, divergence, curl and scalar potential.

TEXT BOOKS

1. Ervin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna publishers, 36th Edition, 2010.

REFERENCE BOOKS

1. G.B.Thomas, calculus and analytical geometry,9th Edition, Pearson Reprint 2006.
2. N.P Bali and Manish Goyal ,A Text of Engineering Mathematics,Laxmi publications,2008.
3. E.L.Ince, Ordinary differential Equations,Dover publications,1958.

WEB REFERENCES

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/details.php?ebook=10166

MOOCS COURSE

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in

APPLIED PHYSICS

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6BS07	BSC	3	1	-	4	40	60	100

Contact Classes: 50	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 50

COURSE OBJECTIVES

1. Learn the basic principles of quantum physics and its applications
2. Understand the formation of energy bands and atomic structure in solids for material classification
3. Understand the underlying mechanism involved in construction and working properties of different types of semiconductor devices
4. Learn the basic principles of laser and optical fiber in information technology
5. Identify the importance of nanoscale and various fabrication and characterization techniques and quantum computations in engineering applications

COURSE OUTCOMES

At the end of the course students will be able to:
1. **Analyze** the microscopic properties of materials using principles of quantum physics for engineering applications
2. **Explain** the behavior of different electronic materials based on the concepts of band theory
3. **Apply** the knowledge of Solar PV cells for choice of materials in efficient alternate energy generation
4. **Gain** the knowledge of production of laser and usage of fibers in fiber optic communication technology
5. **Comprehend** the knowledge of quantum physics in quantum computation for secure information technology

UNIT - I	QUANTUM PHYSICS	CLASSES: 10

Black body radiation, Stefen-Boltzmann"s law, Planck's radiation law (Qualitative treatment), Photoelectric effect, Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's experiment, Heisenberg's Uncertainty Principle, Schrodinger's Time Independent Wave Equation, Physical Significance of the wave Function, Particle in One Dimensional Potential Box.

UNIT - II	ELECTRONIC PROPERTIES OF MATERIALS & BAND THEORY OF SOLIDS	CLASSES: 10

Electronic properties of Materials: Classical free electron theory and Quantum free electron theories of metals, success and drawbacks, Bloch theorem, Kronig-Penny model (Qualitative treatment), E-k diagram, effective mass of electron.

Band theory of solids: Origin of energy band formation in solids, Fermi energy level, Fermi-Dirac distribution law, Classification of materials as conductors, insulators and semiconductors.

UNIT - III	SEMI-CONDUCTORS & SEMICONDUCTOR DEVICES	CLASSES: 08

Semiconductors: Intrinsic and Extrinsic Semiconductors, formation of PN junction diode and its V-I characteristics, Direct and Indirect band gap semiconductors, Hall effect and its applications.

Semiconductor Devices: Construction, working and V-I characteristics of PIN Diode, LED, Solar cell and their applications.

UNIT - IV	LASER & FIBER OPTICS	CLASSES: 12

Laser: Characteristics of Laser, Absorption, Spontaneous and Stimulated emission of radiations. Lasing actions-Pumping mechanism, Meta stable state and Population inversion, Nd-YAG laser, CO2 laser, Applications of lasers in different fields.

Fiber Optics: Structure of fibers, Total Internal Reflection, Acceptance angle – Numerical Aperture, Types of fibers- SI and GI fibers, Single and Multimode fibers - SMSI, MMSI, MMGI, Fiber Optic Communication system, Signal Degradation - Attenuation mechanism, Dispersion, Applications of fibers in different fields.

UNIT - V	PHYSICS OF QUANTUM COMPUTING & QUANTUM GATES	CLASSES: 10

Physics of Quantum computing: Idea of classical bits and qubits, advantages with qubits over classical bits, Bloch vector representation of state of qubits.

Quantum gates-Single qubit logic gates- Pauli X, Y, Z and Hadmard gate in matrix form, Two level gates-CNOT and SWAP gates and representation in matrix form, Comments on No cloning theorem, Entanglement, Quantum Teleportation – Basic Idea, Quantum Key distribution protocol - BB84 protocol.

TEXT BOOKS

1. P.K Palanisamy, Engineering Physics, Sitech Publications, 2013, IVth Ed.
2. Nielsen M. A., I. L Chung, Quantum Computation & Quantum Information, Cambridge Univ. Press.
3. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.

REFERENCE BOOKS

1. Quantum Physics, H.C. Verma, TBS Publiication, 2nd Edition 2012
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11th Edition, 2018.
3. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
4. B.K Pandey and Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition, 2022

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6EE60	BSC	3	1	-	4	40	60	100

Contact Classes: 58	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 58

COURSE OBJECTIVES

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors.

COURSE OUTCOMES

At the end of this course students will be able to:

1. Evaluate current and voltage values in resistive circuits with independent sources.
2. Explain the working of DC machines and solve the numerical problems..
3. Explain the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers.
5. Analyze the different configurations of Transistors and obtain its characteristics.

UNIT - I	ELECTRICAL CIRCUITS	CLASSES : 12

Basic definitions-Ohm's Law, types of elements, types of sources , Kirchhoff's Laws - simple problems., series & parallel resistive networks with DC excitation, star to delta and delta to star transformations.

UNIT - II	DC MACHINES	CLASSES : 12

Principle of Operation of DC Motor, types of DC motor, Torque equation & Losses and problems. DC Generator construction and working Principle, EMF Equation types of generators and problems.

UNIT - III	AC MACHINES	CLASSES : 12

Working principle and Construction of transformer, Emf Equation & problems. Principle operation of 3-phase induction motor, slip and torque Equation, Torque -slip characteristics & problems.

UNIT - IV	DIODE AND ITS CHARACTERISTICS	CLASSES : 12

PN JUNCTION DIODE: Operation of PN junction Diode: forward bias and reverse bias, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Rectifiers, Half wave, Full wave and bridge Rectifiers –capacitor filters, inductor filters

UNIT - V	TRANSISTORS	CLASSES : 10

Bipolar Junction Transistor - NPN & PNP Transistor, CB, CE, CC Configurations and Characteristics.

TEXT BOOKS

1. Basic Electrical Engineering by *M.S.Naidu and S.Kamakshaiah* TMH
2. Electronic Devices and circuits by *J.Millman, C.C.Halkias and Satyabrata Jit* 2ed.,

REFERENCE BOOKS

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, (1994).
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).

ENGINEERING DRAWING

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6ME02	**ESC**	1	-	3	2.5	40	60	100

COURSE OUTCOMES

At the end of the course the student should be able to:
1. Understand various commands and create drawing in AutoCAD.
2. Construct various engineering curves and know their importance.
3. Prepare orthographic projections of objects by visualizing them in different positions.
4. Solve the problem of projections of planes and solids in different positions.
5. Construct the isometric view into orthographic views and vice versa.

UNIT - I	INTRODUCTION TO ENGINEERING DRAWING

Introduction to Engineering Drawing: Principles and their significance.
Introduction to Computer Aided Drafting: Initial Setup Commands, Draw Commands, modify commands, 2D Drawings-Simple Exercises.

UNIT - II	ENGINEERING CURVES

Engineering Curves: Ellipse, Parabola, and Hyperbola (General Method only), Involutes.

UNIT - III	ORTHOGRAPHIC PROJECTIONS OF POINTS AND LINES

Principles of Orthographic Projections -Projections of points.
Projection of lines inclined to both planes (First angle projection only).

UNIT - IV	PROJECTIONS OF PLANES AND SOLIDS

Projections of Planes: Projections of regular planes inclined to one plane.
Projection of Solids**:** Solids inclined to one plane (Regular solids).

UNIT - V	ISOMETRIC VIEW AND ORTHOGRAPHIC VIEWS - CONVERSION

Isometric view: Drawing Isometric circles, Dimensioning Isometric Objects.
Conversion of Isometric view to Orthographic views and Orthographic to isometric view.

TEXT BOOKS

1. Bhatt N.D., Panchal V.M. & Ingle P.R., Engineering Drawing, Charotar Publishing House.
2. Agrawal B. & Agrawal C. M., Engineering Graphics, TMH Publication.

REFERENCE BOOKS

1. D.M. Kulkarni, A.P.Rastogi, A.K. Sarka "Engineering Graphics with AutoCAD" PHI publications.
2. Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers.
3. Shah, M.B. & Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education.

APPLIED PHYSICS LAB

I B. TECH- II SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
A6BS08	**BSC**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		-	-	3	1.5	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		

COURSE OBJECTIVES
1. Understand the temperature and other dependent properties of semiconductor devices and their usages in different applications
2. To know the Laser and Fibre optic technologies and its applications in real time scenario
3. Understand the electromagnetic properties using experimental knowledge
4. Understand the method of least squares fitting

COURSE OUTCOMES
By the end of the course students will be able to:
1. Analyze the electric properties of semiconductor materials by determining energy gap of semiconductors, charge carrier concentration in Semiconductors using Hall effect and threshold voltage of LEDs, photo current in Photo diodes, solar cell, and temperature effect on resistance using thermistor.
2. Identify the optical properties of light such as diffraction phenomenon using grating material for calculation of the wavelength of Laser and acceptance angle, NA of optical fiber using OFC and determine the value of Plank's constant using a light source and interference by using Newton's rings
3. Analyze the electromagnetic properties of a current carrying coil by using Stewart Gee's experiment
4. Analyze the least squares fitting method for data analysis using experimental data of Tensional pendulum

APPLIED PHYSICS LABORATORY LIST OF EXPERIMENTS	
Experiment - 1	**ENERGY GAP OF P-N JUNCION DIODE:** To determine the energy gap of a given semiconductor diode
Experiment – 2	**SOLAR CELL:** To study the V-I and V-P characteristics and determine the fill factor of solar cell
Experiment – 3	**LIGHT EMITTING DIODE:** To study the characteristics of LED by plotting V-I graph and determine the threshold value of given LEDs
Experiment – 4	**HALL EFFECT:** To determine Hall co-efficient and charge carrier concentration of a given semiconductor
Experiment – 5	**PIN PHOTO DIODE:** To study the V-I Characteristics of Photo Diode with respect to intensity of light
Experiment – 6	**OPTICAL FIBRE:** To determine the numerical aperture and acceptance angle of an optical fiber
Experiment – 7	**LASER:** To determine the wavelength of a given laser source by using diffraction grating method
Experiment – 8	**NEWTON'S RINGS:** To determine the radius of curvature of a given Plano convex lens by forming Newton's rings
Experiment – 9	**THERMISTOR:** To study the variation of resistance with respect to temperature using thermistor
Experiment - 10	Understanding the method of least squares - Torsional pendulum as an example
Experiment – 11	**PLANCK'S CONSTANT:** To determine value of planck's constant by measuring radiation in fixed spectral range
Experiment - 12	**STEWART GEE'S EXPERIMENT:** To study the variation of magnetic field along the axis of a circular coil and calculation of magnetic flux

Note: Students have to perform any 8 experiments

REFERENCE BOOKS

1. Applied Physics Lab Manual"- Dr. Radhika Devi, Mr. A V Laxman Rao, N. Noel
2. S. Balasubramanian, M.N Srinivasan "A Text book of practical Physics" - S Chand Publishers, 2017.

PYTHON PROGRAMMING LAB

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS04	ESC	-	-	3	1.5	40	60	100

Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36	Total Classes: 36

COURSE OBJECTIVES

1. To understand the problem-solving approaches.
2. To learn the basic programming constructs in Python.
3. To practice various computing strategies for Python-based solutions to real world problems.
4. To use Python data structures – lists, tuples, dictionaries.
5. To do input/output with files in Python

COURSE OUTCOMES

By the end of the course students will be able to:
1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditions and loops.
3. Develop Python programs step-wise by defining functions and calling them.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Read and write data from/to files in Python

LIST OF PROGRAMS

WEEK - 1

a) Write a program to perform different Arithmetic Operations on numbers in Python
b) Write a Python program which accepts the radius of a circle from the user and compute the area.
c) Write a Python program to get the Python version you are using.
d) Write a Python program that accepts an integer (n) and computes the value of n+nn+nnn

WEEK - 2

a) Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 = f-32/9] '
b) Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
c) A library charges a fine for every book returned late. For first 6 days the fine is 50 paisa, for 10-15 days fine is one rupee and above 15 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled.
d) Write a python program to accept the number of days the member is late to return the book and display the fine or the appropriate message.

WEEK - 3

a) Write a python function to find largest of three numbers.
b) Write a Python function that prints prime numbers in between 50 and 100.
c) Write a python program to find factorial of a number using Recursion.
d) Write a function that receives marks received by a student in 6 subjects and returns the average and percentage of these marks. Call this function from main() and print the result in main

WEEK - 4	
Write a program to demonstrate working with Strings and string operations.	
WEEK - 5	
Write a program to demonstrate working with dictionaries in python	
WEEK - 6	
Write a program to demonstrate working with tuples and List in python.	
WEEK - 7	
a) Write a script named hellow.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file. b) Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order	
WEEK - 8	
Write python programs to demonstrate class & object, static and instance method implementation.	
WEEK - 9	
Write python programs to demonstrate Inheritance and Polymorphism	
WEEK - 10	
Write python programs to demonstrate Exception Handling in python	
WEEK - 11	
Write python programs to demonstrate NumPy library and supporting functions.	
WEEK - 12	
a) Draw an Olympic Symbol in Python using Turtle b) Develop a simple login page using GUI Tkniter	
TEXT BOOKS	
1. Allen B. Downey, Think Python : How to Think like a Computer Scientist, 2nd Edition, O'Reilly Publishers, 2016. 2. Karl Beecher, Computational Thinking: A Beginners Guide to Problem Solving and Programming, 1st Edition, BCS Learning and Development Limited,2017.	
REFERENCES	

1. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, Computational Thinking: A Primer for Programmers and Data Scientists, 1st Edition, Notion Press, 2021.
3. John V Guttag, Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Dataâ€˜â€˜, Third Edition, MIT Press, 2021
4. Eric Matthes, Python Crash Course, A Hands - on Project Based Introduction to Programming, 2nd Edition, No Starch Press, 2019. https://www.python.org/
5. Martin C. Brown, Python: The Complete Reference, 4th Edition, Mc-Graw Hill, 2018.

ENGINEERING WORK SHOP

I B. TECH- II SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
A6ME04	**ESC**	-	-	3	1.5	40	60	100

COURSE OUTCOMES

At the end of the course the student should be able to:
1. Assemble the different components
2. Identify and apply suitable tools for different trades of Engineering processes.
3. Practice on manufacturing of components using workshop trades including Soldering, Carpentry, Fitting and Tin smithy & Fabricate Components with their own hands.
4. Apply basic electrical engineering knowledge for house wiring practice.
5. Learn the safety precautions for various operations in basic trades.

WEEKS	TRADES FOR EXERCISES
	Fitting
WEEK 1	Filing Four Sides of MS Work piece
WEEK 2	L Fit
	Carpentry
WEEK 3	Half Lap Joint
WEEK 4	Dove Tail Joint
	Tin Smithy
WEEK 5	Prepare a Rectangular Tray
WEEK 6	Prepare A Square Tin
	Electrical
WEEK 7	Series and Parallel Connection One Way Switch
WEEK 8	Two Way Switch Connection Stair Case Wiring
	Electronics
WEEK 9	Soldering - Series Connection & Parallel Connection
WEEK 10	Desoldering & Construction of Wheat stone bridge
	TRADES FOR DEMONSTRATION AND EXPOSURE
WEEK 11	Introduction to Black smithy
WEEK 12	Introduction to Plumbing

TEXT BOOKS
1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech. 2. Workshop Manual / K. Venugopal / Anuradha.
REFERENCE BOOKS
1.   Hajra Choudhury S.K., Hajra Choudhury A.K.and Nirjhar Roy S.K., "Elements of Workshop Technology", Media promoters and publishers private limited, Mumbai, Vol. I 2008 and Vol. II 2010. 2. Workshop Manual / Venkat Reddy/ BSP

Data Handling and Interpretation

I B. TECH- II SEMESTER								
Course Code:	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
A6DS01	**ESC**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**1**	**2**	**2**	**50**	**00**	**50**

COURSE OBJECTIVES:

1. The concepts of Co-efficient of Quartile Deviation, Measures of skewness, Mean Deviation , Standard deviation
2. Evaluation of Probability distribution of Discrete and Continuous random variables and their moments.
3. The concept of correlation and regression, covariance and sampling distribution
4. Evaluation of the given data for appropriate test of hypothesis for large samples.
5. Evaluation of the given data for appropriate test of hypothesis for small samples and one way ANOVA

COURSE OUTCOMES:

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

1. Find Coefficient of Quartile deviation , Mean deviation, Standard deviation
2. Evaluation of Probability distribution of Discrete and Continuous random variables and their moments.
3. Apply the concept of correlation and regression to find covariance and Sampling distribution
4. Evaluate the given data for appropriate test of hypothesis for Large samples.
5. Evaluate the given data for appropriate test of hypothesis for small samples and one way ANOVA

Week-1	
Introduction to spreadsheets, reading data, manipulating data. Basic spreadsheet operations and functions.	

Week-2	
Introduction to some more useful functions such as the IF, nested IF, in Excel.	

Week-3	
Introduction to Filtering, Pivot Tables, and Charts Introduction to the Data filtering capabilities of Excel, the construction of Pivot Tables to organize data and introduction to charts in Excel.	

Week-4	
Constructing various Line, Bar and Pie charts. Using the Pivot chart features of Excel.	

Week-5	
Understanding and constructing Histograms and Scatterplots.	

Week-6	
Data visualizations using conditional formatting sparklines and number formats	

Week-7	
create an interactive dashboard using pivot charts and slicers	

Week-8	
complete the dashboard with creative visualisations and dynamic charts	

Week-9	
Introduction to Power BI Power BI Desktop and Data Transformation	
Week-10	
Data Analysis Expressions (DAX)	

ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

I B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS01	ESC	-	-	2	1	50	0	50

Contact Classes: 50	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 50

COURSE OBJECTIVES
1. To provide an overview of the subjects of computer science and engineering.

COURSE OUTCOMES
2. Know the working principles of functional units of a basic Computer
3. Understand program development, the use of data structures and algorithms in problem solving.
4. Know the need and types of operating system, database systems.
5. Understand the significance of networks, internet, WWW and cyber security.
6. Understand Autonomous systems, the application of artificial intelligence.

UNIT - I	BASICS OF A COMPUTER	CLASSES: 10

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	CLASSES: 10

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 AND DATABASE MANAGEMENT SYSTEMS	CLASSES: 10

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	CLASSES: 10

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	CLASSES: 10

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

TEXT BOOKS
1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. GerstingUniversity of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.5th Edition, 2010

REFERENCE BOOKS
1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press, 2nd Edition, 2020. 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

II B.TECH I SEMESTER SYLLABUS

'DISCRETE MATHEMATICS

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
A6CS08	**BSC**	3	-	-	3	40	60	100

Contact Classes: 60	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 60

COURSE OBJECTIVES
1. To help students understand discrete and continuous mathematical structures
2. To impart basics of relations and functions
3. To facilitate students in applying principles of Recurrence Relations to calculate generating
4. Functions and solve the Recurrence relations
5. To acquire knowledge in graph theory

COURSE OUTCOMES
At the end of the course, student will be able to
1. Analyze and examine the validity of argument by using propositional and predicate calculus
2. Apply basic counting techniques to solve the combinatorial problems
3. Apply sets relations and digraphs to solve applied problems
4. Solve the given recurrence relation using different methods such as substitution, Generating function and characteristics roots equation.
5. Use the basic concepts of graph theory and some related theoretical problems

UNIT - I	MATHEMATICAL LOGIC	CLASSES: 11

Statements and notations, Connectives, Well formed formulas, Truth Tables, Tautology, Equivalence implication, Normal forms, Logical Inference, Rules of inference, Direct Method, Direct Method using CP(Conditional Proof), Consistency, Proof of contradiction, Automatic Theorem Proving.

UNIT - II	RELATIONS	CLASSES: 16

Introduction to set theory, Relations, Properties of Binary Relations, Equivalence Relation, Transitive closure, Compatibility and Partial ordering relations, Lattices, Hasse diagram. Functions: inverse Function , Composition of functions. Algebraic Systems, Semi groups and Monoids

UNIT - III	ELEMENTARY COMBINATORICS	CLASSES: 12

Basis of counting, Combinations & Permutations, Enumeration of Combinations and Permutations, Enumeration of Combinations and Permutations With repetitions, Enumerating Permutations with Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorems, The principles of Inclusion – Exclusion, Pigeon- hole principles and its applications.

UNIT - IV	RECURRENCE RELATION	CLASSES: 11

Generating Functions, Function of Sequences, Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions , The method of Characteristics roots,

UNIT - V	GRAPH THEORY	CLASSES: 10

Basic Concepts, Isomorphism and Subgraphs, Trees and their properties, Spanning Trees- DFS,BFS, Minimal Spanning Trees- Prims, Kruskal's Algorithm, Planar Graphs, Euler's Formula, Multi graph and Euler circuits, Hamiltonian Graphs, Chromatic number.

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 I. 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.

OPERATING SYSTEMS

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS11	PCC	3	-	-	3	40	60	100

Contact Classes: 70	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 70

COURSE OBJECTIVES
1. To explain main components of OS and their working
2. To familiarize the operations performed by OS as a resource Manager
3. To familiarize with Dead Locks
4. To impart various scheduling policies of OS
5. To teach the different memory management techniques.

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

1. Analyze the different structures and services of operating system.
2. Analyze various algorithms used for OS services with respect to defined/chosen criteria.
3. Solve the resource allocation and sharing problems.
4. Assess different methods to solve OS problems.
5. Analyze the memory management approaches of operating systems.

UNIT - I	OPERATING SYSTEMS OVERVIEW	CLASSES: 14

OPERATING SYSTEMS OVERVIEW: Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems.
OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations

UNIT - II	PROCESS MANAGEMENT	CLASSES: 16

PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, Scheduling algorithms, multithreaded programming.
CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris).

UNIT - III	DEAD LOCKS	CLASSES: 14

DEADLOCKS: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm.
MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing.

UNIT - IV	FILE SYSTEM	CLASSES: 12

FILE SYSTEM: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection.

File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance.

UNIT - V	MASS STORAGE STRUCTURE	CLASSES: 14

MASS STORAGE STRUCTURE: overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure.

I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance

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.

WEB REFERENCES

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E-TEXT BOOKS

1. https://www.e-booksdirectory.com/details.php?ebook=10166

MOOCS COURSE

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS28	ESC	3	-	-	3	40	60	100

Contact Classes: 58	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 58

COURSE OBJECTIVES

1. Understand different number systems and Boolean Algebra.
2. Design of combinational and sequential logic circuits
3. Understand different Computer Instructions and addressing modes
4. Understand concepts of register transfer logic and arithmetic operations.
5. Learn different types of memory hierarchy

COURSE OUTCOMES

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

1. Apply minimization techniques to simplify Boolean expressions.
2. Apply the principles of Digital electronics to design combinational and sequential logic circuits.
3. Understand the basics of instruction set and their impact on processor design
4. Illustrate register transfer operations
5. Analyze memory hierarchy and I/O Communication.

UNIT - I	NUMBER THEORY and BOOLEAN ALGEBRA	CLASSES: 12

Representation of numbers of different radix, conversion of numbers from one radix to another radix, r-1's complement and r's complement. 4-bit codes. Basic Theorems and Properties of Boolean algebra, Canonical and Standard Forms, Digital Logic Gates, Universal Logic Gates. K- Map Method, Implementation using NAND and NOR gates.

UNIT - II	DESIGN OFCOMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS	CLASSES: 14

Design of full adder, full subtractor, Decoder, Encoder, Multiplexer, De-multiplexer and comparator. Latches, flip-flops, truth tables and excitation tables. Design of Ripple counters, design of synchronous counters, Johnson counter, ring counter, shift registers.

UNIT - III	BASIC COMPUTER ORGANIZATION AND DESIGN	CLASSES: 16

Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-Output and interrupt.
Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC), Reduced Instruction Set Computer (RISC).

UNIT - IV	REGISTER TRANSFER AND MICRO-OPERATIONS	CLASSES: 16

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.
Pipeline and Parallel Processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline.

UNIT - V	MEMORY SYSTEM	CLASSES: 16

INPUT-OUTPUT ORGANIZATION: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.
MEMORY ORGANIZATION: Memory Hierarchy, Main memory, Auxiliary memory, Associate memory, Cache memory.

TEXT BOOKS

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Digital Principles and Applications by Leach, Paul Malvino, 5th Edition.
3. Computer System Architecture- M. Morris Mano, 3rd edition, Pearson/PHI, India.

REFERENCE BOOKS

1. Switching and Finite Automata Theory by Zvi.Kohavi, Tata McGraw Hill.
2. Fundamentals of Digital circuits, A. Anand Kumar, Third Edition, 2013, PHI.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson

DATA STRUCTURES

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS05	PCC	3	-	-	3	40	60	100

Contact Classes: 64	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 64

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

COURSE OUTCOMES
At the end of the course, student will be able to:
1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I	Linear Data Structures – Stack, Queue, Linked List	CLASSES: 15

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 and Hash Structures	CLASSES: 15

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	CLASSES: 12

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	Graph and Sorting Techniques	CLASSES: 12

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

UNIT - V	Pattern Matching	CLASSES: 10

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer -Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, 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 Pseudo code Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.

WEB REFERENCES

1. https://hackr.io/tutorials/learn-data-structures-algorithms
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
3. https://www.udemy.com/introduction-to-algorithms-and-data-structures-in-c/
4. https://leetcode.com

DATABASE MANAGEMENT SYSTEMS LAB

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS10	PCC	-	-	3	1.5	40	60	100

Contact Classes-Nil	Tutorial Classes-Nil	Practical Classes-36	Total Classes-36

COURSE OBJECTIVES

The course should enable the students to:
1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
4. Analyse and Select storage and recovery techniques of database system.

COURSE OUTCOMES

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

The course should enable the students to:
1. Apply the basic concepts of Database Systems and Applications.
2. Develop an ER model for a given database.
3. Use the basics of SQL and construct queries using SQL in database creation and interaction.
4. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
5. Analyze and Select storage and recovery techniques of database system.

LIST OF EXPERIMENTS

WEEK - 1	DDL Commands

Creation of Tables using SQL-Overview of using SQL tool and Data types in SQL
1. Altering Tables and
2. Dropping Tables

WEEK - 2	Create Table with Primary key and Foreign Key & DML Commands

Creating Tables(along with Primary and Foreign keys),Practicing DML commands-
1) Insert
2) Update
3) Delete

WEEK - 3	Selection Queries

Practicing Select command using following operations
1) AND,OR
2) ORDERBY
3) BETWEEN
4) LIKE
5) Apply CHECK constraint

WEEK - 4	AGGREGATE FUNCTIONS and Views

Practice Queries using following functions
1) COUNT
2) SUM
3) AVG
4) MAX
5) MIN

Apply constraint on aggregation using
1) GROUPBY
2) HAVING
   a. **VIEWS Create, Modify and Drop**

WEEK - 5	Nested QUERIES

Practicing Nested Queries using UNION,
1) INTERSECT,
2) CONSTRAINTS
3) IN

WEEK - 6	CO-RELATEDNESTEDQUERIES

Practicing Co – Related Nested Queries using
1) EXISTS
   a. NOT EXISTS, ANY,ALL

WEEK - 7	JOINQUERIES

Practicing Join Queries using
1) Inner join
2) Outer join
3) Equi join
4) Natural join

WEEK - 8	TRIGGERS

Practicing Triggers
Creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger.

WEEK - 9	PROCEDURES

Procedures-Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure

WEEK - 10	CURSORS

Cursors-Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor

WEEK - 11	PL/SQL Part 1

Practice PL/SQL
1) Block structure
2) Variables
3) data types

WEEK - 12	PL/SQL Part 2

Practice PL/SQL
1) operators
2) control structures

Case study 1: College Management
Case study 2: An Enterprise/Organization
Case study 3 : Library Management system
Case study 4: Sailors and shipment

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, 5th edition.

REFERENCE BOOKS

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

DATA STRUCTURES LAB

<table>
<tr><td colspan="9">II B. TECH- I SEMESTER</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2">Category</td><td colspan="3">Hours / Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
</table>

Course Code	Category	L	T	P	C	CIE	SEE	Total
A6CS06	**PCC**	-	-	3	1.5	40	60	100

Contact Classes-Nil	**Tutorial Classes-Nil**	**Practical Classes-36**	**Total Classes-36**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
2. Ability to Implement searching and sorting algorithms

LIST OF EXPERIMENTS

WEEK -1	STACK OPERATIONS

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

WEEK -2	QUEUE OPERATIONS

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

WEEK -3	SINGLYLINKEDLIST

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

WEEK -4	DOUBLYLINKEDLIST

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

WEEK -5	CIRCULAR LINKED LIST

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

WEEK -6	**SORTING TECHNIQUES**

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

WEEK -7	**SORTING TECHNIQUES**

7.   Write a program that implements the following sorting methods to sort a given list of integers in ascending order
      iii) Merge sort   iv) Selection sort

WEEK -8	**TREE TRAVERSALS**

8.   Write a program to implement the tree traversal methods (Recursive and Non Recursive).

    i) Pre-order ii) In order iii) Post order iv) tree display

WEEK -9	**BINARY SEARCH TREES**

9.   Write a program to implement
      i) Binary Search tree   ii) B Trees

WEEK -10	**BINARY SEARCH TREES**

10.   Write a program to implement
      iii) B+ Trees   iv)   AVL trees   v) Red - Black trees

WEEK -11	**GRAPH TRAVERSAL**

11.   Write a program to implement the graph traversal methods.
      i) DFS   ii) BFS

WEEK -12	

12. 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.

GENDER SENSITIZATION

II B. TECH- I SEMESTER								
Course Code	**Category**	**Hours /Week**			**Credits**	**Maximum Marks**		
A6HS05	**MC**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		-	-	2	-	40	60	100
Contact Classes:16	**Tutorial Classes: 0**	**Practical Classes:00**				**Total Classes:16**		

COURSE OUTCOMES
At the end of the course, student will be able to:
1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. 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.

UNIT - I	**UNDERSTANDING GENDER: Gender:**

UNDERSTANDING GENDER: Gender: Why Should We Study It? (Towards a World of Equals: Unit -1) Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male.
First lessons in Caste. Different Masculinities

UNIT - II	**GENDER AND BIOLOGY: Missing Women**

GENDER AND BIOLOGY: Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit - 4)Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10)Two or Many? Struggles with Discrimination

UNIT - III	**GENDER AND LABOUR**

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

UNIT - IV	**ISSUES OF VIOLENCE**

ISSUES OF VIOLENCE: Sexual Harassment: Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading:"Chupulu".
Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading:
New Forums for Justice.
Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-"I Fought for my Life...." - Additional Reading: The Caste Violence

UNIT - V	GENDER: CO – EXISTENCE: Just Relationships
GENDER: CO – EXISTENCE: Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and FathersAdditional Reading: Rosa Parks-The Brave Heart	

TEXT BOOKS

1. All the five Units in the Textbook, "Towards a World of Equals: A Bilingual Textbook onGender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote,Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCE BOOKS

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life...and Won."Available online at: ttp://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

II B.TECH II SEMESTER SYLLABUS

COMPUTER ORIENTED STATISTICAL METHODS

II B. TECH- II SEMESTER:

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A6BS03	**BSC**	3	1	-	4	40	60	100
Contact Classes-42	**Tutorial Classes- Nil**	**Practical Classes-Nil**				**Total Classes-42**		

COURSE OBJECTIVES

1. Evaluation of Probability distribution of Discrete and Continuous random variables and their moments.
2. The concept of correlation and regression, covariance and sampling distribution
3. Evaluation of the given data for appropriate test of hypothesis for large samples.
4. Evaluation of the given data for appropriate test of hypothesis for small samples and one way ANOVA
5. To learn the concept of Markov chain, transition probabilities in discrete & continuous time and Stochastic simulation techniques.

COURSE OUTCOMES

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

1. Evaluation of Probability distribution of Discrete and Continuous random variables and their moments.
2. Apply the concept of correlation and regression to find covariance and Sampling distribution
3. Evaluate the given data for appropriate test of hypothesis for Large samples.
4. Evaluate the given data for appropriate test of hypothesis for small samples and one way ANOVA
5. Recognize if a given stochastic system with finite number of states is a Markov chain or not and also identify classes of states in Markov chains and Characterize the states.

UNIT-I	RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS	Classes :8

Random Variables – Discrete and Continuous. Probability distributions, mass function/ density function of a probability distribution, mathematical expectation.
Binomial, Poisson, Normal distributions -their Properties. Moments about origin, central moments, skewness, Kurtosis and find the mean and variance.

UNIT-II	CORRELATION & REGRESSION AND SAMPLING DISTRIBUTIONS	Classes-9

Coefficient of correlation, the rank correlation, Covariance of two random variables. Regression-Regression Coefficient, The lines of regression.
Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimation- Point estimation and interval estimation

UNIT-III	TESTING OF HYPOTHESIS - I	Classes:9

Testing of hypothesis: Null hypothesis, Alternate hypothesis, Type I& Type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test.
Large sample tests:
(i) Test of Equality of means of two samples, equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)
(ii) Tests of significance of difference between sample S.D and population S.D.
(iii) Tests of significance difference between sample proportion and population proportion, difference between two sample proportions.

UNIT-IV	TESTING OF HYPOTHESIS-II	Classes:8

Student t-distribution, its properties; Test of significance sample mean and population mean, difference between means of two small samples. Snedecor's F- distribution and its properties. Test of equality of two population variances. Chi-square distribution, its properties, Chi-square test of goodness of fit. One way ANOVA

UNIT-V	STOCHASTIC PROCESSES AND MARKOV CHAINS	Classes:8

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. B.S.Grewal, Higher Engineering Mathematics, Khanna publishers, 36th Edition, 2010.
2. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi, Prentice Hall.
3. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning

Reference Books:

1. Ervin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Fundamentals of Mathematical Statistics by S.C. Guptha&V.K. Kapoor, S. Chand
3. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Academic Press

Web references:

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -Text Books:

1. https://www.e-booksdirectory.com/details.php?ebook=10166

MOOCS Course:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

II B. TECH- II SEMESTER

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
A6HS08	**HSMC**	3	-	-	3	40	60	100

COURSE OBJECTIVES

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issues governing the business operations namely; demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

COURSE OUTCOMES

At the end of the course, the student will be able to do:
1. Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
2. Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
3. Develop an understanding of
4. Analyze how capital budgeting decisions are carried out.
5. Understanding the framework for both manual and computerized accounting process
6. Know how to analyze and interpret the financial statements through ratio analysis.

UNIT - I	Introduction & Demand Analysis

Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT - II	Production & Cost Analysis

Production & Cost Analysis: Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT - III	Markets & New Economic Environment

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

UNIT - IV	Capital Budgeting

Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

UNIT - V	Introduction to Financial Accounting & Financial Analysis

Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, and Trial Balance - Final Accounts (Trasing Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXTBOOKS

1. Varshney &Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCEBOOKS

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey &Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting - A Managerial Perspective, Pearson, 2012.
6. S.N. Maheswari& S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha: MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J.V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

DATA ANALYTICS USING R

II B. TECH- II SEMESTER :

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6DS02	PCC	2	-	-	2	40	60	100
Contact Classes-53	Tutorial Classes-Nil	Practical Classes-Nil				Total Classes-53		

COURSE OBJECTIVES:

1. Use object oriented programming concepts to solve real world problems.
2. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
3. Use multithreading concepts to develop inter process communication.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).
5. Solve real world problems using Collections

COURSE OUTCOMES:

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

1. Use object oriented programming concepts to solve real world problems.
2. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
3. Use multithreading concepts to develop inter process communication.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).
5. Build the internet-based dynamic applications using the concept of applets

UNIT-I	Introdution to R	Classes: 12

Introduction to R-Features of R, Installation of R, Getting Started, Variables in R, Mathematical Operators and Vectors, Assigning Variables, Special Numbers, classes, different types of numbers, changing classes, examining variables, the workplace, library of package, getting to know a package. Input of Data, Output in R, In-Built Functions in R, Packages in R

UNIT-II	Data Types & Functions	Classes: 11

Data Types of R-Vectors, Matrices, Arrays, Lists, Factors, Data Frame-Basic Expressions Vectors - sequences, lengths, names, indexing vectors, vector recycling and repetition, Matrices and Arrays - creating arrays and matrices, rows, columns, dimensions, indexing arrays, Arithmetic. Decision-Making Structures - Loops, User-Defined Functions, User-Defined Package, Reports using Rmarkdown, Conditional - if and else, vectorized if, multiple selection, Loops - repeat loops, while loops, for loops, Advanced looping - replication, looping over lists, looping over arrays, Multiple - input apply, instant vectorization.

UNIT-III	Lists, Strings and Data Frames	Classes: 10

Lists, Functions, Strings and Factors Lists - creating lists, automatic and recursive variables, list dimensions and arithmetic, indexing lists, conversion between vectors and lists, Combining lists, NULL, Pairlists, Data Frames - Creating Data Frames, Indexing Data Frames, Basic Data Frame Manipulation, Functions - Creating and Calling Functions, Passing functions, variable scope, Strings - Constructing and printing strings, Formatting numbers, Special characters, Changing case, Extracting Substrings.

UNIT-IV	Regression and Clustering	Classes: 10

Statistics with R Summarizing data, calculating relative frequencies, tabulating factors and creating contingency tables, testing categorical variables for independence, calculating quantiles of a dataset, converting data into z-scores, t-test, testing sample proportions, testing normality, comparing means of two samples, testing correlation for significance, linear regression in R, logistic regression in R, clustering with R.

UNIT-V	Visualization	Classes: 10

R-Visualization Techniques Basic Visualization, Pie Chart, Bar Chart, Histograms, Line Chart, Kernel Density Plots, Quantile-Quantile (Q-Q) Plot, Box-and-Whisker Plot, Violin Plot, Dot Chart, Bubble Plot, Image Plot, Mosaic Plot.

Text Books:

Data Analytics with R, Dr. Bharti Motwani, ISBN: 9788126576463, Wileyindia

Reference Books:

1. Teetor, P., R Cookbook, Mumbai: O" Reilly India / Shroff Publishers,2014.
2. Cotton, R. Learning R, Mumbai: O" Reilly India / Shroff Publishers,2014.
3. Nathan Metzler, R Programming for Beginners,2019
4. Sandip Rakshit , R Programming for Beginners,2017.

OBJECT ORIENTED PROGRAMMING USING JAVA

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
A6IT02	**ESC**	3	-	-	3	40	60	100

Contact Classes-53	Tutorial Classes-Nil	Practical Classes-Nil	Total Classes-53

COURSE OBJECTIVES

1. Use object oriented programming concepts to solve real world problems.
2. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
3. Use multithreading concepts to develop inter process communication.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).
5. Solve real world problems using Collections

COURSE OUTCOMES

At the end of the course, student will be able to:
1. Use object oriented programming concepts to solve real world problems.
2. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
3. Use multithreading concepts to develop inter process communication.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).
5. Build the internet-based dynamic applications using the concept of applets

UNIT - I	JAVA BASICS	CLASSES: 12

JAVA BASICS: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static Method ,String and String Buffer Classes, Using Java API Document.

UNIT - II	INHERITANCE, POLYMORPHISM, PACKAGES AND INTERFACES	CLASSES: 11

INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Encapsulation, Need for encapsulation in java, Data hiding vs Encapsulation, getter and setter methods, Dynamic method dispatch, Usage of final keyword.

PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces

UNIT - III	EXCEPTION HANDLING AND FILES	CLASSES: 10

IEXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes.

I / O STREAMS AND FILES: Concepts of streams, Stream classes- Byte and Character stream, Reading console Input and Writing Console output, IO/Serialization, File Handling,

UNIT – IV	MULTITHREADING AND JDBC	CLASSES: 10

MULTI THREADING: Concepts of Thread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication, Concurrency, Executors framework

JDBC-Connecting to Database - JDBC Type 1 to 4 drives, connecting to a database, querying a Database and processing the results, updating data with JDBC

UNIT - V	COLLECTION FRAMEWORK	CLASSES: 10

COLLECTION FRAMEWORK: Introduction to Java Collections, Overview of Java Collection frame work, Generics, Commonly used Collection classes- Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties, Lambdas & Functional Interfaces

TEXT BOOKS

1. Herbert Schildt and Dale Skrien, ‖Java Fundamentals – A comprehensive Introduction‖, McGraw Hill, 1st Edition, 2013.
2. Herbert Schildt, ‾Java the complete reference‖, McGraw Hill, Osborne, 7th Edition, 2011.
3. T.Budd, ‾Understanding Object- Oriented Programming with Java‖, Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

REFERENCE BOOKS

1. P.J.Dietel and H.M.Dietel , ‾Java How to program‖, Prentice Hall, 6th Edition, 2005.
2. P.Radha Krishna , ‾Object Oriented programming through Java‖, CRC Press, 1st Edition, 2007.
3. S.Malhotra and S. Choudhary, ‾Programming in Java‖, Oxford University Press, 2nd Edition, 2014.

DESIGN AND ANALYSIS OF ALGORITHMS

II B. TECH- II SEMESTER :

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6CS15	PCC	3	-	-	3	40	60	100

COURSE OUTCOMES

At the end of this course students will be able to:

1. Identify various Time and Space complexities of various algorithms

2. Understand Tree Traversal method and Greedy Algorithms

3. Apply Dynamic Programming concept to solve various problems

4. Apply Backtracking, Branch and Bound concept to solve various problems

5. Implement different performance analysis methods for non deterministic algorithms

UNIT-I	

INTRODUCTION: Algorithm, pseudo code for expressing algorithms, performance analysis-space complexity, time complexity, asymptotic notation- big (O) notation, omega notation, theta notation and little (o) notation, recurrences, probabilistic analysis, disjoint set operations, union and find algorithms.

UNIT-II	

DIVIDE AND CONQUER: General method, applications-analysis of binary search, quick sort, merge sort, AND OR Graphs.
GREEDY METHOD: General method, Applications-job sequencing with deadlines, Fractional knapsack problem, minimum cost spanning trees, Single source shortest path problem.

UNIT-III	

GRAPHS (Algorithm and Analysis): Breadth first search and traversal, Depth first search and traversal, Spanning trees, connected components and bi-connected components, Articulation points.
DYNAMIC PROGRAMMING: General method, applications - optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV	

BACKTRACKING: General method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles.
BRANCH AND BOUND: General method, applications - travelling sales person problem, 0/1 knapsack problem- LC branch and bound solution, FIFO branch and bound solution.

UNIT-V	

NP-HARD AND NP-COMPLETE PROBLEMS: Basic concepts, non-deterministic algorithms, NP-hard and NP-complete classes.

TEXT BOOKS

1. Ellis Horowitz, Satraj Sahni, Rajasekharam (2007), Fundamentals of Computer Algorithms, 2nd edition, University Press, New Delhi.

REFERENCE BOOKS

1. R. C. T. Lee, S. S. Tseng, R.C. Chang and T. Tsai (2006), Introduction to Design and Analysis of Algorithms A strategic approach, McGraw Hill, India.
2. Allen Weiss (2009), Data structures and Algorithm Analysis in C++, 2nd edition, Pearson education, New Delhi.
3. Aho, Ullman, Hopcroft (2009), Design and Analysis of algorithms, 2nd edition, Pearson education, New Delhi

DATA ANALYTICS USING R LAB

II B. TECH- II SEMESTER:

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
A6DS03	**PCC**	-	-	3	1.5	40	60	100

COURSE OBJECTIVES:

1. Install and set up R and RStudio.
2. Understand R data types, R functions
3. Understand the R Programming Language
4. Exposure on solving of data science problems.
5. Perform operations on Correlation and regression using R.

COURSE OUTCOMES:

At the end of this course students will be able to:

1. Demonstrate how to install and configure RStudio
2. Perform basic operations using R Studio.
3. Import, review, manipulate and summarize data-sets in R
4. Make use of R studio to analyze data by working on datasets.
5. Apply various concepts to write programs in R
6. Analyze data and generate reports based on the data.

LIST OF EXPERIMENTS

WEEK-1	

Download and install R-Programming environment and install= basic packages using install.packages() command in R.

WEEK-2	

Learn all the basics of R-Programming (Data types, Variables, Operators etc.)

WEEK-3	

R AS CALCULATOR APPLICATION

a. Using with and without R objects on console
b. Using mathematical functions on console
c. Write an R script, to create R objects for calculator application and save in Specific edition in disk.

WEEK-4	

DESCRIPTIVE STATISTICS IN R

a. Write a R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars datasets.
b. Write a R script to find subset of dataset by using subset (), aggregate () functions on iris

dataset.

WEEK-5	

Learn the basics of functions in R and implement with examples.

WEEK-6	

Implement data frames in R. Write a program to join columns and rows in a data frame using cbind() and rbind() in R

WEEK-7	

Implement different String Manipulation functions in R.

WEEK-8	

READING AND WRITING DIFFERENT TYPES OF DATASETS

Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.

a.   Reading Excel data sheet in R
b.   Reading XML dataset in R

WEEK-9	

VISUALIZATIONS

a.   Find the data distributions using box and scatter plot.
b.   Find the outliers using plot.

WEEK-10	

CORRELATION AND COVARIANCE

a.   Find the correlation matrix.
b.   Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris dataAnalysis of covariance: variance (ANOVA), if data have categorical variables on iris data

WEEK-11	COLLECTIONS

REGRESSION MODEL

Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require(MASS).

WEEK-12	CONNECTING TO DATABASE

a. MULTIPLE REGRESSION MODEL

Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.

b. REGRESSION MODEL FOR PREDICTION

Apply regression Model techniques to predict the data on above dataset.

TEXT BOOKS

1. Data Analytics Using R, Seema Acharya. McGraw Hill Education, First Edition
2. R For Beginners by Sandip Rakshit, MC GRAW HILL INDIA.

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6IT03	ESC	-	-	3	1.5	40	60	100

Contact Classes-Nil	Tutorial Classes-Nil	Practical Classes-36	Total Classes-36

COURSE OUTCOMES

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

1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
2. Understand the use of different exception handling mechanisms and concept of multithreading for robust and efficient application development.
3. Understand and implement concepts on file streams and operations in java programming for a a given application programs.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).

LIST OF EXPERIMENTS

WEEK - 1	JAVABASICS

a. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.
b. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non recursive functions.

WEEK - 2	ARRAYS

a. Write a java program to sort given list of integers in ascending order.
b. Write a java program to multiply two given matrices.

WEEK - 3	STRINGS

a. Write a java program to check whether a given string is palindrome.
b. Write a java program for sorting a given list of names in ascending order.

WEEK - 4	OVERLOADING & OVERRIDING

a. Write a java program to implement method overloading and constructors overloading.
b. Write a java program to implement method overriding.

WEEK - 5	INHERITANCE

Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area() that prints the area of the given shape.

WEEK - 6	INTERFACES

a. Write a program to create interface A in this interface we have two method meth1 and meth2. Implements this interface in another class named MyClass.
b. Write a program to give example for multiple inheritance in Java.

WEEK - 7	EXCEPTION HANDLING

Write a program that reads two numbers Num1 and Num2. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception.

WEEK - 8	I/O STREAMS

a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

WEEK - 9	MULTI THREADING

Write a java program that implements a multi-thread application that has three threads. First thread generates random integer very 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number

WEEK - 10	GENERICS

a. Write a Java program to swap two different types of data using Generics.
b. Write a Java program to find maximum and minimum of two different types of data using Generics.

WEEK - 11	COLLECTIONS

Create a linked list of elements.
a. Delete a given element from the above list.
b. Display the contents of the list after deletion

WEEK - 12	CONNECTING TO DATABASE

Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.

TEXT BOOKS

1. P.J.Dietel and H.M.Dietel , ̄Java How to program‖, Prentice Hall, 6th Edition, 2005.
2. P.Radha Krishna , ̄Object Oriented programming through Java‖, CRC Press, 1st Edition, 2007.
3. S.Malhotra and S. Choudhary, ̄Programming in Java‖, Oxford University Press, 2nd Edition, 2014.

CONSTITUTION OF INDIA

II B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A6HS06	MC	-	-	2	-	40	60	100

COURSE OBJECTIVES
1. Understand the need for constitution
2. Appreciate the fundamental duties and rights of the citizens of India.
3. Explain the role and amendments of constitution in a democratic society.
4. Describe the directive principles of state policy and their significance.
5. List the key features of the constitution, union government and state government.

COURSE OUTCOMES
At the end of this course students will be able to:

1. Create awareness about the constitutional values and objectives written in the Indian constitution.
2. List fundamental rights and fundamental duties of Indian citizens.
3. Identify the division of legislative, executive and financial powers between the union and state governments.
4. Understand the working of Indian democracy, its institutions and processes at the local, state and union levels.
5. Explain the functions and responsibilities of election commission of india and union public service commission.

UNIT - I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION	

History of Making of the Indian Constitution: Introduction to the constitution of India, the making of the constitution and salient features of the constitution.

UNIT - II	PHILOSOPHY OF THE INDIAN CONSTITUTION	

Philosophy of the Indian Constitution: Preamble Salient Features, Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Rightto Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties, Amendment of the constitutional powers and procedures.

UNIT - III	UNION GOVERNMENT	

Union Government: Union Government, Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with powers and functions), president of India (with powers and functions), Prime minister of India (With powers and functions), Union judiciary (Supreme court), Jurisdiction of the supreme court.

UNIT - IV	STATE GOVERNMENT	

State Government: State Government, State legislature (Legislative Assembly/ Vidhan Sabha, Legislative council/ Vidhan parishad), powers and functions of the state legislature, State executive, Governor of the state (with powers and functions), The chief Minister of the state (with powers and functions), State Judiciary (High courts)

UNIT - V	ELECTION COMMISSION	

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.

TEXT BOOKS

1. M.V.Pylee,Indian Constitution Durga DasBasu,Human Rights in Constitutional Law,Prentice-HallofIndia Pvt. Ltd .New Delhi
2. Noorani,A.G.,(South Asia Human Rights Documentation Centre),Challenges to Civil Right), Callenges to Civil Rights Guarantees in India,Oxford University Press,2012
3. P.M.Bakshi, The constitution of India, Universal Law Publishing Co.,
4. The Constitution of India,1950 (Bare Act),Government Publication.
5. Dr.S.N.Busi, Dr. B.R.Ambedkar framing of Indian Constitution,1st Edition, 2015.

REFERENCE BOOKS

1. M.P.Jain,Indian ConstitutionLaw,7thEdn.,LexisNexis,2014.
2. D.D.Basu, Introduction to the Constitution of India,Lexis Nexis,2015.
3. Indian constitution at work, NCERT
4. Subash Kashyap, Indian Constitution, National Book Trust
5. J.A.Siwach, Dynamics of Indian Government & amp; Politics
6. D.C.Gupta, Indian Government and Politics
7. H.M.Sreevai,ConstitutionalLawofIndia,4theditionin3volumes(UniversalLawPublication)
8. J.C.Johari, Indian Government and Politics Hans
9. J.RajIndian Government and Politics

E-RESOURCES

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution