

**PRASAD V POTLURI
SIDDHARTHA INSTITUTE OF TECHNOLOGY
(Autonomous)**



**ACADEMIC RULES & REGULATIONS (PVP23)
and**

I Year B.Tech. Course Structure, Syllabus

Applicable for the batch of students admitted from the Academic Year 2023-2024

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(DATA SCIENCE)**

**PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF
TECHNOLOGY**

(Autonomous)

AICTE approved, NBA & NAAC A+ Accredited, An ISO 9001:2015 certified Institution
Permanently Affiliated to Jawaharlal Nehru Technological University, Kakinada
Kanuru, Vijayawada -520 007, Andhra Pradesh

Phone:0866 2581699

E-Mail: principal@pvpsiddhartha.ac.in

<https://www.pvpsiddhartha.ac.in>

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PREFACE

PVP Siddhartha Institute of technology, established in 1998, is one of the seventeen educational institutions sponsored and run by Siddhartha Academy of General & Technical Education. The 250 members of the Academy are a group of industrialists, educationists, auditors and philanthropists with vast experience in their respective fields and above all with an ardent desire to spread quality Education. All the academic organizations of Siddhartha Academy stand symbolic of the pragmatic vision of its founders. PVP Siddhartha Institute of Technology has the advantage of inheriting the higher academic standards. The college is approved by AICTE and is permanently affiliated to JNTUK. It is certified by ISO 9001-2015 for its quality standards. The institute is accredited by NAAC with A⁺ grade. The college was conferred autonomous status in 2012. The UG programs-CE, EEE, ME, ECE, CSE & IT are accredited by the National Board of Accreditation. Courses in CSM and CSD are also offered.

The curriculum is revised periodically to address the challenges of industry and academia and to foster the global competencies among the students. The curriculum has been revised five times since 2012. The present curriculum(PVP23) is designed incorporating the features such as outcome based approach, encouraging self-learning through MOOCs platforms i.e., Swayam, COURSERA, EDX, NPTEL, etc., transformation of creative ideas into a prototype through Internship & Project, enhancing depth & breadth by introducing open electives in core and multi-disciplinary areas, offering courses by industry experts to improve Industry Institute Interaction in addition to internships at industry and introduction of value added courses to enhance employability skills of students.

Institute Vision

To provide rich ambience for Academic and Professional Excellence, Research, Employability skills, Entrepreneurship and Social responsibility.

Institute Mission

To empower the students with Technical knowledge, Awareness of up-to-date technical trends, Inclination for research in the areas of human needs, Capacity building for Employment / Entrepreneurship, Application of technology for societal needs.

Quality Policy

At PVPSIT, We commit ourselves to offer Quality professional education in engineering & Management by adhering to applicable statutory and regulatory requirements and through continuous improvement in the Quality of our services by,

- Regular up gradation of knowledge and skills of faculty
- Improving the teaching methods and strategies
- Providing state of art infrastructure
- Recruiting competent faculty and maintaining prescribed Teacher Student ratio
- Improving the employability of students
- Enhanced Collaboration with industry and institutions of National Repute

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING (DATA SCIENCE)

VISION OF THE DEPARTMENT

- To be a centre of excellence in academics and research in Computer Science and Engineering and take up challenges for the benefit of society.

MISSION OF THE EPARTMENT

- Impart professional education through best curriculum in harmony with the industry needs.
- Inculcate ethics, research capabilities and team work in the young minds so as to put efforts to the advancement of the nation.
- Strive for student achievement and success with leadership qualities and preparing them for continuous learning in the global environment.

PROGRAM EDUCATIONAL OBJECTIVES	
PEO	STATEMENTS
PEO I	The graduates of the program will excel in the concepts of basic engineering and advanced concepts of computer science engineering.
PEO II	The graduates of the program will be professional in computing industry or pursuing higher studies.
PEO III	The graduates of the program will excel in team work, ethics, communication skills and contribute to the benefit to the society.
PROGRAM OUTCOMES (PO's)	
PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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.
PO 3	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.
PO 4	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.
PO 5	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.
PO 6	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.
PO 7	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.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	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.
PO 11	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.

PO 12	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.
PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO1	Apply the various statistical and machine learning techniques and tools to collect, process, analyze and interpret large volumes data sets.
PSO2	Designing and develop data-driven solutions to address real-world problems across different domains.

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- Award of the Degree
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- Course Pattern
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**ACADEMIC REGULATIONS (PVP23) FOR B. TECH
(REGULAR/HONORS)**

(Effective for the students admitted into I year from
the Academic Year **2023-24** onwards)

1. Award of the Degree

- (a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
- (i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).
 - (ii) Registers for 160 credits and secures all 160 credits.
- (b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:
- (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.
 - (ii) Registering for Honors is optional.
 - (iii) Honors is to be completed simultaneously with B.Tech. programme.
2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. Admissions

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. Program related terms

Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week.

One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit Definition:

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

- a) **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
- b) **Choice Based Credit System (CBCS):** The CBCS provides a choice for students to select from the prescribed courses.

5. Semester/Credits:

- i) A semester comprises 90 working days and an academic year is divided into two semesters.
- ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.
- iii) Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

6. Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 160)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13	8 %	8 – 9%
2.	Basic Sciences (BS)	20	13 %	12 - 16%
3.	Engineering Sciences (ES)	23.5	14%	10 – 18%
4.	Professional Core (PC)	54.5	34 %	30 – 36%
5.	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21 %	19 - 23%
6.	Internships & Project work (PR)	16	10 %	8 – 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	-

7. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly classified as follows:

S.No	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2.	Core Courses	Professional Courses (PC) Core	Includes subjects related to the parent discipline/department/branch of Engineering
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain specific skill enhancement courses (SEC)	interdisciplinary/job-oriented/domain courses which are relevant to the industry
4.	Project & Internships	Project Internships	B.Tech. Project or Major Project Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non credit courses	Covering subjects of developing desired attitude among the learners

8. Programme Pattern

- i. Total duration of the of B. Tech (Regular/Honors) Programme is four academic years.
- ii. Each academic year of study is divided into two semesters.
- iii. Minimum number of instruction days in each semester is 90 days.
- iv. There shall be mandatory student induction program for freshers, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.
- v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students.

- vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.
- vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.
- viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.
- ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.
- x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.
- xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
- xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.
- xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
- xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.
- xv. Undergraduate degree with Honors is introduced by the University for the students having good academic record.
- xvi. Each college shall take measures to implement Virtual Labs (<https://www.vlab.co.in>) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.
- xvii. Each college shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/ other competitive exams etc.
- xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

9. Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship & Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

- i) For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ii) For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.
- iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.
- iv) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of 'T' for theory subject and 'P' for practical subject.

a) Continuous Internal Evaluation

- i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.
- ii) Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
- The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
- The objective paper shall be conducted by the respective institution on the day of subjective paper test.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

- iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.
- iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.
- v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25

Marks obtained in second mid: 20

Final mid semester Marks: $(25 \times 0.8) + (20 \times 0.2) = 24$

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent

Marks obtained in second mid: 25

Final mid semester Marks: $(25 \times 0.8) + (0 \times 0.2) = 20$

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

- i) There shall be 6 questions and all questions are compulsory.
- ii) Question I shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.
- iii) There shall be 2 short answer questions from each unit.
- iv) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- v) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical & Electronics Engineering shall have the following pattern:

- i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

- a) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.
- b) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.
- c) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.
 - Procedure: 20 marks
 - Experimental work & Results: 30 marks
 - Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

- d) For the subject having design and/or drawing, such as Engineering Drawing, the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weightage of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage of 5 marks. There shall be no objective paper in mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing, multiple branches etc., is mentioned along with the syllabus.

- e) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re- examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.
- f) The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

10. Skill oriented Courses

- i) There shall be five skill-oriented courses offered during III to VII semesters.
- ii) Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain /Interdisciplinary/Job oriented.
- iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.
- iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.
- v) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.
- vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.
- vii) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the University.

11. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the University. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the university.

Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

12. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

- i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
- ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
- iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.
- iv) The concerned department shall identify the courses permitted for credit transfer.
- v) The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
- vi) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- vii) The university shall ensure no overlap of MOOC exams with that of the university examination schedule. In case of delay in results, the university will re-issue the marks sheet for such students.
- viii) Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

- ix) The institution shall submit the following to the examination section of the university:
 - a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
 - b) Undertaking form filled by the students for credit transfer.
- x) The universities shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the University from time to time.

13. Academic Bank of Credits (ABC)

The University has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

- i. provide option of mobility for learners across the universities of their choice
- ii. provide option to gain the credits through MOOCs from approved digital platforms.
- iii. facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
- iv. Execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

14. Mandatory Internships

Summer Internships : Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.

Full Semester Internship and Project work: In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the

candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

15. Guidelines for offering a Minor

To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream/branch are eligible to obtain degree in Minor in another stream.

- i) The Minor program requires the completion of 12 credits in Minor stream chosen.
- ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.
- iii) Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 4 (Four) Open Electives are offered in the curriculum. A student can complete the requirement for Minor by opting for the courses offered through various verticals/tracks under Open Electives.

16. Guidelines for offering Honors

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

- i) Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.
- ii) A student shall earn additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).
- iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two

subjects per semester pertaining to the Honors from V Semester onwards.

- iv) The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.
- v) Courses that are used to fulfill the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.
- vi) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.
- vii) The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.
- viii) A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.
- ix) A student registered for Honors shall pass in all subjects that constitute the requirement for the Honors degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Honors degree programme.
- x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xi) The Honors will be mentioned in the degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering.

Enrolment into Honors:

- i) Students of a Department/Discipline are eligible to opt for Honors program offered by the same Department/Discipline
- ii) The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7.0 CGPA without any backlog subjects will be permitted to register for Honors.
- iii) If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.
- iv) Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.
- v) Honors is to be completed simultaneously with a Major degree program.

Registration for Honors:

- i) The eligible and interested students shall apply through the Head of the Department (HOD) of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.
- ii) The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.

- iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.
- iv) There is no fee for registration of subjects for Honors program offered in offline at the respective institutions.

17. Attendance Requirements:

- i) A student shall be eligible to appear for the University external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects. b) Condonation 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.
- ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the University.
- iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
- vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.
- viii) For induction programme attendance shall be maintained as per AICTE norms.

18. Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

- i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university norms.
- ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any *decimal* fraction should be *rounded off to lower* digit) up to in the subjects that have been studied up to III semester.
- iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any *decimal* fraction should be *rounded off to lower* digit) in the subjects that have been studied up to V semester. And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.
- iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

19. Grading:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
90 & above	Superior	10
80 - 89	A (Excellent)	9
70 - 79	B (Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

- i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.
- ii) For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

where, C_i is the number of credits of the i th subject and G_i is the grade point scored by the student in the i th course.

The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

where " S_i " is the SGPA of the i th semester and C_i is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D and F.

Award of Class:

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

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 5.0 < 5.5$

CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10**20. With-holding of Results**

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

21. Multiple Entry / Exit Option**(a) Exit Policy:**

The students can choose to exit the four-year programme at the end of first/second/third year.

- i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- iii) **Bachelor of Science (in Field of study/discipline) i.e., B.Sc. Engineering in (Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The Universities shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

22. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme /to establish startups. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The principal of the respective college shall forward such proposals submitted by the students to the University. An evaluation committee constituted by the University shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not

23. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

24. Minimum Instruction Days for a Semester:

The minimum instruction days including exams for each semester shall be 90 days.

25. Medium of Instruction:

The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

26. Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

27. CONDUCT AND DISCIPLINE

1. Students shall conduct themselves within and outside the premises of the Institute in a manner befitting the students of our Institution.
2. As per the order of Honorable Supreme Court of India and AICTE guidelines, ragging in any form is considered a criminal offence and is banned. Ragging within or outside any educational institution is prohibited. Ragging means doing an act, that causes or is likely to cause insult or annoyance or fear of apprehension or threat or intimidation or outrage of modesty or injury to a student. Any form of ragging will be severely dealt with as per AP Prohibition of Ragging Act-1997 section-4.

Table : Punishments for Ragging

Nature of ragging	Punishment
Teasing, embarrassing and humiliating	Imprisonment up to 6 months or fine up to Rs.1,000/- or both
Assaulting or using criminal force or criminal intimidation	Imprisonment up to 1 year or fine up to Rs.2,000/- or both
Wrongfully restraining or confining or causing hurt	Imprisonment up to 2 years or fine up to Rs.5,000/- or both
Causing grievous hurt kidnapping or raping or committing unnatural offence	Imprisonment up to 5 years and fine up to Rs.10,000/-
Causing death or abetting suicide	Imprisonment up to 10 years and fine up to Rs.50,000/-

3. A student who is convicted of an offence and punished with imprisonment for a term of more than six months shall not be admitted into the institution.
4. Whenever any student complains of ragging to the head or manager of an educational institution, such head or manager should inquire into the complaint and if the complaint is prima-facie found true, should suspend the student or students complained against.
5. If the head or manager of an educational institution fails or neglects to take action in the manner specified in the Act, the person shall be deemed to have abetted the offence and shall be punished with the punishment provided for the offence.
6. If a student commits suicide due to or in consequence of ragging, the person who commits such ragging shall be deemed to have abetted such suicide.
7. The following acts of omission and/or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures.
 - i. Lack of courtesy and decorum; indecent behaviour anywhere within or outside the campus
 - ii. Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.

The following activities are not allowed within the campus:

- Mutilation or unauthorized possession of library books.
- Noisy and unseemly behaviour, disturbing studies of fellow students.
- Hacking computer systems (such as entering into other person's areas without prior permission, manipulation and/or damage of computer hardware and software or any other cybercrime etc.)
- Use of mobile phones.
- Plagiarism of any nature.
- Any other act of gross indiscipline as decided by the Institute from time to time.
- Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarment from a examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

- For an offence committed in (i) a hostel, (ii) a department or in a class room and (iii) elsewhere, the Chief Warden, the Head of the Department and the Principal, respectively, shall have the authority to reprimand or impose fine.
- Cases of adoption of unfair means and/or any malpractice in an examination shall be reported to the Principal for taking appropriate action.
- Unauthorized collection of money in any form is strictly prohibited.
- Detained and break-in-study candidates are allowed into the campus for academic purposes only with the permission from authorities.
- Misconduct committed by a student outside the Institute campus but having the effect of damaging, undermining & tarnishing the image & reputation of the institution will make the student concerned liable for disciplinary action commensurate with the nature and gravity of such misconduct.
- The disciplinary action committee constituted by the Principal, shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.
- Grievance redressal committee, constituted by the Principal, shall deal with all grievances pertaining to the academic/ administrative and disciplinary matters.
- All the students must abide by the code and conduct rules of the Institute.

28. MALPRACTICES

The Principal shall refer the cases of malpractices by students in internal assessment tests and end semester examinations, to a malpractice enquiry committee constituted for the purpose. The committee shall follow the approved scales of punishment.

The committee consists of:

1. Heads of Department (Three)
2. Controller of Examinations
3. Assistant Controller of Examinations

Disciplinary action for malpractices/improper conduct in examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible, any paper, note book, programmable calculators, mobile phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in the examination hall but has not made use of (material shall include any marks on the student's body that 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)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through mobile 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	If the candidate 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. He 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.
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University 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	If the candidate smuggles in an 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 other examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	If the candidate 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	If the candidate refuses to obey the	In case of students of the Institute, they shall be

	orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the Institute 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.	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	If the candidate 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 other examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	If the candidate possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the Institute, who is not a candidate for the particular examination or any person not connected with the Institute indulges in any malpractice or improper	Student of the Institute: 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

	conduct mentioned in clause 6 to 8.	work. He 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 Institute: Will be handed over to police and a police case will be registered against them.
10	If the candidate 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. He 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 awarded suitable punishment.	

Note: Special squads may be formed to oversee the proper conduct of examinations.

29. OTHER MATTER

- 29.1 Scribe facility is extended to B Tech students strictly following the guidelines issued under F. No. 16-110/2003-DD.III Dt. 26-02-2013 by the Ministry of Social Justice and Empowerment, Department of Disability Affairs, Govt. of India.
- 29.2 Students who are suffering from contagious diseases are not allowed to appear either continuous internal assessment or semester end examinations
- 29.3 The students who participate in coaching/tournaments held at State /National /International levels through University/Indian Olympic Association during semester end examination period will be promoted to subsequent semesters till the entire programme is completed as per the guidelines of University Grants Commission Letter No. F.1-5/88 (SPE/PES), dated 18-08-1994.
- 29.4 Based on the recommendations of HOD & Principal, exemption from attending the class work shall be given to those students who secure placement and intend to join as the employer in VIII semester of B.Tech. Special Continuous Internal Evaluation (Assignment Tests, Sessional, etc.,) will be arranged to such candidates separately if necessary. However, they shall appear for Semester End Examinations as per the Academic Calendar
- 29.5 The Principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the Heads of the Departments in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved in the Heads of the Departments Meetings, shall be reported to the academic council for ratification.

30. GENERAL

- 1 Wherever the words “he”, “him”, “his”, occur in the regulations, they may include “she”, “her”, “hers”.
- 2 The academic regulations should be read as a whole for the purpose of any interpretation.
- 3 In case of any doubt or ambiguity in the interpretation of above rules, the decision of the principal is final.

31. INSTITUTE RULES AND REGULATIONS

- 1 Use of **Mobile phones** is strictly prohibited inside the Institute academic area.
- 2 Students should come to Institute in **proper dress**.
- 3 All students should wear **Identity cards** in the Institute premises.
- 4 Students should be present in their respective classrooms **before the commencement of class sharply**.
- 5 Students should not leave the Institute premises without prior permission of their respective Heads of the departments during Institute working hours.
- 6 Students should maintain silence in the class rooms during working periods.
- 7 Sitting / wandering of the students at the stair cases, corridors, cycle stands or the areas within the Institute premises is strictly prohibited.
- 8 Usage of Vehicle horn inside the Institute premises is prohibited.

32. AMENDMENTS TO REGULATIONS

The Academic Council may, from time to time, revise, amend or change the regulations, schemes of examination and/or syllabi.

Oratory
PRINCIPAL

**ACADEMIC REGULATIONS (PVP23) FOR B.TECH.
(LATERAL ENTRY SCHEME)**

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2024-2025 onwards)

1. Award of the Degree

- (a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
- (i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).
 - (ii) Registers for 120 credits and secures all 120 credits.
- (b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:
- (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. Program i.e., 120 credits.
 - (ii) Registering for Honors is optional.
 - (iii) Honors is to be completed simultaneously with B.Tech. Programme.

2. Students, who fail to fulfill the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.2

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.
- ii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.
And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. Course Pattern

- i) The entire course of study is three academic years on semester pattern.
- ii) A student eligible to appear for the end examination in a subject but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- iii) When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfillment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

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

I B.Tech. COURSE STRUCTURE



Prasad V. Potluri Siddhartha Institute of Technology (Autonomous)

Approved by AICTE and Affiliated to JNTUK

Accredited by NAAC : A+

All UG programs accredited by NBA, ISO 9001-2015 Certified Institute
Vijayawada, Andhra Pradesh, India.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DS)

PVP23 COURSE STRUCTURE

I B.TECH - I - SEMESTER

S.No	Course Code	Course Title	C	L	T	P	Internals	Externals	Total
1	23BS1101	Linear Algebra and Calculus	3	3	0	0	30	70	100
2	23BS1103	Engineering Physics	3	3	0	0	30	70	100
3	23ES1102	Introduction to Programming	3	3	0	0	30	70	100
4	23ES1103	Basic Electrical & Electronics Engineering	3	3	0	0	30	70	100
5	23ES1104	Engineering Graphics	3	1	0	4	30	70	100
6	23BS1152	Engineering Physics Lab	1	0	0	2	30	70	100
7	23ES1152	Computer Programming Lab	1.5	0	0	3	30	70	100
8	23ES1153	IT Workshop	1	0	0	2	30	70	100
9	23ES1154	Electrical & Electronics Engineering Workshop	1.5	0	0	3	30	70	100
10	23MC1141	NSS / NCC / Scouts & Guides /Community Service	0.5	0	0	1	100	0	100
TOTAL			20.5	13	0	15	370	630	1000

I B.TECH - II- SEMESTER

S.No	Course Code	Course Title	C	L	T	P	Internals	Externals	Total
1	23HS1201	Communicative English	2	2	0	0	30	70	100
2	23BS1201	Differential Equations and Vector Calculus	3	3	0	0	30	70	100
3	23BS1202	Chemistry	3	3	0	0	30	70	100
4	23ES1201	Basic Civil & Mechanical Engineering	3	3	0	0	30	70	100
5	23DS3201	Data Structures	3	3	0	0	30	70	100
6	23HS1251	Communicative English Lab	1	0	0	2	30	70	100
7	23BS1251	Chemistry Lab	1	0	0	2	30	70	100
8	23ES1251	Engineering Workshop	1.5	0	0	3	30	70	100
9	23DS3251	Data Structures Lab	1.5	0	0	3	30	70	100
10	23MC1242	Health and wellness, yoga & sports	0.5	0	0	1	100	0	100
TOTAL			19.5	14	0	11	370	630	1000

LINEAR ALGEBRA & CALCULUS
(Common to all branches)

Course Code	23BS1101	Year	I	Semester	I
Course Category	Basic Science	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	NIL
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Interpret the basic concepts of Linear algebra and Calculus.(L2)
CO2	Apply the echelon form to obtain the solution of system of linear equations and eigen vectors of a matrix.(L3)
CO3	Apply the concepts of calculus to find the series expansion and extremum of a given function, area enclosed by plane curves and volume of the solids.(L3)
CO4	Analyze the solution set of linear system of equations and nature of the quadratic forms.(L4)
CO5	Analyze the behavior of functions using mean value theorems, extremum of the given function and limits of integration for functions of several variables.(L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2													
CO 2	3													
CO 3	3													
CO 4		3							1	1				
CO 5		3							1	1				

SYLLABUS		
Unit No.	Contents	Mapped CO
I	Matrices Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.	CO1, CO2, CO4
II	Eigen values, Eigen vectors and Orthogonal Transformation Eigen values, Eigen vectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.	CO1, CO2, CO4
III	Calculus Mean Value Theorems: Rolle’s Theorem, Lagrange’s mean value theorem with their geometrical interpretation, Cauchy’s mean value theorem, Taylor’s and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.	CO1, CO3, CO5
IV	Partial differentiation and Applications (Multivariable calculus) Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor’s and Maclaurin’s series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.	CO1, CO3, CO5
V	Multiple Integrals (Multi variable Calculus) Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).	CO1, CO3, CO5

Learning Resources

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R.K.Jain and S. R.K.Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheal Greenberg, Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H.K Das, Er.Rajnish Verma, S.Chand Publications, 2014, Third Edition (Reprint 2021).

E-Resources:

1. <https://nptel.ac.in/courses/111/108/111108157/>
2. <https://youtu.be/xDSejIvZmg4>
3. <https://nptel.ac.in/courses/111104125>

ENGINEERING PHYSICS
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23BS1103	Year	I	Semester	I
Course Category	Basic Science	Branch	CSE(DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	----
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Interpret the fundamental concepts of optical sources, structure and properties of various solid materials.(L2)
CO2	Apply the principles of lasers, optical fibers and semiconductors in engineering aspects. (L3)
CO3	Apply the concepts of quantum mechanics, Dielectrics, Magnetic materials and crystal physics for engineering applications. (L3)
CO4	Examine the nature of communication system, and semiconducting materials. (L4)
CO5	Analyze the theory of solids deduce various analytical parameters. (L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

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

SYLLABUS		
Unit No.	Contents	Mapped CO
I	<p>LASERS: Characteristics of lasers –Absorption, spontaneous and stimulated emission of radiation – population inversion – pumping mechanisms – Ruby, Helium-Neon & Semiconductor lasers -Applications of lasers.</p> <p>Fiber optics: Principle of optical fiber –structure of optical fiber Acceptance angle and numerical aperture – Types of optical fibers Attenuation in optical fibers – optical fiber in communication system-applications of optical fiber.</p>	CO1, CO2, CO4
II	<p>Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.</p> <p>X-ray Diffraction: Bragg’s law- X-ray Diffract meter–crystal structure determination by Laue’s and powder methods.</p>	CO1, CO3, CO5
III	<p>Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors-Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss</p> <p>Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferro magnetism & Domain walls (Qualitative)- Hysteresis-soft and hard magnetic materials.</p>	CO1, CO3, CO5
IV	<p>Quantum Mechanics: Dual nature of matter – Heisenberg’s Uncertainty Principle – Significance and properties of wave function–Schrodinger’s time independent and dependent wave equations– Particle in a one- dimensional infinite potential well.</p> <p>Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy</p>	CO1, CO3, CO5
V	<p>Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature- Drift and diffusion currents–Einstein’s equation–Hall effect and its applications.</p>	CO1, CO2, CO4

Learning Resources**Text Books:**

1. A Textbook of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & T V S Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and PoonamTandon, Oxford press (2015)

Reference Books:

1. Engineering Physics- B.K.Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics –Shatendra Sharma, Jyotsna Sharma, Pearson Education,2018.
3. Engineering Physics” - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010
4. Engineering Physics-M.R.Srinivasan, New Age international publishers(2009).

E-Resources:

<https://www.loc.gov/rr/scitech/selected-internet/physics.html>

Introduction to Programming

(Common to all branches)

Course Code	23ES1102	Year	I	Semester	I
Course Category	Engineering Science	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Basic Mathematics
Continues Internal Evaluate:	30	Semester End Exam:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Describe the basics of Computer Programming and Problem Solving	L2
CO2	Apply programming constructs of C language to solve the problems	L3
CO3	Apply different data types like arrays, structures, unions, and pointers in implementing solutions to various problems.	L3
CO4	Analyze the given problem and use a modular programming approach to develop solutions.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

Syllabus		Mapped CO
Unit No.	Contents	
I	Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts, pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.	CO1
II	Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while do-while) Break and Continue.	CO1, CO2
III	Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.	CO1, CO2, CO3
IV	Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, dynamic memory allocation, User-defined data types- Structures, Unions.	CO1, CO3, CO4
V	Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters, Recursion, Scope and Lifetime of Variables, Basics of File Handling.	CO1, CO3, CO4

Learning Resources

Textbooks

1. Programming in C, Reema Thareja, AICTE Edition, 2018, Oxford University Press
2. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988

References

1. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996
2. Computing fundamentals and C Programming, Bala Guruswamy, E., McGraw-Hill Education, 2008.
3. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

e- Resources and other Digital Material

1. <https://www.geeksforgeeks.org/c-programming-language/>
2. <https://www.greatlearning.in/academy/learn-for-free/courses/c-programming>
3. https://onlinecourses.nptel.ac.in/noc22_cs101/course

Basic Electrical & Electronics Engineering
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23ES1103	Year	I	Semester	I
Course Category	Engineering Science	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Describe the fundamentals of electrical circuits, machines, MC/MI instruments, semiconductor devices and its applications, principles of digital electronics (L2)
CO2	Apply the basic knowledge of mathematics, science and electrical engineering to obtain the desired parameters of electric circuits, machines, measuring instruments and power generation (L3)
CO3	Analyze the behaviour of Electric circuits, electrical load and electricity bill (L4)
CO4	Apply the basic principles of semiconductor devices and digital electronics to interpret analog and digital circuits respectively (L3)
CO5	Analyze the characteristics of analog circuits and performance of digital circuits (L4)
CO6	Acquire the capacity to do various activities on diverse topics within the field of electrical and electronics engineering

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO 2	3					1	1							
CO 3		3				1								
CO 4	3													
CO 5		3												
CO 6						1	1		2			1		

SYLLABUS		
Unit No.	Contents	Mapped CO
PART A: BASIC ELECTRICAL ENGINEERING		
I	<p>DC & AC Circuits DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems. AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).</p>	CO1, CO2, CO3, CO6
II	<p>Machines and Measuring Instruments Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines. Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.</p>	CO1, CO2, CO6
III	<p>Energy Resources, Electricity Bill & Safety Measures Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation. Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of—unitl used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.</p>	CO1, CO2, CO3, CO6
PART B: BASIC ELECTRONICS ENGINEERING		
IV	<p>SEMICONDUCTOR DEVICES Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.</p>	CO1, CO4, CO5, CO6
V	<p>BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation:</p>	CO1, CO4, CO5, CO6

	Block diagram of an electronic instrumentation system.	
VI	DIGITAL ELECTRONICS Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)	CO1, CO4, CO5, CO6

Learning Resources	
PART A: BASIC ELECTRICAL ENGINEERING	
Text Books:	
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition 2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013 3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition	
Reference Books:	
1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition 2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020 3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017 4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Pearson Publications, 2018, Second Edition.	
e- Resources & other digital material:	
1. https://nptel.ac.in/courses/108105053 2. https://nptel.ac.in/courses/108108076	
PART B: BASIC ELECTRONICS ENGINEERING	
Textbooks:	
1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021. 2. R. P. Jain, Modern Digital Electronics, 4 th Edition, Tata Mc Graw Hill, 2009	
Reference Books:	
1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010. 2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002. 3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.	
e- Resources & other digital material:	
1. https://nptel.ac.in/courses/108105132 2. https://nptel.ac.in/courses/108101091	

Engineering Graphics
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23ES1104	Year	I	Semester	I
Course Category	Engineering Science	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	1-0-4	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Construct regular polygons, conic sections, curves and scales used in Engineering practice.(L3)
CO2	Construct orthographic projections of an object when its position is defined with respect to the reference planes. (L3)
CO3	Develop the lateral surfaces of solids. (L3)
CO4	Develop the orthographic projections for the given isometric view. (L3)
CO5	Identify the appropriate commands that are used to prepare the given drawing in CAD environment

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

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

Syllabus

Unit No.	Syllabus	Mapped CO's
1	Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions And Constructing regular polygons by general method. Curves: construction of ellipse, parabola and hyperbola by general method Cycloids, Involute, Normal and tangent to the Curves. Scales: Plain scales and diagonal scales.	CO1
2	Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants. Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes.	CO2
3	Projections of Planes: Regular planes only, Plane perpendicular to both reference planes, Plane parallel to one reference plane and perpendicular to the other reference plane, Plane inclined to one reference plane and perpendicular to the other reference plane, plane inclined to both the reference planes. Projections of Solids: Types of solids: Polyhedra and Solids of revolution.	CO2

	Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other plane	
4	Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.	CO2
	Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.	CO3
5	Conversion of Views: Conversion of isometric views to orthographic views.	CO4
	Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination).	CO5

Learning Resources

Text Books

1. N.D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C.Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe, Tata Mc Graw Hill, 2017.
4. K. Venugopal, Engineering Drawing and Graphics, 6/e, New Age Publishers, 2011.

e- Resources & other digital material

1. <http://www.youtube.com/watch?v=XCWJ XrkWco>, Accessed on 01-06-2017.
2. <http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html#isodrawing>, Accessed on 01-06-2017.
3. <http://www.slideshare.net>, Accessed on 01-06-2017.
4. <http://edpstuff.blogspot.in>, Accessed on 01-06-2017.

ENGINEERING PHYSICS LAB

(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23BS1152	Year	I	Semester	I
Course Category	Basic Science	Branch	CSE (DS)	Course Type	Lab
Credits	1	L-T-P	0-0-2	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Identify the type of semiconductor using Hall effect and measure the thermal resistivity, energy band gap [L3].
CO2	Apply resonance to estimate the frequency of a tuning fork and verify laws of a stretched string [L3].
CO3	Examine the optical, elastic, and dielectric properties of the given materials. [L4].
CO4	Assess the intensity of the magnetic field of circular coil carrying current with distance and measure resistance using four probe method [L4]

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3													
CO3		3												
CO4		3												

Exp. No.	Contents	Mapped CO
1	Determination of dielectric constant of the various solid samples	CO3
2	Determination of wavelength of Laser light using diffraction grating.	CO3
3	Determination of the resistivity of semiconductors by four probe methods	CO4
4	Determination of energy gap of a semiconductor using p-n junction diode	CO1
5	Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method	CO4
6	Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect	CO1
7	Determination of temperature coefficients of a thermistor.	CO1
8	Determination of rigidity modulus of the material of the given wire using Torsional pendulum	CO3
9	To verify the laws of transverse vibrations of a string using Sonometer.	CO2
10	Determination of Frequency of electrically maintained tuning fork by Melde's experiment	CO2

Learning Resources**References:**

A Textbook of Practical Physics-S.Balasubramanian, M.N.Srinivasan,S.Chand Publishers, 2017

WebResources

www.vlab.co.in

<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

Computer Programming Lab
(Common to all Branches)

Course Code	23ES1152	Year	I	Semester	I
Course Category	Engineering Sciences	Branch	CSE (DS)	Course Type	Lab
Credits	1.5	L-T-P	0-0-3	Prerequisites	Basic Mathematics
Continuous Internal Evaluation:	30	Semester End Exam:	70	Total Marks:	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Apply C programming language constructs to solve the given problem	L2
CO2	Implement programs as an individual on different IDE's/ online platforms.	L3
CO3	Develop an effective report based on various programs implemented.	L3
CO4	Apply technical knowledge for a given problem and express it with effective oral communication.	L3
CO5	Analyze outputs using given constraints/test cases.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (H:High, M: Medium, L:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	2				1									
CO3										3				
CO4										3				
CO5		3										1		

Syllabus		
Expt. No.	Contents	Mapped CO
I	<p>WEEK 1</p> <p>Objective: Getting familiar with the programming environment on the computer and writing the first program.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 1: Problem-solving using Computers.</p> <p>Lab1: Familiarization with programming environment</p> <p>i)Basic Linux environment and its editors like Vi, Vim & Emacs etc.</p> <p>ii)Exposure to Turbo C, gcc</p> <p>iii)Writing simple programs using printf(), scanf()</p>	<p>CO1, CO2, CO3, CO4, CO5</p>
II	<p>WEEK 2</p> <p>Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.</p> <p>Suggested Experiments /Activities:</p> <p>Tutorial 2: Problem-solving using Algorithms and Flow charts. Lab 1: Converting algorithms/flow charts into C Source code.</p> <p>Developing the algorithms/flowcharts for the following sample programs</p> <p>i)Sum and average of 3 numbers</p> <p>ii)Conversion of Fahrenheit to Celsius and vice versa</p> <p>iii)Simple interest calculation</p>	<p>CO1, CO2, CO3, CO4, CO5</p>
III	<p>WEEK 3</p> <p>Objective: Learn how to define variables with the desired datatype, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 3: Variable types and type conversions:</p> <p>Lab 3: Simple computational problems using arithmetic expressions.</p> <p>i)Finding the square root of a given number</p> <p>ii)Finding compound interest</p> <p>iii)Area of a triangle using heron's formulae</p> <p>iv)Distance travelled by an object</p>	<p>CO1, CO2, CO3, CO4, CO5</p>
IV	<p>WEEK 4</p> <p>Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial4: Operators and the precedence and as associativity:</p> <p>Lab4: Simple computational problems using the operator' precedence and associativity</p> <p>i) Evaluate the following expressions.</p> <p>a. $A+B*C+(D*E) + F*G$</p>	<p>CO1, CO2, CO3, CO4, CO5</p>

	<p>b. $A/B * C - B + A * D / 5$</p> <p>c. $A+++B---A$</p> <p>d. $J = (i++) + (++i)$</p> <p>Find the maximum of three numbers using conditional operator</p> <p>Take marks of 5 subjects in integers, and find the total, average in float</p>	
V	<p>WEEK 5</p> <p>Objective: Explore the full scope of different variants of “if construct” namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for “if construct”.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 5: Branching and logical expressions:</p> <p>Lab 5: Problems involving if-then-else structures.</p> <p>i) Write a C program to find the max and min of four numbers using if-else.</p> <p>ii) Write a C program to generate electricity bill.</p> <p>iii) Find the roots of the quadratic equation.</p> <p>iv) Write a C program to simulate a calculator using switch case.</p> <p>v) Write a C program to find the given year is a leap year or not.</p>	<p>CO1, CO2, CO3, CO4, CO5</p>
VI	<p>WEEK 6</p> <p>Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 6: Loops, while and for loops</p> <p>Lab 6: Iterative problems e.g., the sum of series</p> <p>i) Find the factorial of given number using any loop.</p> <p>ii) Find the given number is a prime or not.</p> <p>iii) Compute sine and cos series</p> <p>iv) Checking a number palindrome</p> <p>V) Construct a pyramid of numbers.</p>	<p>CO1, CO2, CO3, CO4, CO5</p>
VII	<p>WEEK 7:</p> <p>Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 7: 1 D Arrays: searching.</p> <p>Lab 7: 1D Array manipulation, linear search</p> <p>i) Find the min and max of a 1-D integer array.</p> <p>ii) Perform linear search on 1D array.</p> <p>iii) The reverse of a 1D integer array</p> <p>iv) Find 2's complement of the given binary number.</p> <p>V) Eliminate duplicate elements in an array.</p>	<p>CO1, CO2, CO3, CO4, CO5</p>

VIII	<p>WEEK 8 : Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays. Suggested Experiments/Activities: Tutorial 8: 2 D arrays, sorting and Strings. Lab 8: Matrix problems, String operations, Bubble sort i) Addition of two matrices ii) Multiplication two matrices iii) Sort array elements using bubble sort iv) Concatenate two strings without built-in functions v) Reverse a string using built-in and without built-in string functions</p>	CO1, CO2, CO3, CO4, CO5
IX	<p>WEEK 9: Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C Suggested Experiments/Activities: Tutorial 9: Pointers, structures and dynamic memory allocation Lab 9: Pointers and structures, memory dereference. i) Write a C program to find the sum of a 1D array using malloc() ii) Write a C program to find the total, average of n students using structures iii) Enter n students data using calloc() and display failed students list iv) Read student name and marks from the command line and display the student details along with the total. v) Write a C program to implement realloc()</p>	CO1, CO2, CO3, CO4, CO5
X	<p>WEEK 10: Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures Suggested Experiments/Activities: Tutorial 10: Bitfields, Self-Referential Structures, Linked lists Lab10 : Bitfields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields i) Create and display a singly linked list using self-referential structure. ii) Demonstrate the differences between structures and unions using a C program. iii) Write a C program to shift/rotate using bitfields. Write a C program to copy one structure variable to another structure of the same type</p>	CO1, CO2, CO3, CO4, CO5
	<p>WEEK 11: Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration</p>	CO1, CO2, CO3, CO4, CO5

XI	<p>Suggested Experiments/Activities:</p> <p>Tutorial 11: Functions, call by value, scope and extent, Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem. i)Write a C function to calculate NCR value. ii)Write a C function to find the length of a string. iii)Write a C function to transpose of a matrix. iv)Write a C function to demonstrate numerical integration of differential equations using Euler’s method.</p>	
XII	<p>WEEK 12:</p> <p>Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions. Suggested Experiments/Activities: Tutorial 12: Recursion, the structure of recursive calls Lab 12: Recursive functions i)Write a recursive function to generate Fibonacci series. ii)Write a recursive function to find the lcm of two numbers. iii)Write a recursive function to find the factorial of a number. iv)Write a C Program to implement Ackermann function using recursion. v)Write a recursive function to find the sum of series.</p>	CO1, CO2, CO3, CO4, CO5
XIII	<p>WEEK 13:</p> <p>Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers Suggested Experiments/Activities: Tutorial 13: Call by reference, dangling pointers Lab 13: Simple functions using Call by reference, Dangling pointers. i)Write a C program to swap two numbers using call by reference. ii)Demonstrate Dangling pointer problem using a C program. iii)Write a C program to copy one string into another using pointer. iv)Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.</p>	CO1, CO2, CO3, CO4, CO5
XIV	<p>WEEK14:</p> <p>Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files. Suggested Experiments/Activities: Tutorial 14: File handling Lab 14: File operations i)Write a C program to write and read text into a file. ii)Write a C program to write and read text into a binary file using fread() and fwrite() iii)Copy the contents of one file to another file. iv)Write a C program to merge two files into the third file using command-line arguments. v)Find no. of lines, words and characters in a file vi)Write a C program to print last n characters of a given file.</p>	CO1, CO2, CO3, CO4, CO5

Learning Resources**Text Books**

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

e- Resources & other digital material

1. <https://www.geeksforgeeks.org/c-programming-language/>
2. <https://www.greatlearning.in/academy/learn-for-free/courses/c-programming>
3. https://onlinecourses.nptel.ac.in/noc22_cs101/course

IT WORKSHOP
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23ES1153	Year	I	Semester	I
Course Category	Engineering Sciences	Branch	CSE (DS)	Course Type	Lab
Credits	1	L-T-P	0-0-2	Prerequisites	-Nil -
Continuous Internal Evaluation:	30	Semester End Exam:	70	Total Marks:	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Describe various Hardware components, operating systems, and World wide web functionalities and dependencies	L2
CO2	Apply various tools for Document/ Presentation preparation.	L3
CO3	Develop an effective report based on various experiments completed	L3
CO4	Apply technical knowledge for a given problem and express it with effective oral communication	L3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations(3:High, 2:Medium, 1:Low)

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

Syllabus

Expt. No.	Contents	Mapped
I	PC Hardware & Software Installation (WEEK-1) Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.	CO1 CO3 CO4
II	PC Hardware & Software Installation (WEEK-2) Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.	CO1 CO3 CO4
III	PC Hardware & Software Installation (WEEK-3) Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.	CO1 CO3 CO4

IV	PC Hardware & Software Installation (WEEK-4) Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva	CO1 CO3 CO4
V	PC Hardware & Software Installation (WEEK-4) Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva	CO1 CO3 CO4
VI	Internet & World Wide Web (WEEK-5) Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.	CO1 CO3 CO4
VII	Internet & World Wide Web (WEEK-5) Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.	CO1 CO3 CO4
VIII	Internet & World Wide Web (WEEK-6) Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.	CO1 CO3 CO4
IX	Internet & World Wide Web (WEEK-6) Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.	CO1 CO3 CO4
X	LaTeX and WORD (WEEK-7) Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.	CO2 CO3 CO4
XI	LaTeX and WORD (WEEK-7) Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.	CO2 CO3 CO4
XII	LaTeX and WORD (WEEK-8) Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.	CO2 CO3 CO4
XIII	LaTeX and WORD (WEEK-8) Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.	CO2 CO3 CO4

XIV	<p>EXCEL (WEEK-9) Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources. Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text</p>	<p>C02 C03 C04</p>
XV	<p>EXCEL (WEEK-10) Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.</p>	<p>C02 C03 C04</p>
XVI	<p>EXCEL (WEEK-10) LOOKUP/VLOOKUP Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting</p>	<p>C02 C03 C04</p>
XVII	<p>POWER POINT (WEEK-11) Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.</p>	<p>C02 C03 C04</p>
XVIII	<p>POWER POINT (WEEK-11) Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.</p>	<p>C02 C03 C04</p>
XIX	<p>POWER POINT (WEEK-12) Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.</p>	<p>C02 C03 C04</p>
XX	<p>AI TOOLS – ChatGPT (WEEK-13) Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them. • Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"</p>	<p>C02 C03 C04</p>
XXI	<p>AI TOOLS – ChatGPT (WEEK-14) Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas • Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."</p>	<p>C02 C03 C04</p>
XXII	<p>AI TOOLS – ChatGPT (WEEK-15) Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are. • Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"</p>	<p>C02 C03 C04</p>

Learning Resources**Text Books**

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech,2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition

Reference Books

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
2. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
3. LaTeX Companion, Leslie Lamport, PHI/Pearson.
4. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3 rd edition
5. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3 rd edition

Electrical & Electronics Engineering Workshop
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23ES1154	Year	I	Semester	I
Course Category	Engineering Science	Branch	CSE (DS)	Course Type	Lab
Credits	1.5	L-T-P	0-0-3	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Solve for various electrical parameters in an Electrical Circuit (L3)
CO2	Analyze Wheatstone bridge and Open Circuit Characteristics of DC Shunt Generator (L4)
CO3	Analyze the Characteristics of Different Electronic Circuits (L4)
CO4	Examine the Truth Tables of Logic Gates and Flip-flops Using Respective IC's (L4)
CO5	Conduct experiments as a team / individual by using equipment available in the laboratory
CO6	Make an effective report based on experiments

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

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

Syllabus

Expt. No.		Mapped CO's
	PART A: ELECTRICAL ENGINEERING LAB	
	Conduct any six experiments	
1	Verification of KCL and KVL.	CO1,CO5,CO6
2	Verification of Superposition theorem.	CO1,CO5, CO6
3	Measurement of Resistance using Wheat stone bridge.	CO2,CO5, CO6
4	Magnetization Characteristics of DC shunt Generator.	CO2,CO5, CO6
5	Measurement of Power and Power factor using Single-phase wattmeter.	CO1,CO5, CO6
6	Measurement of Earth Resistance.	CO1, CO5, CO6
7	Calculation of Electrical Energy for Domestic Premises.	CO1,CO5, CO6

PART B: ELECTRONICS ENGINEERING LAB		
	Conduct any six experiments (Both Software and Hardware)	
8	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.	CO3,CO5, CO6
9	Plot V – I characteristics of Zener Diode and its application as voltage Regulator.	CO3,CO5, CO6
10	Implementation of half wave and full wave rectifiers.	CO3,CO5, CO6
11	Plot Input & Output characteristics of BJT in CE and CB configurations.	CO3,CO5, CO6
12	Frequency response of CE amplifier.	CO3,CO5, CO6
13	Simulation of RC coupled amplifier with the design supplied.	CO3,CO5, CO6
14	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.	CO4,CO5, CO6
15	Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.	CO4,CO5, CO6

Learning Resources

Reference Books (PART-A)

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books (PART-B)

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

**NSS/NCC/SCOUTS & GUIDES/
COMMUNITY SERVICE**
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23MC1141	Year	I	Semester	I
Course Category	MC	Branch	CSE (DS)	Course Type	Practical
Credits	0.5	L-T-P	0-0-1	Prerequisites	-
Continuous Internal Evaluation:	100	Semester End Evaluation:	-	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Outline the importance of discipline, character and service motto. (L2)
CO2	Solve some societal issues by applying acquired knowledge, facts, and techniques. (L3)
CO3	Explore human relationships by analyzing social problems. (L3)
CO4	Determine to extend their help for the fellow beings and downtrodden people. (L4)
CO5	Develop leadership skills and civic responsibilities. (L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

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

Syllabus

Exp No.	Contents	Mapped CO
Experiments		
1	<p style="text-align: center;">UNIT- I: Orientation</p> <p>General Orientation on NSS activities, career guidance.</p> <p>Activities:</p> <p>i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills</p> <p>ii) Conducting orientations programs for the students – future plans-activities-releasing road map etc.</p> <p>iii)Displaying success stories-motivational biopics- award winning movies on societal issues etc.</p> <p>iv)Conducting talent show in singing patriotic songs- paintings- any other contribution.</p>	CO1

2	<p>UNIT- II: Nature & Care Activities:</p> <ul style="list-style-type: none"> i) Best out of waste competition. ii) Poster and signs making competition to spread environmental awareness. iii) Recycling and environmental pollution article writing competition. iv) Organizing Zero-waste day. v) Digital Environmental awareness activity via various social media platforms. vi) Virtual demonstration of different eco-friendly approaches for sustainable living. vii) Write a summary on any book related to environmental issues. 	<p>CO2 CO5</p>
3	<p>UNIT- III: Community Service Activities:</p> <ul style="list-style-type: none"> i) Conducting One Day Special Camp in a village contacting village- area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities-experts-etc. ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS, iii) Conducting consumer Awareness. Explaining various legal provisions etc. iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education. v) Any other programmes in collaboration with local charities, NGOs etc. 	<p>CO3 CO4 CO5</p>

Learning Resources

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. National Service Scheme Manual (Revised), 2006, Government of India.
3. Davis M. L. and Cornwell D. A., *Introduction to Environmental Engineering*, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. *Introduction to Environmental Engineering and Science*, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

COMMUNICATIVE ENGLISH
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23HS1201	Year	I	Semester	II
Course Category	Humanities	Branch	CSE (DS)	Course Type	Theory
Credits	2	L-T-P	2-0-0	Prerequisites	-----
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Interpret the text and use grammar, vocabulary to enhance LSRW skills(L2)
CO2	Apply grammatical structures and use a wide range of vocabulary in thematic concepts(L3)
CO3	Acquire the ability to prepare resumes and official letters(L3)
CO4	Frame a coherent Paragraph, Essay and prepare note making(L4)
CO5	Examine the text/ graphical elements for global comprehension and data interpretation(L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations
(3:Substantial,2:Moderate,1:Slight)

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

SYLLABUS

Unit No.	Contents	Mapped CO
I	<p>Lesson: HUMANVALUES: Gift of Magi (Short Story)</p> <p>Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.</p> <p>Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.</p> <p>Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.</p>	CO1, CO2

	<p>Writing: Paragraph writing, Punctuation.</p> <p>Grammar: Parts of Speech, Basic Sentence Structures, Forming questions</p> <p>Vocabulary: Synonyms</p>	
II	<p>Lesson: NATURE: The Brook by Alfred Tennyson(Poem)</p> <p>Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.</p> <p>Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks</p> <p>Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph.</p> <p>Writing: Note making.</p> <p>Grammar: use of articles and zero article, prepositions</p> <p>Vocabulary: Antonyms</p>	CO1, CO2,CO4
III	<p>Lesson: BIOGRAPHY: Elon Musk</p> <p>Listening: Listening for global comprehension and summarizing What is listened to</p> <p>Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed</p> <p>Reading: Reading a text in detail by making basic inferences- recognizing and interpreting specific context clues; strategies to use text clues for comprehension.</p> <p>Writing: Paraphrasing</p> <p>Grammar: Subject-verb agreement</p> <p>Vocabulary: Prefixes and Suffixes</p>	CO1, CO2, CO5
IV	<p>Lesson: INSPIRATION: The Toys of Peace by Saki</p> <p>Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.</p> <p>Speaking: Role-plays for practice of conversational English in academic contexts (formal and informal)- asking for and giving information/ directions.</p> <p>Reading: Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/ relationships, communicate processes or display complicated data.</p> <p>Writing: Letter Writing: Official Letters</p> <p>Grammar: Reporting verbs and Tenses</p> <p>Vocabulary: Root words.</p>	CO1, CO2, CO3, CO5

V	<p>Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)</p> <p>Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.</p> <p>Speaking: Formal oral presentations on topics from academic contexts</p> <p>Reading: Reading comprehension.</p> <p>Writing: Writing structured essays on specific topics, cover letter and resume.</p> <p>Grammar: Editing short texts—identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject -verb agreement)</p> <p>Vocabulary: One word substitutes.</p>	<p>CO1, CO2, CO3, CO4</p>
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Learning Resources

Text Books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023.

Reference Books:

1. Dubey, Shamji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy-The Complete Hand book for Building a Superior Vocabulary. Anchor, 2014.

E-Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. www.eslpod.com/index.html
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to all branches)

Course Code	23BS1201	Year	I	Semester	II
Course Category	Basic Science	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Pre-requisites	NIL
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Interpret the basic concepts of differential equations and vector calculus (L2).
CO2	Apply different methods to solve ordinary differential equations and partial differential equations, L-C-R Circuit problems (L3).
CO3	Apply the differential operator to calculate the divergence and flux of vector point functions (L3).
CO4	Analyze the given ordinary differential equation and partial differential equation to find the solution (L4).
CO5	Analyze the given data to find work done, flux using line and surface integrals, areas and volumes using vector integral theorems (L4).

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

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

SYLLABUS		
Unit No.	Contents	Mapped CO
I	Differential equations of first order and first degree Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay.	CO1,CO2, CO4
II	Linear differential equations of higher order(Constant Coefficients) Definitions, complementary function, general solution, particular integral, Wronskian, Method of variation of parameters. Applications to L-C-R Circuit problems.	CO1,CO2, CO4
III	Partial Differential Equations Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.	CO1,CO2, CO4
IV	Vector differentiation Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl.	CO1,CO3, CO5
V	Vector integration Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.	CO1,CO3, CO5

Learning Resources

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers, 2017, 44th Edition.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B.V.Ramana, Mc Graw Hill Education, 2017

E-Resources:

1. <https://nptel.ac.in/courses/111/105/111105121/>
2. <https://nptel.ac.in/courses/111/105/111105122/>
3. <https://nptel.ac.in/courses/111/107/111107108/>

CHEMISTRY

(Common to IT,CSE-AIML,CSE-DS)

Course Code	23BS1202	Year	I	Semester	II
Course Category	Basic Sciences	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Interpret fundamental concepts of chemistry. (L2)
CO 2	Apply knowledge of quantum mechanics, materials and energy sources to describe and solve problems. (L3)
CO3	Utilize knowledge of conducting polymers and instrumentation to design and develop new materials.(L3)
CO4	Analyze bonding models, Modern engineering materials, and electrochemical processes to make informed decisions.(L4)
CO5	Analyze the applications of polymers and instrumentation methods . (L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High,2: Medium, 1:Low)

	PO1	PO2	P O3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2	3													
CO3	3													
CO4		3							1	1				
CO5		3							1	1				

SYLLABUS

Unit No.	Contents	Mapped CO
I	UNIT I Structure and Bonding Models: Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2 , particle in one dimensional box, molecular orbital theory – bonding in homo-and hetero nuclear diatomic molecules – energy level diagrams of O ₂ and CO etc. π -molecular orbitals of butadiene and benzene-calculation of bond order.	CO1,CO2, CO4
II	UNIT II Modern Engineering materials Semiconductors- Introduction, basic concept, applications. Super conductors- Introduction, basic concept, applications. Super capacitors- Introduction, Basic Concept, Classification and Applications. Nano materials- Introduction, classification, properties and applications of Fullerenes, carbon Nano tubes, Graphines and nanoparticles.	CO1,CO2, CO4

III	<p>UNIT III Electrochemistry and Applications</p> <p>Electrochemical cell, Nernst equation, cell potential calculations and numerical problems. potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conduct metric titrations (acid-base titrations). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells – lithium-ion batteries- working of the batteries including cell reactions. Fuel cells- hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).</p>	CO1,CO2, CO4
IV	<p>UNIT IV Polymer Chemistry</p> <p>Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization with specific examples and mechanisms of polymer formation</p> <p>Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.</p> <p>Elastomers–Buna-S,Buna-N–preparation, properties and applications.</p> <p>Conducting polymers – poly acetylene, poly aniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).</p>	CO1,CO3, CO5
V	<p>UNIT V Instrumental Methods and Applications</p> <p>Electromagnetic spectrum- Absorption of radiation- Beer-Lambert’s law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification. HPLC: Principle, Instrumentation and Applications.</p>	CO1,CO3, CO5

Learning Resources

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins’ Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

E-Resources:

<https://nptel.ac.in/courses/103108100>
https://onlinecourses.nptel.ac.in/noc23_cy19/preview
<https://nptel.ac.in/courses/118104008>

BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23ES1201	Year	I	Semester	II
Course Category	Engineering Science	Branch	CSE (DS)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

PART A: BASIC CIVIL ENGINEERING

Course Outcomes:

On completion of the course, the student should be able to:

CO1	Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society	L2
CO2	Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying	L2
CO3	Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.	L2
CO4	Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.	L2
CO5	Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.	L2

Contribution of course outcomes towards Achievement of Program Outcomes

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

Course Content

UNIT-1	Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate-Bricks - Cement concrete- Steel. Introduction to Prefabricated construction Techniques	CO1,CO5
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UNIT-2	Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.	CO2
UNIT-3	Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology– Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).	CO3,CO4

LEARNING RESOURCES

Textbooks	<ol style="list-style-type: none"> 1. Basic Civil Engineering, M.S.Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition. 2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition. <p>Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.</p>
Reference Books	<ol style="list-style-type: none"> 1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition. 2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016. 3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition. 4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition. 5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B-Basic Mechanical Engineering

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	Level	UNIT
CO1	Understand regarding various engineering material, different modules of Mechanical engineering and importance of Mechanical Engineering in different sectors and industries	Understand	L2	1,2,3
CO2	Explain different manufacturing and thermal engineering processes.	Understand	L2	2
CO3	Describe the concepts of a power plant, mechanical power transmission elements and robotics.	Understand	L2	3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (H: High (3), M: Medium (2), L:Low (1))

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2				3								
CO2	2	2				3								
CO3	2	2				3								

Syllabus

UNIT	Content	Mapped CO
I	<p>Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.</p> <p>Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials</p>	CO1
II	<p>Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.</p> <p>Thermal Engineering – Working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.</p>	CO1, CO2
III	<p>Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants.</p> <p>Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.</p> <p>Introduction to Robotics - Joints & links, configurations, and applications of robotics.</p>	CO1, CO3

Learning Recourse(s)**Text Book(s)**

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference books

1. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
2. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt.Ltd.
3. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.

DATA STRUCTURES
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code:	23DS3201	Year:	I	Semester:	II
Course Category:	Professional Core	Branch:	CSE (DS)	Course Type:	Theory
Credits:	3	L-T-P:	3-0-0	Prerequisites:	Introduction to Programming
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

COURSE OUTCOMES

Upon successful completion of the course, Student will be able to

CO1	Describe different linear and non-linear data structures	L2
CO2	Apply suitable searching, sorting algorithms for various applications.	L3
CO3	Apply suitable linear and nonlinear data structures to solve the various problems	L3
CO4	Analyze suitable data structures to solve various problems	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

SYLLABUS

Unit No.	COURSE CONTENTS	Mapped CO
UNIT-1	Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis. Searching Techniques: Linear & Binary Search. Sorting Techniques: Bubble sort, Selection sort, Insertion sort.	CO1,CO2
UNIT-II	Linked Lists: Singly linked lists: representation and operations, doubly linked lists, representation and operations and circular linked lists: representation and operations, Comparing arrays and linked lists.	CO1,CO3, CO4

UNIT-III	Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks: infix to postfix conversion, expression evaluation, balanced parentheses.	CO1,CO3, CO4
UNIT-IV	Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists. Circular Queue: Introduction, representation, properties, and operations on circular queue.	CO1,CO3, CO4
UNIT-V	Trees: Introduction to Trees, Binary Tree, Binary Search Tree – Insertion, Deletion & Traversal (Recursion Only). Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing.	CO1,CO2, CO3, CO4

Learning Resources

Text Books

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications.

References

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis Samantha, Second Edition, 2009, PHI.
3. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
4. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
5. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
6. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
7. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

e-Resources and other Digital Material

1. <http://cse.iitkgp.ac.in/pds/>
2. <http://cmpe.emu.edu.tr/bayram/courses/231/LectureNotesSlides/IQBAL/Lecture%20Notes>
3. <https://www.geeksforgeeks.org/data-structures/>
4. <https://www.programiz.com/dsa>
5. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
6. <https://www.youtube.com/watch?v=zWg7U00EAOE&list=PLBF3763AF2E1C572F>
7. https://www.youtube.com/watch?v=S47aSEqm_OI&list=PLgj_VZKxRKrxgFyOutPJpoLFBaQMOpK

COMMUNICATIVE ENGLISH LAB
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23HS1251	Year	I	Semester	II
Course Category	Humanities	Branch	CSE(DS)	Course Type	Lab
Credits	1	L-T-P	0-0-2	Prerequisites	
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Demonstrate the English language proficiency through Emphasis on LSRW Skills. (L3)
CO2	Apply communication skills through various language learning activities. (L3)
CO3	Develop an insight into the importance of phonetics for better pronunciation and accent. (L3)
CO4	Enhance professionalism through debates, group discussions and presentations. (L4)
CO5	Hone employability skills. (L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial,2:Moderate,1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1									3	3		3		
CO2									3	3		3		
CO3									3	3		3		
CO4									3	3		3		
CO5									3	3		3		
AVG									3	3		3		

Syllabus		
Exp. No.	Contents	Mapped CO
Experiments		
1	Vowels & Consonants	CO1,CO3
2	Accent	

3	JAM	
4	Role Play or Conversational Practice	CO1, CO2
5	Listening-I (Global comprehension)	
6	Listening-II (Identifying key terms, understanding concepts)	CO1,CO2
7	Group Discussions	
8	Debates	CO1,CO2 & CO4
9	PPTs/Poster Presentation	
10	Interview Skills	CO1,CO5

Learning Resources

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
4. J.Sethi&P.V.Dhamija. *A Course in Phonetics and Spoken English*, (2ndEd), Kindle, 2013.

CHEMISTRY LAB
(Common to IT,CSE-AIML,CSE-DS)

Course Code	23BS1251	Year	I	Semester	II
Course Category	Basic Sciences	Branch	CSE (DS)	Course Type	Lab
Credits	1	L-T-P	0-0-2	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Demonstrate the working of potentiometer and conductometer instruments. (L3)
CO2	Prepare advanced materials like polymers and Nano materials (L3)
CO3	Calculate the strength of Pb-Acid battery(L4)
CO4	Examine the ferrous iron content in a sample using dichrometry (L4)
CO5	Calculate the wave length of a sample by using UV-Visible Spectroscopy and colorimetry (L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations(3:High,2: Medium, 1:Low)

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3													
CO3		3												
CO4		3												
CO5		3												

Syllabus		
Exp. No.	Contents	Mapped CO
Experiments		
1	Conductometric titration of strong acid vs strong base	CO1
2	Conductometric titration of weak acid vs. strong base	CO1
3	Determination of cell constant and conductance of solutions	CO1
4	Potentiometry - determination of redox potentials and emfs	CO1
5	Determination of Strength of an acid in Pb-Acid battery	CO3
6	Preparation of a Bakelite	CO2
7	Verify Lambert-Beer's law	CO5
8	Wavelength measurement of sample through UV-Visible Spectroscopy	CO5
9	Preparation of nanomaterials by precipitation method	CO2
10	Estimation of Ferrous Iron by Dichrometry	CO4

Learning Resources

References:

- "Vogel's Quantitative Chemical Analysis 6th Edition " Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

Engineering Workshop
(Common to CE,ME,IT,CSE-AIML,CSE-DS)

Course Code	23ES1251	Year	I	Semester	II
Course Category	Engineering Science	Branch	CSE (DS)	Course Type	Lab
Credits	1.5	L-T-P	0-0-3	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Upon successful completion of the course, the student will be able to				
Course Outcomes		Skill	Level	Expt. No
CO1	Identify workshop tools and their operational capabilities.	Apply	L3	1-9
CO2	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, plumbing and welding	Apply	L3	2,3,4,6,7,8
CO3	Apply fitting operations in various applications	Apply	L3	4
CO4	Apply basic electrical engineering knowledge for House Wiring Practice	Apply	L3	5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: High, 2: Medium, 1: Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					2			3	2		2		
CO2	3		2			2			3	2		2		
CO3	3		2			2			3	2		2		
CO4	3		2			2			3	2		2		

Syllabus		
Expt. No.	Contents	Mapped CO's
1	Demonstration: Safety practices and precautions to be observed in workshop.	CO1
2	Wood Working: Familiarity with different types of woods and tools used in wood working and make following joints. a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint	CO1, CO2
3	Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets. a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing	CO1, CO2

4	Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire	CO1, CO2 CO3
5	Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires	CO1, CO4
6	Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns..	CO1, CO2
7	Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint	CO1, CO2
8	Plumbing: Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.	CO1, CO2
9	Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.	CO1

Learning Resources

Text Books

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

Data Structures Lab

(Common to CSE.IT,CSE-AIML,CSE-DS)

Course Code:	23DS3251	Year:	I	Semester:	II
Course Category:	Professional Core	Branch:	CSE (DS)	Course Type:	Practical
Credits:	1.5	L-T-P:	0-0-3	Prerequisites:	Computer Programming Lab
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

COURSE OUTCOMES

Upon successful completion of the course, Student will be able to

CO1	Apply Linear and non-linear data structures for solving problems.	L3
CO2	Implement programs as an individual on different IDEs	L3
CO3	Develop an effective report based on various programs implemented	L3
CO4	Apply technical knowledge for a given problem and express with an effective oral communication	L3
CO5	Analyse outputs using given constraints/test cases	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: Substantial, 2: Moderate, 1: Slight)

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

Syllabus		
Unit No.	Contents	Mapped CO
1.	Exercise 1: Array Manipulation i) Write a program to reverse an array. ii) C Programs to implement the Searching Techniques – Linear & Binary Search	CO1,CO2,CO3, CO4,CO5
2.	Exercise 2: Sorting i) C Programs to implement Sorting Techniques – Bubble sort, Selection sort and Insertion Sort	CO1,CO2,CO3, CO4,CO5
3.	Exercise 3: Linked List Implementation i) Implement a singly linked list and perform insertion and deletion operations. ii) Develop a program to reverse a linked list iteratively and recursively. iii) Find minimum and maximum element in a linked list.	CO1,CO2,CO3, CO4,CO5
4.	Exercise 4: Linked List Applications i) Implement a linked list to represent polynomials and perform addition. ii) Develop a program to append one linked list to the end of the other. iii) Implement a circular linked list and perform insertion, deletion, and traversal.	CO1,CO2,CO3, CO4,CO5
5.	Exercise 5: Doubly Linked List Implementation i) Implement a doubly linked list and perform insertion and deletion operations	CO1,CO2,CO3, CO4,CO5
6.	Exercise 6: Stack Operations i) Implement a stack using arrays and linked lists. ii) Write a program to evaluate a postfix expression using a stack. iii) Implement a program to check for balanced parentheses using a stack.	CO1,CO2,CO3, CO4,CO5
7.	Exercise 7: Queue Operations i) Implement a queue using arrays and linked lists. ii) Implement a circular queue and perform insertion and deletion operations.	CO1,CO2,CO3, CO4,CO5
8.	Exercise 8: Stack and Queue Applications i) Use a stack to evaluate an infix expression and convert it to postfix. ii) Create a program to determine whether a given string is a palindrome or not.	CO1,CO2,CO3, CO4,CO5
9.	Exercise 9: Binary Search Tree i) Implementing a BST using Linked List. ii) Traversing of BST.	CO1,CO2,CO3, CO4,CO5
10.	Exercise 10: Hashing i) Implement a hash table with collision resolution techniques.	CO1,CO2,CO3, CO4,CO5

Learning Resources
<p>Text Books</p> <ol style="list-style-type: none"> 1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson. 2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI. 3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications. 4. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008
<p>References</p> <ol style="list-style-type: none"> 1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders 2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft 3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum 4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein 5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.
<p>e-Resources & other digital material</p> <ol style="list-style-type: none"> 1. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html 2. http://www.algomatic.com/algorithm/single-linked-list-insert-delete 3. http://www.algomatic.com/algorithm/binary-tree-insert-delete-display 4. https://www.youtube.com/watch?v=AfYqN3fGapc 5. https://www.youtube.com/watch?v=7vw2iIdqHIM 6. http://littlesvr.ca/dsa-html5-animations/sorting.php

HEALTH AND WELLNESS, YOGA AND SPORTS**(Common to CE,ME,IT,CSE-AIML,CSE-DS)**

Course Code	23MC1242	Year	I	Semester	II
Course Category	MC	Branch	CSE(DS)	Course Type	Practical
Credits	0.5	L-T-P	0-0-1	Prerequisites	Nil
Continuous Internal Evaluation:	100	Semester End Evaluation:	--	Total Marks:	100

Course Outcomes

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

CO1	Outline the importance of yoga and sports for Physical fitness and sound health.(L2)
CO2	Make use of various activities that help to enhance their health.(L3)
CO3	Develop Positive Personality for individual and group work.(L3)
CO4	Categorize the health-related fitness components.(L4)
CO5	Analyze the current personal fitness levels.(L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

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

UNIT NO	Contents	Mapped COS
I	<p>Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups.</p> <p>Activities:</p> <ul style="list-style-type: none"> i) Organizing health awareness programmes in community ii) Preparation of health profile iii) Preparation of chart for balance diet for all age groups 	CO1, CO2, CO5
II	<p>Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.</p> <p>Activities:</p> <p>Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar</p>	CO1, CO3, CO4, CO5

III	<p>Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.</p> <p>Activities:</p> <ul style="list-style-type: none"> i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running. 	CO1, CO4, CO5
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Learning Recourses

Text Books

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993

Reference Books

1. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
2. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, Inc. 2014