ACADEMIC REGULATIONS COURSE STRUCTURE

AND

DETAILED SYLLABUS

DEPARTMENT

OF

CIVIL ENGINEERING

(Applicable for batches admitted from 2023-2024)

VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY
(Autonomous)
Approved by AICTE, Permanently Affiliated to JNTUK,

NAAC Accredited with 'A' Grade, ISO 9001:2015 Certified

Nambur (V), Pedakakani (M), Guntur (Dt.), Andhra Pradesh – 522 508

ACADEMIC REGULATIONS (R23) FOR B. TECH
(REGULAR/HONORS/MINOR)
Applicable for the students of B. Tech. (Regular) from the Academic Year 2023-24 onwards

The B.Tech Degree of Jawaharlal Nehru Technological University Kakinada, Kakinada shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION

To impart quality education through exploration and experimentation and generate socially conscious engineers, embedding ethics and values, for the advancement in science and technology.

MISSION

➢ To educate students with a practical approach to dovetail them to industry-needs.

➢ To govern the institution with a proactive and professional management with passionate teaching faculty.

➢ To provide holistic and integrated education and achieve overall development of students by imparting scientific and technical, social and cognitive, managerial and organizational skills.

➢ To compete with the best and be the most preferred institution of the studious and the scholarly.

➢ To forge strong relationships and linkage with the industry.

OBJECTIVES

➢ Equip the institute with state-of-the-art infrastructure comparable to the best in the industry.

➢ Tap the resources of the best minds in the field as faculty and visiting faculty.

➢ Groom students to become global entrepreneurs and responsible citizens.

➢ Provide financial assistance to meritorious students.

➢ Requisition the services of the best HR managers to place our students in reputed industries.

➢ Provide conducive atmosphere to the faculty for Research & Development and ensure active participation of the students.

About CIV Department

➢ In past years, civil engineers focused on design and construction of new facilities, such as buildings, bridges and highways, water treatment and environmental facilities, foundations and tunnels. Today's civil engineer not only has to design new facilities but must also analyze the effects of deterioration on infrastructure elements, consider system interdependencies and evaluate life-cycle impacts while also considering environmental and economic sustainability within the context of society. Civil engineers must be equipped with in-depth knowledge of traditional, fundamental principals and new technologies in order to address the complex, interdisciplinary problems faced within society. The undergraduate program at VVIT gives the students the necessary background to success within this new context and to become the future leaders of the profession.

Department Vision

➢ To provide globally competitive and socially responsible Civil Engineering professionals, who can contribute to the organization and nation-building through their innovative ideas and to create knowledge pool of Civil Engineering through quality research.

Department Mission

➢ To develop and implement qualitative teaching and learning practices to impart quality education to the students to dovetail them to industry needs

➢ To develop engineers with good scientific and engineering knowledge so as to comprehend, analyze, design and apply knowledge to the fast-changing needs in the field of Civil Engineering.

➢ To provide hands-on experience and knowledge to the students to make them engineers of excellence.

➤ To promote innovative and original thinking in the minds of budding engineers to face the Challenges of future by shaping the department into a center of academic and research excellence.

➤ To inculcate the value of discipline and encourage the student to become a responsible and worthy citizen of the nation.

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

A student will be declared eligible for the award of the B.Tech. 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 fulfill 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 offered during the summer on a fast-track mode to enable students to do additional courses or complete backlogs in coursework.

iv) The Universities/HEIs can decide on the courses to be offered in the summer term depending on the availability of faculty and the number of students.

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 Core Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences, and management courses
2.	Core Courses	Professional Core Courses (PC)	Includes subjects related to the 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	Project	B.Tech. Project or Major Project

	&Internships	Internships	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. The total duration of the B. Tech (Regular) Programme is four academic years.

ii. Each academic year of study is divided into two semesters.

iii. The minimum number of instruction days in each semester is 90 days.

iv. There shall be a mandatory student induction program for freshers, with a three-week duration before the commencement of the 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 is 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 the **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.   An undergraduate degree with **Honors** is introduced for the students having good academic record.

xvi.   Each department 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 department 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 **must secure** not less than **35% of marks** in the **end**

examination and a **minimum of 40% of marks** in the **sum of the mid semester and end examination marks** taken together for the theory, practical, design, drawing subject or project etc. In the case of a mandatory course, he/she should secure 40% of mid semester marks.

THEORY COUSES

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

i) For the theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

ii) For practical subjects, the distribution shall be 30 marks for the Internal Evaluation and 70 marks for the End Examination.

iii) If any subject has both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given the 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 a semester, there shall be two mid-term examinations. The first midterm examination shall be conducted for the first two and half units of syllabus and the second midterm examination shall be conducted for the rest of the syllabus. Each **mid-term examination consists** of (i) one **online objective** examination (ii) one **descriptive** examination (iii) one **assignment** and (iv) one **Subject Seminar**.

The **online examination** (objective) shall be **10 marks** with duration of **20 minutes**, **descriptive examination** shall be for **10 marks** with a duration of **1 hour 30 minutes**, **assignment** test shall be **5 marks** with duration of **50 minutes** (Open book system with questions of L4 standard on Bloom's scale) and **Subject Seminar 5 marks**.

ii) The first **online** examination (objective) is set with **20 multiple choice questions for 10 marks** (20 questions x 1/2 marks) from first two and half units (50% of the syllabus).

iii) The first **descriptive examination** is set with **30 marks** (two questions for 12 marks and one question for 6 marks) with either or choice from first two and half units (50% of the syllabus), the student must answer all questions. The marks obtained in the subjective

paper are condensed to 10 marks.

iv) The first **assignment Test** from first two and half units conducted for **20 Marks** and will be **scaled down to 5 Marks**. The test is an **open book** system, and the duration of the exam is **50 minutes**. Students can bring a maximum of three printed text books related to that subject. (Soft copies of the text books will not be allowed.) The assignments must provide broadened exposure to the course. The questions shall include problem solving approach, problem analysis & design, implementation, case studies etc.

v) For the first subject **seminar 5 marks**, each student shall be evaluated based on the presentation on any topic of his/her choice in the subject duly approved by the faculty member concerned.

In the **similar lines**, the **second mid** examinations shall be conducted on the rest of the syllabus. Any fraction in the total of mid marks shall be rounded off to the next higher mark.

vi) 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	: (25x0.8) + (20x0.2) = 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	: (0x0.2) + (25x0.8) = 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 1** shall contain **10 compulsory short answer questions** (2 short questions from each unit) for a total of **20 marks** such that **each question** carries **2 marks**.

iii) In each of the questions from **2 to 6**, there shall be **either/or type** questions of **10 marks each**. Students shall answer any one of them.

iv) The questions from **2 to 6** shall be set by covering one unit of the syllabus for each question.

Note: End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical &Electronics Engineering shall have the following pattern: **Question 1** shall contain **10 compulsory short answer questions** (Fist five Questions from first two and half units and last five questions from remaining syllabus). The questions numbers **2, 3, 4(a)** shall be set by covering from first two and half units and questions numbers **4(b), 5, 6** in the remaining syllabus.

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 internal marks** and the 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 regularity/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**.

d) For the subject having **design and/or drawing/graphics**, 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 first mid exam is set with **30 marks** (two questions for 12 marks and one question for 6 marks) with either or choice from first two and half units (50% of the syllabus), the student must answer all questions. The marks obtained in the subjective paper are condensed to 15 marks. The **second mid** examinations shall be conducted on the rest of the syllabus. Any fraction in the total of mid marks shall be rounded off to the next higher mark. Finalized 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.

There shall be no objective paper in the mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final internal marks for the subject.

Note: 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**. **Internal examination** shall be evaluated **30 marks** in **each part**. F**inal Internal marks** shall be arrived by considering the **average of marks obtained in two parts**.

The **end examination pattern for design and/or drawing/graphics** shall consist 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 a

minimum of **40%** 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 departments** as per the norms and shall be produced to the various committees 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**.

g) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 internal 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.

iii) 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.

iv) The student shall be given an option to choose either the skill courses being offered by the department 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 department

to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

v) 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 Head of the department.

11. Massive Open Online Courses (MOOCs)

A Student must pursue and complete **one course compulsorily** through MOOCs approved by the concerned department. 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**. The **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 college**.

Necessary amendments to the **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 **college 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 departments** and it is **mandatory** for the student to share **necessary information** with the **department**.

iii) The **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 **department shall notify** at the **beginning of semester** the **list** of the online learning courses **eligible for credit transfer**.

vi) The department 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 department shall ensure **no overlap of MOOC exams** with that of the **college examination schedule**. In case of **delay in results**, the college will **re-issue** the **marks sheet** for **such students**.

viii) Students **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**:

➢ List of students **who have passed MOOC** courses in the **current semester** along with the **certificate of completion**.

➢ **Undertaking form** filled in 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 institution 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 a **minimum of 40%** of marks for successful completion. In case a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the institution.

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 a project report on the work carried out during the internship.

The **project report** shall be **evaluated** by an **external examiner**. The total marks for project work are **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 an **internal examiner and external examiner** appointed by the University and is evaluated for **140 marks**.

The department 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 a 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 **04 Open Electives** are offered in the curriculum.

A student can complete the requirement for Minor within the 160 credits 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 additional specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is the best choice for academically excellent students having a 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 an 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 Principal of the department shall arrange separate class work and timetable of the courses offered under Honors program.

v) Courses that are used to fulfil 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 students 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 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 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 for 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 students pursuing the Honors.

iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from the 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 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) 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.

iv) 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.

v) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

vi) 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.

vii) 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 17.

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 a 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	S (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.,

$SGPA = \Sigma (C_i \times G_i)/\Sigma C_i$

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

$CGPA = \Sigma (C_i \times S_i)/ \Sigma C_i$

where "S_i" is the SGPA of the ith 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 to be secured
First Class with distinction*	≥ 7.75 (Without any supplementary appearance)
First Class	≥ 7.75 (With any supplementary appearance) (or) ≥ 6.75 and < 7.75

Second Class	≥5.75 and <6.75
Pass Class	≥5 and <5.75
Fail	<5

***Note:** Students who have written supplementary examinations to fulfil the credit requirement will not be awarded First Class with Distinction. For such students the highest degree that is awarded will be First Class Only.

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 HoD of the respective department shall forward such proposals submitted by the students to the Principal. An evaluation committee constituted by the Principal 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 fulfilment 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. General Instructions:

a. The academic regulations should be read as a whole for purpose of any interpretation.

b. Malpractices rules-nature and punishments are appended.

c. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

d. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

e. The Universities may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Universities.

f. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Vice-Chancellor / Head of the institution is final.

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ACADEMIC REGULATIONS (R23)
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 th 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**

  A student will be declared eligible for the award of the B.Tech. 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 fulfil the requirement for the award of the degree within <u>six</u> 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 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 fulfilment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

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

* * * *

MALPRACTICE RULES
DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

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

		the examination (including practical 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.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other

	around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including

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

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

⇒ Ragging within or outside any educational institution is prohibited.

⇒ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	10 Months	+	Rs. 50,000/-

In case any emergency call Toll Free No. 1800 425 1288

LET US MAKE VVIT A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY
NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

In case any emergency call Toll Free No. 1800 425 1288

LET US MAKE VVIT A RAGGING FREE CAMPUS

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FIRST YEAR
COURSE STRUCTURE AND SYLLABUS

B.TECH. - COURSE STRUCTURE – R23
(Applicable from the academic year 2023-24 onwards)

INDUCTION PROGRAMME

S.No.	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to all branches career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch corresponding labs, tools, and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

I B.TECH - I SEMESTER

SN	Course Code	Subjects	L/D	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS&H	Engineering Physics	3	0	0	3
3	BS&H	Linear Algebra & Calculus	3	0	0	3
4	ES	Basic Civil & Mechanical Engineering	3	0	0	3
5	ES	Introduction to Programming	3	0	0	3
6	BS&H	Communicative English Lab	0	0	2	1
7	BS&H	Engineering Physics Lab	0	0	2	1
8	ES	Engineering Workshop	0	0	3	1.5
9	ES	Computer Programming Lab	0	0	3	1.5
10	BS&H	Health and wellness, Yoga, and sports	0	0	1	0.5
11	LS	Life Skills-I	2	0	0	0
		Total Credits				**19.5**

I B.TECH - II SEMESTER

SN	Course Code	Subjects	L/D	T	P	Credits
1	BS&H	Engineering Chemistry	3	0	0	3
2	BS&H	Differential Equations & Vector Calculus	3	0	0	3
3	ES	Basic Electrical and Electronics Engineering	3	0	0	3
4	ES	Engineering Graphics	1	0	4	3
5	ES	IT Workshop	0	0	2	1
6	PC	Engineering Mechanics	3	0	0	3
7	BS&H	Engineering Chemistry Lab	0	0	2	1
8	ES	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	PC	Engineering Mechanics & Building Practices Lab	0	0	3	1.5
10	BS&H	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
11	LS	Life Skills-II	2	0	0	0
		Total Credits				**20.5**

B.Tech II YEAR I SEMESTER

S.No.	Category	Title	L	T	P	Credits
1	BS	Numerical Techniques And Statistical Methods	3	0	0	3
2	HSMC	Universal human values – understanding harmony and Ethical human conduct	2	1	0	3
3	Engineering Science	Surveying	3	0	0	3
4	Professional Core	Strength of Materials	3	0	0	3
5	Professional Core	Fluid Mechanics	3	0	0	3
6	Professional Core	Surveying Lab	0	0	3	1.5
7	Professional Core	Strength of Materials Lab	0	0	3	1.5
8	Skill Enhancement Course	Building Planning and Drawing	0	1	2	2
Total			**14**	**2**	**8**	**20**
9	Audit Course	Environmental Science	2	0	0	-

B.Tech II YEAR II SEMESTER

S.No.	Category	Title	L	T	P	Credits
1	Management Course-I	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science / Basic Science	Engineering Geology	3	0	0	3
3	Professional Core	Concrete Technology	3	0	0	3
4	Professional Core	Structural Analysis	3	0	0	3
5	Professional Core	Hydraulics &Hydraulic Machinery	3	0	0	3
6	Professional Core	Concrete Technology Lab	0	0	3	1.5
7	Professional Core	Engineering Geology lab	0	0	3	1.5
8	Skill Enhancement course	Remote Sensing &Geographical Information Systems	0	1	2	2
9	Engineering Science	Design Thinking & Innovation	1	0	2	2
Total			**15**	**1**	**10**	**21**
10	Mandatory course	Building materials and Construction	3	0	0	-
Mandatory Community Service Project Internship of 08 weeks' duration during summer vacation						

I B.TECH	**COMMUNICATIVE ENGLISH**	L	T	P	C
I SEMESTER		2	0	0	2

Course Objectives:

➢ To facilitate effective listening, speaking, reading, and writing skills among the students.

➢ To enhance the LSRW skills in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.

➢ To help the students to make them effective in speaking and writing skills and to make them industry ready.

Course Outcomes

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

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues.

CO2: Apply grammatical structures to formulate sentences and correct word forms.

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.

CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.

CO5: Create a coherent paragraph, essay, and resume.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi (Short Story)

Lesson: "How to Fashion Your Own Brand of Success" by Howard Whitman

Listening: Identifying the topic, the context, and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies, and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II

Lesson:	**NATURE: The Brook by Alfred Tennyson (Poem)**
Lesson:	**"How to Conquer the Ten Most Common Causes of Failure" by Louis Binstock**
Listening:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary:	Homonyms, Homophones, Homographs.

UNIT III

Lesson:	**BIOGRAPHY: Elon Musk**
Lesson:	**"How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz**
Listening:	Listening for global comprehension and summarizing what is listened to.
Speaking:	Discussing specific topics in pairs or small groups and reporting what is discussed
Reading:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing:	Summarizing, Note-making, paraphrasing
Grammar:	Verbs - tenses; subject-verb agreement; Compound words, Collocations
Vocabulary:	Compound words, Collocations

UNIT IV

Lesson:	**INSPIRATION: The Toys of Peace by Saki**
Lesson:	**"How to Raise Your Self-Esteem and Develop Self-confidence" by James W Newman**
Listening:	Making predictions while listening to conversations/transactional dialogues without video; listening with video.
Speaking:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading:	Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes, or display complicated data.
Writing:	Letter Writing: Official Letters, Resumes

Grammar: Reporting Verbs, Direct & Indirect Speech, Active & Passive Voice

Vocabulary: Words often Confused, Jargons

UNIT V
Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Lesson: "How to Eliminate Your Bad Habits" by Benjamin Franklin

Listening: Identifying key terms, understanding concepts and answering a series ofrelevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

Text Books
1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan 2023 (Units 1, 2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)
3. University of Success: OG Mandino Jaico Impression 2019 (5 Selected Lessons)

Reference Books:
1. Dubey, Sham Ji & 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 Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web 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

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I B.TECH	ENGINEERING PHYSICS	L	T	P	C
I SEMESTER		3	0	0	3

Course Objectives:

➢ To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.

CO2: Familiarize with the basics of crystals and their structures.

CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.

CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials.

CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids.

CO6: Identify the type of semiconductor using Hall effect.

UNIT-I: WAVE OPTICS

Interference: Introduction – principle of superposition – interference of light – interference in thin films (Reflection geometry) & applications – colours in thin films – Newton's Rings, determination of wavelength and refractive index.

Diffraction: Introduction – Fresnel and Fraunhofer diffractions – Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction grating - Dispersive power and resolving power of grating (Qualitative)

Polarization: Introduction -Types of polarization -Polarization by reflection, refraction, and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT-II: CRYSTALLOGRAPHY AND X-RAY DIFFRACTION

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.

X-ray diffraction: Bragg's law-X-ray Diffractometer–crystal structure determination by Laue's and powder methods

UNIT-III: DIELECTRIC AND MAGNETIC MATERIALS

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's equation – complex dielectric constant – frequency dependence of polarization–dielectric loss.

Magnetic Materials: Introduction – magnetic dipole moment – magnetization – magnetic susceptibility and permeability – atomic origin of magnetism – classification of magnetic materials: Dia, para, ferro, anti-ferro & ferrimagnetic materials – domain concept for ferromagnetism & domain walls (Qualitative) – hysteresis – soft and hard magnetic materials.

UNIT – IV: QUANTUM MECHANICS AND FREE ELECTRON THEORY

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.

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.

UNIT – V: SEMICONDUCTORS

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.

TEXT BOOKS

1. "Applied Physics" by T. Vijaya Krishna, T. Madhu Mohan, B. K. Pandey, Manoj K. Harbola, S. Chaturvedi - Cengage, 2020.

2. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.

3. Engineering Physics -D. K. Bhattacharya and Poonam Tandon, Oxford press(2015)

REFERENCE BOOKS

1. Engineering Physics –Shatendra Sharma, Jyotsna Sharma, Pears on Education, 2018.
2. Engineering Physics"-Sanjay D.Jain, D.Sahasrabudhe and Girish, University Press.2010
3. Engineering Physics -M. R. Srinivasan, New Age international publishers (2009).
4. Fundamentals of Physics- Halliday, Resnick and Walker, Wiley (2006).
5. Physics for Scientists & Engineers, Serway and Jewett, Cengage (2019).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

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I B.TECH	LINEAR ALGEBRA AND CALCULUS	L	T	P	C
I/II SEMESTER	(ALL BRANCHES)	3	0	0	3

Course Objectives:

➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. (L6)

CO2: Determine the eigenvalues and eigenvectors of a matrix or a linear transformation and using them to diagonalize a matrix. (L5)

CO3: Utilize mean value theorems to real life problems. (L3)

CO4: Familiarize with functions of several variables which is useful in optimization. (L3)

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. (L3)

UNIT-I: MATRICES

Rank of a matrix by Echelon form and 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 - Gauss elimination method, Jacobi and Gauss-Seidel iteration methods.

UNIT-II: EIGENVALUES, EIGENVECTORS AND ORTHOGONAL TRANSFORMATION

Eigenvalues, Eigenvectors, and their properties - Diagonalization of a matrix - Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem - Quadratic form and nature of a quadratic form - Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT-III: CALCULUS

Mean Value Theorems (without proofs): Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation - Cauchy's mean value

theorem - Taylor's and Maclaurin's theorems with remainders - Problems and applications on the above theorems.

UNIT-IV: PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE 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's multipliers.

UNIT-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).

Textbooks:

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, Micheael Greenberg, Pearson publishers, 9th edition. Higher Engineering Mathematics, H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021).

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I B.TECH	BASIC CIVIL AND MECHANICAL	L	T	P	C
I SEMESTER	ENGINEERING	3	1	0	3

BASIC CIVIL ENGINEERING

Course Objectives:

➢ Get familiarized with the scope and importance of Civil Engineering sub-divisions and introduction to basic civil engineering materials and construction techniques.

➢ Introduce the preliminary concepts of surveying.

➢ Acquire preliminary knowledge on Transportation and its importance in nation's economy.

➢ Get familiarized with the importance of quality, conveyance, and storage of water.

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 and understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles, and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation and importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

UNIT I
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.

UNIT – II
SURVEYING: Objectives of Surveying- Horizontal Measurements- Angular Measurements-Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings - Contour mapping.

UNIT - IIIA

TRANSPORTATION ENGINEERING: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbor, 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).

Text Books

1. M. S. Palanichamy, Basic Civil Engineering, McGraw Hill Education, 4th edition, 2017
2. S. S. Bhavikatti, Basic Civil Engineering, New Age International, 2010
3. Srikrishna A. Dhale and Kiran M. Tajne, Basics of Civil Engineering, 2014.

Reference Books:

1. G. Shanmugam and M. S. Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education, 2018.
2. S. Gopi, Basic Civil Engineering, Pearson, 2018
3. Introduction to Civil Engineering, Course Material, IIT Madras.

BASIC MECHANICAL ENGINEERING

Course objectives:

➢ Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
➢ Explain different engineering materials and different manufacturing processes.
➢ Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

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

CO4: Understand the different manufacturing processes **{Understand level, KL2}**

CO5: Demonstrate the working of different mechanical power transmission systems and Basics of robotics. **{Understand level, KL2}**

CO6: Understand the working principles of Various power plants **{Understand level, KL2}**

UNIT-IIIB

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.

ENGINEERING MATERIALS: Classification of Engineering materials &Their applications: Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials. Definition of Strength, Hardness, Ductility and Toughness

UNIT-IV

MANUFACTURING PROCESSES: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

MECHANICAL POWER TRANSMISSION: Belt Drives, Chain, Rope drives, Gear Drives and their applications.

INTRODUCTION TO ROBOTICS: Joints & links, configurations, and applications of robotics

UNIT-V

POWER PLANTS: working principle of Steam, Diesel, Hydro, Nuclear power plants.

THERMAL ENGINEERING: working principle of Boilers (Cochran boiler, Babcock and Wilcox boiler, La Mont boiler), Refrigeration cycle (Ideal Vapour Compression refrigeration cycle) and air-conditioning system (Summer air-conditioning system), IC engines, Otto cycle, Diesel cycle, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Textbooks

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.

2. A Tear 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. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications

3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.

4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

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I B.TECH	INTRODUCTION TO PROGRAMMING COMMON TO ALL BRANCHES	L	T	P	C
I SEMESTER		3	0	0	3

Course Objectives:

➢ To introduce students to the fundamentals of computer programming.
➢ To provide hands-on experience with coding and debugging.
➢ To foster logical thinking and problem-solving skills using programming.
➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
➢ To encourage collaborative learning and teamwork in coding projects.

Course Outcomes: A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.
CO2: Analyze a problem and develop an algorithm to solve it.
CO3: Implement various algorithms using the C programming language.
CO4: Understand more advanced features of C language.
CO5: Develop problem-solving skills and the ability to debug and optimize the code.

UNIT I INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING

Introduction: History of Computers, Basic organization of a computer: ALU, input-output units, memory.
Problem solving techniques: Algorithmic approach, characteristics of algorithm, Algorithms, flowcharts (Using Dia Tool).
Introduction to Programming: Languages & types, Basics of a Computer Program- basic structure of a C program, C Tokens – Literals, Primitive Data Types, Keywords, operators, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

UNIT II CONTROL STRUCTURES

Decision making: Simple sequential programs Conditional Statements (if, if-else, switch),
Iterative Statements: Loop - for, while, do-while, unconditional branching - break and continue.

UNIT III ARRAYS AND STRINGS

Arrays: indexing, memory model, programs with array of integers, two dimensional arrays
Strings: Introduction to Strings.

UNIT IV POINTERS & USER DEFINED DATA TYPES

Pointers: dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, Dynamic memory management.
User-defined data types: Structures and Unions.

UNIT V Functions & File Handling

Functions: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables,
File Handling: Basics of File Handling

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.

2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition

3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

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I B.TECH	COMPUTER PROGRAMMING LAB	L	T	P	C
I SEMESTER	COMMON TO ALL BRANCHES	0	0	3	1.5

Course Objectives:

➢ The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

UNIT I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

   i)   Basic Linux environment and its editors like Vi, Vim & Emacs etc.

   ii)   Exposure to Turbo C, gcc

   iii) Writing simple programs using printf(), scanf()

WEEK 2

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.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

   i)   Sum and average of 3 numbers

   ii)   Conversion of Fahrenheit to Celsius and vice versa

   iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

  i) Finding the square root of a given number

  ii) Finding compound interest

  iii) Area of a triangle using heron's formulae

  iv) Distance travelled by an object

WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

  i) Evaluate the following expressions.

     a. A+B*C+(D*E) + F*G
     b. A/B*C-B+A*D/3
     c. A+++B---A
     d. J= (i++) + (++i)

  ii) Find the maximum of three numbers using conditional operator

  iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

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".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

 i) Write a C program to find the max and min of four numbers using if-else.

 ii) Write a C program to generate electricity bill.

 iii) Find the roots of the quadratic equation.

 iv) Write a C program to simulate a calculator using switch case.

 v) Write a C program to find the given year is a leap year or not.

WEEK 6

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.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

 i) Find the factorial of given number using any loop.

 ii) Find the given number is a prime or not.

 iii) Compute sine and cos series

 iv) Checking a number palindrome

 v) Construct a pyramid of numbers

WEEK 7:

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.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

 i) Find the min and max of a 1-D integer array.

 ii) Perform linear search on1D array.

 iii) The reverse of a 1D integer array

 iv) Find 2's complement of the given binary number.

 v) Eliminate duplicate elements in an array.

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

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()

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.

  iv) Write a C program to copy one structure variable to another structure of the same type

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

Suggested Experiments/Activities:

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

WEEK 12:

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.

WEEK 13:

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

WEEK14:

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.

Textbooks:

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

I B.TECH	COMMUNICATIVE ENGLISH LAB	L	T	P	C
I SEMESTER		0	0	2	1

Course Objectives:
➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
➢ To train the students in basic communication skills and also make them ready to face job interviews.

Course Outcomes:
CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2: Apply communication skills through various language learning activities.
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.
CO5: Create effective career objectives.

List of Topics:
1. Vowels & Consonants

2. Neutralization/Accent Rules

3. Communication Skills & JAM

4. Role Play or Conversational Practice

5. E-mail Writing

6. Resume Writing, Cover Letter, SOP

7. Group Discussions-Methods & Practice

8. Debates - Methods & Practice

9. PPT Presentations/ Poster Presentation

10. Interview Skills

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*, (2nd Ed),Kindle, 2013

Web Resources:
Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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I B.TECH	ENGINEERING PHYSICS LAB	L	T	P	C
I SEMESTER		0	0	2	1

Course Objectives:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The students will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductor using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photo electric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.

13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

References

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

Web Resources:

➢ www.vlab.co.in

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

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I B.TECH	ENGINEERING WORKSHOP	L	T	P	C
I SEMESTER		0	0	3	1.5

Course objectives:

➢ To familiarize students with wood working, sheet metal operations, fitting and electricalhouse wiring skills

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

CO1: Identify workshop tools and their operational capabilities (KL1)

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, and welding (KL2)

CO3: Apply fitting operations in various applications (KL3)

CO4: Apply basic electrical engineering knowledge for House Wiring Practice (KL3)

List of Experiments:(Student has to complete Two experiments in each Trade)

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in woodworking and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridlejoint
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
4. **Fitting:** Familiarity with different types of tools used in fitting and do the followingfitting exercises.
   a) V-fit
   b) Dovetail fit.
   c) Semi-circular fit
   d) Bicycle tire puncture and change oftwo-wheeler tyre

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
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

Textbooks:

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

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I B.TECH	HEALTH AND WELLNESS, YOGA AND SPORTS	L	T	P	C
I SEMESTER		0	0	1	0.5

Course Objectives

➢ The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

Course Outcomes: After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality

UNIT I

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.

Activities:
i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT II

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.

Activities:
Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:
   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.

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

General Guidelines:
1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

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I B.TECH	LIFE SKILLS-I	L	T	P	C
I SEMESTER		2	0	0	0

Course Outcomes: After completion of the course the student will be able to

CO 1: To convert difficult data into equations and find solution by various methods and means using Algebra.

CO 2: Application of Number system usage in daily life.

CO 3: Enhance the logical abilities on various series and analogies (number, letter and verbal).

CO 4: Implementing logical classification, coding and decoding (number, letter and verbal).

CO 5: Understand importance of effective communication ski, usage of contextual vocabulary

CO 6: Understand the importance of grammar for effective communication.

The Life Skills course is divided into three components – Part-A. Quantitative Ability, Part-B. Reasoning Ability and Part-C. Verbal Ability.

Part-A: Quantitative Ability: Almost all competitive examinations test the candidate for quantitative aptitude, especially recruitment test, public service examinations management courses, where they evaluate the student's thinking prowess and analytical skills. Critical analysis of problems asked in examination reveal that they are designed to correlate multiple topics and the test taker is expected to identify those link points and come out with an out-of-box unique solution. The purpose of the test is to assess arithmetic abilities, logic, analysis, problem solving and decision-making skills.

Part-B: Reasoning Ability: Reasoning ability is the ability to draw connections between factors, and the ability to synthesize a message from a body of information. Reasoning ability of the aspirants for jobs or courses is tested by means of a verbal reasoning test non-verbal reasoning. Thus, reasoning is a highly specialized thinking which helps an individual to explore mentally the cause & effect relationship of an event or solution of a problem by adopting some well-organized systematic steps based on previous experience combined with present observation. Most of the recruitment tests consist of questions to assess the reasoning ability of the students.

Part-C: Verbal Ability: The dramatic changes in global economies have been matched with the transformation in technology and these have an impact on education as well the workplace. Life skills provide students with important skills such as independent thinking, social skills, situational

awareness, and communication skills needed in the campus and future workplaces. They equip the student with the requisite tools for all round development, and the requisite non-academic skills to enrich their lives.

Part-A: Quantitative Ability

Unit-1: Module 1: Linear equation or simple equation and Algebraic equation

Module 2: Number System – Prime Factorization, divisibility of a factorial number, number of zeroes, unit digit and remainders, Examples, and practice problems.

Unit-2: Module 3: LCM AND HCF – Definitions of LCM and HCF, Methods of finding LCM and HCF using Prime Factorization method and Division Method, Examples, and practice problems.

Module 4: Ratio, proportion, and variation – Definition of Ratios and Proportions, Meaning of Ratios and Proportions, Properties of Ratios, Formulas, differences between Ratios and Proportions, Examples, and practice problems.

Part-B: Reasoning Ability

Unit-3: - Module 5: Series

Module 6: Analogy

Unit-4: - Module 7: Classification

Module 8: Coding and Decoding

Part-C: Verbal Ability

Unit-5: - Module 5: Functional English; Ad-lib/ impromptu speaking sessions; JAM sessions

Module 6: Writing paragraphs (describing a process, reporting an incident, explaining an experience); Summarizing TED talks; and Letter Writing

Unit-6: Module 7: Time management; Stress Management; and Emotional intelligence

Module 8: Interpersonal skills; Team dynamics; and Leadership development

Reference Books

1. Quantitative Aptitude for Competitive Examination by Dr R S Agarwal
2. Fast Track Objective Arithmetic Paperback – 2018 by Rajesh Verma
3. Teach Yourself Quantitative Aptitude, by Arun Sharma

4. The Pearson Guide to Quantitative Aptitude for Competitive Examination by Dinesh Khattar
5. Quantitative Aptitude for all Competitive Exam by Abhijit Gupta
6. Quantitative Aptitude Quantum CAT by Sarvesh K. Verma
7. How to Prepare for Data Interpretation by Arun Sharma
8. Logical Reasoning Data Interpretation by Nishit K. Sinha
9. Analytical Reasoning (2018-2019) Session by MK Panday
10. How to Crack Test of Reasoning by Jaikishan and Premkishan [Arihant]
11. Logical Reasoning and Data Interpretation for CAT & other MBA exams by K. Sinha Nishit [Pearson]
12. Reasoning for Competitive Exams by K. Sinha Nishit [Pearson]
13. How to Prepare for Logical Reasoning for CAT by Arun Sharma [McGraw Hill]
14. Shortcuts in Reasoning (Verbal, Non-Verbal, Analytical & Critical) for Competitive Exams by Disha Experts
15. Visual Intelligence for Beginners by Matthew Alcot
16. McCarthy, Michael& Felicity O'Dell. English Vocabulary in Use beginner, Cambridge University Press, 2017.
17. McCarthy, Michael & Felicity O'Dell. English Vocabulary in Use Upper-Intermediate, Cambridge University Press, 2017.
18. McCarthy, Michael & Felicity O'Dell. English Vocabulary in Use Advanced, Cambridge University Press, 2017.
19. Sonmez, John. Soft Skills: The Software Developer's Life, Manning Publications, 2014.
20. Tulgan, Bruce. Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young Talent, Pan Macmillan India, 2016.

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I B.TECH	ENGINEERING CHEMISTRY	L	T	P	C
II SEMESTER		3	0	0	3

Course Objectives:

- ➢ To familiarize engineering chemistry and its applications
- ➢ To impart the concept of soft and hard water, hard water softening methods, need of water purification and purification methods.
- ➢ To train the students on the principles& applications of electrochemistry, and how these principles are useful to understand the mechanism of corrosion & its prevention methods.
- ➢ To know the significance of polymers in household appliances and composites (FRP) in aerospace and automotive industries.
- ➢ To understand the essentiality of fuel technology, lubrication & significance of nanomaterials in modern era.

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

CO1: Understand the importance of water and its purification methods.

CO2: Demonstrate the basic principles of electrochemistry, significance of lithium-ion batteries & fuel cells, corrosion, and its prevention methods.

CO3: Explain the preparation, properties, and applications of thermoplastics & thermos settings, mechanism of conduction in polymer conductors & Significance of calorific value, refining of petroleum.

CO4: Distinguish between setting and hardening of cement.

CO5: Summarize the concepts of colloids, micelles, and nanomaterials.

UNIT I: WATER TECHNOLOGY

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles **–**Priming, foaming**,** scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT II: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes –electrochemical cell, Nernst equation, electrochemical series.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium-ion batteries- working principle of the batteries including cell reactions; Fuel Cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III: POLYMERS AND FUEL CHEMISTRY

Introduction to polymers, functionality of monomers, free radical mechanism of chain growth polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties, and

applications of poly styrene. PVC Nylon and Bakelite.

Elastomers – Preparation, properties, and applications of Buna- S, Buna -N, Thiokol rubbers.

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol, and biofuel-bio diesel.

UNIT IV: MODERN ENGINEERING MATERIALS

Composites-Fibre reinforced plastics (CFRP &GFRP), properties and Engineering applications.

Refractories- Classification, Properties of refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification, and Applications.

Building materials- Portland Cement, constituents, Setting and Hardening of cement.

UNIT V: SURFACE CHEMISTRY AND NANOMATERIALS

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids characterization of colloids (Braggs scattering method (no derivation)), preparation of nanometallic oxides by sol-gel method, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Langmuir), BET equation (no derivation) applications of colloids and nanomaterials.

Textbooks:
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. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to colloids and surface chemistry, Butterworth-Heineman, 1992.
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

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I B.TECH	DIFFERENTIAL EQUATIONS AND	L	T	P	C
II SEMESTER	VECTOR CALCULUS	3	0	0	3

Course Objectives:

➢ To enlighten the learners in the concept of differential equations and multivariable calculus.

➢ To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

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

CO1: Solve the differential equations related to various engineering fields. (L3)

CO2: Solve the second and higher order differential equations and its applications. (L3)

CO3: Identify solution methods for partial differential equations that model physical processes. (L3)

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. (L5)

CO5: Estimate the work done against a field, circulation and flux using vector calculus. (L5)

UNIT-I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST

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 - Electrical circuits.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER (CONSTANT COEFFICIENTS)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral - Wronskian, Method of variation of parameters - Simultaneous linear equations - Applications to L-C-R circuit problems and Simple harmonic motion.

UNIT-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.

UNIT-IV: Vector differentiation

Scalar and vector point functions - Vector operator del - Del applied to scalar point functions - Gradient, Directional derivative - Del applied to vector point functions - Divergence and Curl - Vector identities.

UNIT-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 - Gauss divergence theorem (without proof) and related problems.

Textbooks:

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.

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I B.TECH	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
II SEMESTER		3	0	0	3

Course Objectives

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

Course Outcomes

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

CO1: Remembering the basic electrical elements and different fundamental laws. **(Remember)**

CO2: Understand the construction and operation of AC and DC machines, measuring instruments. **(Remember, Understand)**

CO3: Understand the different power generation mechanisms, Electricity billing concept, important safety measures related to electrical operations & understand the basic operation of Semiconductor Devices **(Remember, Understand)**

CO4: Understand the operation of different electronics circuits. **(Remember, Understand)**

CO5: Understand the Boolean Algebra theorems, simplify and design logic circuits and elements of sequential logic circuits. **(Remember, Understand)**

UNIT 1: 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).

UNIT 2: 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. (Elementary Treatment only).

UNIT 3A: 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 "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. (Simple numerical problem)

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.

UNIT 3B: 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. (Elementary Treatment only)

UNIT 4: BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

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: Block diagram of an electronic instrumentation system. (Elementary Treatment only).

UNIT 5: 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)

Content Beyond the syllabus: Digital Multi-meters (Block diagram).

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, DhanpatRai& Co, 2013 .
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.
4. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

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. Bhatacharya, Person Publications, 2018, Second Edition.
5. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
6. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
7. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

e- Resources & other digital material
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

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I B.TECH	ENGINEERING GRAPHICS (First angle projection only)	L	T	P	C
II SEMESTER		1	0	4	3

Course objectives:

➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
➢ To impart knowledge on the projection of points and lines
➢ To improve the visualization skills for better understanding of plane surfaces and projection of solids
➢ To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
➢ To make the students understand the viewing perception of a solid object in Isometric and Orthographic projection.

Course Outcomes

1. Upon successful completion of the course, the student will be able to
2. **CO1:** Constructions of various engineering curves {**Apply level, KL3**}
3. **CO2:** Apply the principle of orthographic projection to points and lines {**Apply level, KL3**}
4. **CO3:** Understand and draw the projection of planes and solids inclined to both planes in first quadrant {**Understand level, KL2**}
5. **CO4:** Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications {**Apply level, KL3**}
6. **CO5:** Develop isometric drawings of simple objects reading the orthographic projections of those objects {**Analyze level, KL4**}

UNIT-I

INTRODUCTION: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

CURVES: construction of ellipse, parabola and hyperbola by general method **(Eccentricity method),** Cycloids, Involutes, Normal and tangent to Curves.

UNIT-II

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 Lines Inclined to both the reference planes, Midpoint problems.

UNIT-III

PROJECTIONS OF PLANES: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

PROJECTIONS OF SOLIDS: Types of solids: Polyhedra and Solids of revolution. 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 another plane.

UNIT-IV

SECTIONS OF SOLIDS: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in **simple position only.**

DEVELOPMENT OF SURFACES: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone in **simple position only.**

UNIT-V

CONVERSION OF VIEWS: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

COMPUTER GRAPHICS: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD **(Not for end examination).**

Learning Resources
Text books

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 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 AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.
4. AutoCAD 2018 Training Guide (English, Paperback, Sagar Linkan)

Websites
1 .https://www.autodesk.com.au/campaigns/autocad-tutorials
2. https://nptel.ac.in/courses/112104172

I B.TECH	IT WORKSHOP	L	T	P	C
II SEMESTER		0	0	2	1

Course Objectives:
- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:
CO1: Perform Hardware troubleshooting.
CO2: Understand Hardware components and inter dependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation.
CO5: Perform calculations using spreadsheets.

PC Hardware & Software Installation

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

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

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

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

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.

Internet & World Wide Web

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

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

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

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX 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.

Task 2: Using La TeX 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 La TeX and Word.

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

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

EXCEL

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

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

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

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

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

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

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT

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?"

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."

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?'"

Reference 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

3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition

4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)

5. LaTeX Companion, Leslie Lamport, PHI/Pearson.

6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition

7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

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I B.TECH	ENGINEERING MECHANICS	L	T	P	C
II SEMESTER		3	0	0	3

PRE-REQUISITES: Nil

Course objectives:

1. To get familiarized with different types of force systems.

2. To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.

3. To teach the basic principles of centroid and center of gravity.

4. To determine the moment of inertia foe different composite figures and bodies.

5. To understand the kinematics and kinetics of translational and rotational motion of particle and rigid bodies.

SYLLABUS

UNIT-I

Introduction to Engineering Mechanics: Basic Concepts. Scope and Applications **Systems of Forces:** Coplanar Concurrent Forces, Components in Space, Resultant, Moment of Force and its applications, Couples and Resultant of Force Systems in plane and space.

Equilibrium of Systems of Forces: Definition, Equations of Equilibrium, Equilibrium of Coplanar concurrent and parallel force Systems.

UNIT-II

Equations of Equilibrium for Spatial System of forces. Numerical examples on spatial system of forces using vector approach.

Friction: Introduction**,** coefficient of friction, Cone of Static friction. Application to simple systems, connected systems and Ladder Friction. Analysis of plane trusses by method of joints and method of sections

UNIT-III

Centroid: Centroids of simple figures (from basic principles), Centroids of Composite Figures. **Centre of Gravity:** Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

UNIT-IV

Area Moments of Inertia: Definition Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, **Products of Inertia**, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT-V

Rectilinear and Curvilinear motion of a particle: Kinematics of particle with constant & Variable acceleration in Linear and angular motion, Projectile motion. D'Alembert's Principle, Work Energy method and Impulse Momentum method. **Kinematics and Kinetics of rigid body:** Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

Learning Resources

Text books:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., McGraw Hill Education 2017. 5th Edition.

2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.

3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

4. Reddy Vijay Kumar K. and K. Suresh Kumar (2010), Singer's Engineering Mechanics.

Reference books

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill

    Education. 2017. First Edition.

2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI,

2002. 4th Edition.

3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L.G.Kraige., John Wiley, 2008. 6th Edition.

4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press,2014. Second Edition

5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc.,

   New Delhi, 2022, 14th Edition

Websites

1. http://nptel.ac.in/

2. http://mhrd.gov.in/e-contents

I B.TECH	**ENGINEERING CHEMISTRY LAB**	L	T	P	C
II SEMESTER		0	0	2	1

Course Objectives:
➢ To verify the fundamental concepts with experiments

Course Outcomes: At the end of the course, the students will be able to
CO1: Determine the cell constant and conductance of solutions.
CO2: Prepare advanced polymer materials.
CO3: Determine the physical properties like surface tension, adsorption, and viscosity. CO4: Estimate the Iron and Calcium in cement.
CO5: Calculate the hardness of water.

List of Experiments:
1. Determination of Strength of an acid in Pb-Acid battery.
2. Determination of Hardness of a groundwater sample.
3. Estimation of Ferrous Iron by Dichrometry.
4. Conductometric titration of strong acid vs. strong base.
5. pH metry/ pH metric titration of strong acid Vs strong base.
6. potentiometric titration of strong acid vs. strong base
7. Estimation of Dissolved Oxygen by Winkler's method.
8. Preparation of a polymer (Bakelite).
9. Determine the strength of given $KMnO_4$ by colorimetry.
10. Estimation of Calcium in port land Cement.
11. Preparation of nanomaterials by precipitation method.
12. Adsorption of acetic acid by charcoal.
13. Determination of percentage Moisture content in a coal sample.
14. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
15. Determination of Viscosity of lubricating oil by Redwood Viscometer 2.
16. Determination of Calorific value of gases by Junker's gas Calorimeter.
17. Estimation of Vitamin-C present in soft drink.

Note: A student can choose any 10 experiments from the above list

Reference:

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

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I B.TECH	ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP	L	T	P	C
II SEMESTER		0	0	2	1

Preamble: Electrical and Electronics Engineering Workshop Lab provides the essential facilities to the students to augment their concepts about the fundamentals of Electrical and Electronics Engineering.

➢ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
➢ To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

Course Objectives: The student should be able to

➢ To understand the Electrical circuit design concept, operation of Electrical Machines and Transformer,control the speed of three phase induction motors, measurement of resistance, power, and power factor.
➢ To apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments.
➢ To analyzethe various characteristics of electrical circuits, electrical machines and measuring instruments.
➢ To understand the usage of electronic measuring instruments.
➢ To Plot and discuss the characteristics of various electron devices.

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

CO1, Analyse the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. (L2)
CO2, Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments, calculations for the measurement of resistance, power and power factor. (L3)
CO3, Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.(L4)
CO4, Understand the usage of electronic measuring instruments.(L2)
CO5, Plot and discuss the characteristics of various electron devices.(L3)

LIST OF EXPERIMENTS
Any Ten of the following experiments are to be conducted:
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Calculation of Electrical Energy for Domestic Premises
7. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
8. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
9. Implementation of half wave and full wave rectifiers
10. Plot Input & Output characteristics of BJT in CE and CB configurations
11. Frequency response of CE amplifier.
12. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.

List of Additional Experiments: Any of the two experiments are to be conducted.
1. Measurement of Earth Resistance using Megger.
2. Simulation of RC coupled amplifier with the design supplied
3. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs
4. Measurement of parameters of choke coil.

Learning Resources
Text books
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.

Reference books:
1. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013.
2. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.
3. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill, 2009
4. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

e- Resources & other digital material
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

I B.TECH	ENGINEERING MECHANICS &	L	T	P	C
II SEMESTER	BUILDING PRACTICES LAB	0	0	3	1.5

Course Objectives: The students completing the course are expected to
➢ Verify the Law of Parallelogram of Forces and Lami's theorem.
➢ Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
➢ Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

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

CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.

CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.

CO3: Determine the Centre of gravity different configurations and

CO4: Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.

CO5: Exposure to safety practices in the construction industry.

Students have to perform any 10 of the following Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Pipes and Sanitary Fittings used in buildings.

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I B.TECH	NSS/NCC/SCOUTS &	L	T	P	C
II SEMESTER	GUIDES/COMMUNITY SERVICE	0	0	1	0.5

Course Objectives:

➢ The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

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

CO1: Understand the importance of discipline, character and service motto.

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.

CO3: Explore human relationships by analyzing social problems.

CO4: Determine to extend their help for the fellow beings and downtrodden people.

CO5: Develop leadership skills and civic responsibilities.

UNIT I: ORIENTATION

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II: NATURE & CARE ACTIVITIES

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) Organising 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.

UNIT III: Community Service Activities

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.

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. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
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.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

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I B.TECH	LIFE SKILLS-II	L	T	P	C
II SEMESTER		2	0	0	0

Course Outcomes: After completion of the course the student will be able to:

CO 1: Enhance application skills in Business Mathematics.

CO 2: Implementation of Mathematical skills in Business.

CO 3: To improve logical visualization and counting in series, analogies and classification (non-verbal reasoning).

CO 4: Implementation of arrangement in circular and row form in daily life.

CO 5: Appreciate the importance of job requisites and attaining them.

CO 6: Recognize the importance of goal setting and building of a ethical, and personal value system.

Part-A: Quantitative Ability

Unit-1: Module 1: PERCENTAGE - Formula of percentages, Finding percentages, percentage differences, changes in percentages, computing table of percentages, fraction to percentage and vice versa, Examples and practice problems.

Module 2: PROFIT and LOSS

Unit-2: - Module 3: DISCOUNT

Module 4: PARTNERSHIP

Part-B: Reasoning Ability

Unit-3: Module 5: Counting Figures

      Module 6: Non-Verbal Reasoning

Unit-4: - Module 7: Finding Missing Terms

Module 8: Arrangements

Part-C: Verbal Ability

Unit-5: - Module 9: Understanding professional communication; Contextual Usage of selected vocabulary; Contextual understanding of vocabulary in a paragraph.

Module 10: Parts of speech; Subject-verb agreement; Tenses

Unit-6: - Module 11: Introduction to employability /life skills; Career guidance; Personal grooming and projecting a positive self-image.

Module 12: Goal setting & Planning; Ethics, values & Attitude

Reference Books

1. Quantitative Aptitude for Competitive Examination by Dr R S Agarwal
2. Fast Track Objective Arithmetic Paperback – 2018 by Rajesh Verma

3.   Teach Yourself Quantitative Aptitude, by Arun Sharma
4.   The Pearson Guide to Quantitative Aptitude for Competitive Examination   by Dinesh Khattar
5.   Quantitative Aptitude for all Competitive Exam by Abhijit Gupta
6.   Quantitative Aptitude Quantum CAT by Sarvesh K. Verma
7.   Reasoning Ability for Competitive Examination by Dr R S Agarwal
8.   A Modern Approach to Logical Reasoning (2019-20 Session) by R.S. Aggarwal [S. Chand]
9.   How to Prepare for Logical Reasoning for CAT by Arun Sharma [McGraw Hill]
10. Multidimensional Reasoning by Mishra and Kumar Dr. Lal [Upkar's]
11. A Modern Approach to Verbal & Non-Verbal Reasoning (2019-20 Session) by R.S. Aggarwal [S. Chand]
12. A New Approach to Reasoning Verbal & Non-Verbal by B.S. Sijwali and Indu Sijwali [Arihant]
13. Analytical Reasoning (2018-2019) Session by MK Panday
14. How to Crack Test of Reasoning by Jaikishan and Premkishan [Arihant]
15. Logical Reasoning and Data Interpretation for CAT & other MBA exams by K. Sinha Nishit [Pearson]
16. Reasoning for Competitive Exams by K. Sinha Nishit [Pearson]
17. Shortcuts in Reasoning (Verbal, Non-Verbal, Analytical & Critical) for Competitive Exams by Disha Experts
18. Visual Intelligence for Beginners by Matthew Alcot
19. Logical Reasoning & Data Interpretation by Nishit K. Sinha
20. McCarthy, Michael& Felicity O'Dell. English Vocabulary in Use beginner, Cambridge University Press, 2017.
21. McCarthy, Michael & Felicity O'Dell. English Vocabulary in Use Upper-Intermediate, Cambridge University Press, 2017.
22. McCarthy, Michael & Felicity O'Dell. English Vocabulary in Use Advanced, Cambridge University Press, 2017.
23. Sonmez, John. Soft Skills: The Software Developer's Life, Manning Publications, 2014.
24. Tulgan, Bruce. Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young Talent, Pan Macmillan India, 2016

II B.TECH	NUMERICAL TECHNIQUES AND	L	T	P	C
I SEMESTER	STATISTICAL METHODS	3	0	0	3

Course Objectives:
- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration.
- To familiarize the students with the foundations of probability and statistical methods.
- To equip the students to solve application problems in their disciplines.

Course Outcomes:

1. Evaluate the approximate roots of polynomial and transcendental equations by different

    algorithms. Apply Newton's forward & backward interpolation and Lagrange's

    formulae for equal and unequal intervals (L3)

2. Apply numerical integral techniques to different Engineering problems. Apply different

    algorithms for approximating the solutions of ordinary differential equations with initial

    conditions to its analytical computations (L3)

3. Apply discrete and continuous probability distributions (L3)

4. Design the components of a classical hypothesis test (L6)

5. Infer the statistical inferential methods based on small and large sampling tests (L4)

UNIT – I: Iterative Methods:

Introduction – Solutions of algebraic and transcendental equations: Bisection method –

Secant method – Method of false position – Iteration method – Newton-Raphson method

(One variable and simultaneous Equations)

Interpolation: Newton's forward and backward formulae for interpolation – Interpolation

with unequal intervals – Lagrange's interpolation formula

UNIT – II: Numerical integration, Solution of ordinary differential equations with initial conditions:

Trapezoidal rule, Simpson's 1/3rd and 3/8th rule, Solution of initial value problems by

Taylor's series, Picard's method of successive approximations, Euler's method, Runge-

Kutta method (second and fourth order), Milne's Predictor and Corrector Method.

UNIT – III: Probability and Distributions:

Introduction of probability, Baye's theorem, Random variables, Discrete and Continuous random variables.

Distribution functions: Probability mass function, Probability density function and

Cumulative distribution functions, Mathematical Expectation and Variance, Binomial,

Poisson, Uniform and Normal distributions.

UNIT – IV: Sampling Theory:

Introduction of Population and Samples, Sampling distribution of Means and Variance

(definition only), Point and Interval estimations, Maximum error of estimate, Central limit theorem (without proof), Estimation using t- test.

UNIT – V: Tests of Hypothesis:

Introduction of Hypothesis, Null and Alternative Hypothesis, Type I and Type II errors,

Level of significance, One tail and two-tail tests , Test of significance for large samples and Small Samples: Single and difference means, Single and two proportions, Student's t- test, F-test, χ^2-test.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. Miller and Freund's, Probability and Statistics for Engineers,7/e, Pearson, 2008.

Reference Books:

1. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
2. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
3. Lawrence Turyn,Advanced Engineering Mathematics, CRC Press.

4. S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

5. Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.

II B.TECH	UNIVERSAL HUMAN VALUES - UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	L	T	P	C
I SEMESTER		2	1	0	3

Course Objectives:
- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:
- Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
- Identify one's self, and one's surroundings (family, society nature) (L1, L2)
- Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
- Relate human values with human relationship and human society. (L4)
- Justify the need for universal human values and harmonious existence (L5)
- Develop as socially and ecologically responsible engineers (L3, L6)

Course Topics
The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.
The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being
PS4 Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self
PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,*Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautifu*l - Cecile Andrews
7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – PanditSunderlal
   Rediscovering India - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self- exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other

students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1.   https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf

2.   https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf

3.   https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

4.   https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf

5.   https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf

6.   https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3- S2A%20Und%20Nature-Existence.pdf

7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf

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8.   https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-   values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385

https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

II B.TECH	SURVEYING	L	T	P	C
I SEMESTER		3	0	0	3

Course Objectives:

The objective of this course are to:

1. Know the principle and methods of surveying and measuring of horizontal and vertical- distances and angles
2. Identification of source of errors and rectification methods
3. Know surveying principles to determine areas and volumes
4. Setting out curves and use modern surveying equipment for accurate results
5. Know the basics of Photogrammetry Surveying

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Apply the principle and methods of surveying and measuring of horizontal and vertical- distances and angles	L2
CO 2	Identify the source of errors and rectification methods	L3
CO 3	Apply surveying principles to determine areas and volumes	L2
CO 4	Setting out curves and using modern surveying equipments	L3
CO 5	Apply the basics of Photogrammetry Surveying in field	L4

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying. Surveying accessories. Introduction to Compass, leveling and Plane table surveying, scale of a map, Representation of scale, Errors due to use of wrong scale, Shrunk scale.

Linear distances- Approximate methods, Direct Methods- Instruments for chaining and Taping, Chains- Tapes, ranging, Tape corrections, Errors due to incorrect chain.

Prismatic Compass- Types of Meridians, Bearings, included angles, Local Attraction, Magnetic Declination, and dip, Designation of Bearings - W.C.B and Q.B System.

UNIT - II

Leveling- Types of levels, methods of levelling, and Determination of

levels, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, methods of contour surveying.
Areas - Determination of areas consisting of irregular boundary and regular boundary. **Volumes -**Determination of volume of earth work in cutting and embankments for level section, capacity of reservoirs.

UNIT - III
Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT – IV

Tacheometric Surveying: Introduction, Basic Systems of Tacheometric Measurement (Fixed hair, Movable hair & Tangential System).

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves.
Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDARSurvey(Light Detection And Ranging).

UNIT - V
Photogrammetry Surveying:
Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments, mosaics, map substitutes.

Text Books:
1. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.
2. Textbook of Surveying by C Venkatramaiah , Universities Press 1st Edition, 2011.

Reference Books:
1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying‖ by Chandra A M, New age Internation1al

II B.TECH I SEMESTER	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3

Course Learning Objectives:

1. To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress
2. To impart concepts of shear force and bending moment on various types of beams and loading conditions
3. To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
4. To the concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
5. To impart concepts of torsion and governing torque equation, the power transmitted by shafts, to classify columns and calculation of load carrying capacity using different empirical formulas.

Course Outcomes:

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

CO	Statement	Blooms level
CO 1	To understand the basic materials behavior under the influence of different external loading conditions and the support conditions.	L2
CO 2	To draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members.	L3
CO 3	To acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams	L2
CO 4	To analyze the deflections due to various loading conditions.	L3
CO 5	To assess the stresses in columns by various theories and the maximum torque , power transmitted by circular shafts	L4

UNIT — I:

Simple Stresses and Strains: Elasticity and plasticity - Types of stresses and strains - Hooke's law - Factor of safety, Poisson's ratio - Relationship between Elastic constants - Bars of varying section - stresses in composite bars.

Strain energy-− Resilience – Gradual, sudden and impact loadings – simple applications

UNIT – II:

Shear Force and Bending Moment: Definition of beam - Types of beams - Concept of shear force and bending moment - Point of contra flexure - Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT — III:

Flexural Stresses: Theory of simple bending - Assumptions - Derivation of bending equation, Neutral axis - Determination of bending stresses - section modulus of rectangular and circular sections (Solid and Hollow), I, and T sections - Design of simple beams
Shear Stresses: Derivation of formula - Shear stress distribution across various beam sections like rectangular, circular, I and T sections.

UNIT — IV:

Deflection of Beams: Double integration and Macaulay's methods - Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems - Moment area method -application to simple cases of cantilever and simply supported beams.

UNIT — V:

Torsion –. Derivation of Torsion equation – Assumptions – Torsion moment of resistance – Polar section modulus – Power transmitted by shafts and problems on circular shafts only
Columns: Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions– Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.

TEXTBOOKS:

1. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010.
3. Mechanics of Materials by A. Pytel and J. Kiusalaas, Cengage, 2nd edition, 2012

REFERENCES:

1. Mechanics of Materials by R. C. Hibbeler, Pearson, 10th edition, 2022

2. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).

3. Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and MudimbyAndal, Cambridge University Press, 2018, 1st Edition

4. Mechanics of Solids — E P Popov, Prentice Hall, 2nd Edition, 2015.A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi 7th edition 2022.

5. Strength of Materials by S.S.Ratan Tata McGrill Publications 3rd Edition , 2016.

II B.TECH	FLUID MECHANICS	L	T	P	C
I SEMESTER		3	0	0	3

Course Objectives:

1. To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2. To impart ability to solve engineering problems in fluid mechanics
3. To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4. To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5. To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

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

COs	STATEMENTS	Blooms level
CO1	Understand the principles of fluid statics, kinematics and dynamics	**L2**
CO2	Apply the laws of fluid statics and concepts of buoyancy	**L3**
CO3	Understand the fundamentals of fluid kinematics and differentiate types of fluid flows	**L2**
CO4	Apply the Principle of conservation of energy for flow measurement.	**L3**
CO5	Analyse the losses in pipes and discharge through pipe network.	**L4**

UNIT - I

Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

Fluid statics: Fluid Pressure: Pressure at a point, Pascal 's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges,

UNIT – II

Hydro Statics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved

surfaces – Centre of pressure. Buoyancy,

Stability of Floating bodies: **Centre of Buoyancy**, types of Equilibrium of floating bodies, Metacenter and its height -Analytical method and Experimental method

UNIT - III

Fluid kinematics:

Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one-, two- and three-dimensional flows; Streamline, path line, streak line and stream tube;

stream function, velocity potential function. One, two and three - Dimensional continuity equations

UNIT - IV

Fluid Dynamics: Surface and body forces; Equations of motion - Euler 's equation; Bernoulli 's equation, their derivations Energy and Limitations.

Practical applications of Bernoulli 's equation: Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend.

UNIT – V

Laminar and Turbulent Flow: Reynold's experiment – its practical significance. Characteristics of Laminar

& Turbulent flows, Hydraulic Grade Line and Total Energy Line; Pipes in Parallel and Series. Concept of equivalent length. Energy losses in pipelines; Major Losses and Minor losses in pipelines.

Darcy Laws of Fluid friction Weisbach equation Flow through circular pipe, Hagen-Poiseuille Formula, Flow between parallel plates

Textbooks:

1. R.K.Rajput A textbook of Fluid Mechanics and Hydraulic Machinery by, S Chand &Company Ltd , New Delhi
2. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House $_{22}$nd, 2019.
3. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill,2nd edition 2018

Reference Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition ,2022.
4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Online Learning Resources:
https://archive.nptel.ac.in/courses/112/105/112105269/
https://nptel.ac.in/courses/112104118
https://nptel.ac.in/courses/105103192

II B.TECH	SURVEYING LAB	L	T	P	C
I SEMESTER		0	0	3	1.5

Course Objectives:

By the end of this course student will be able to

1. Know about various linear and angular measuring instruments

2. Take Measurements in the linear and angular view

3. Determine the area and volume by interpreting the data obtained from surveying activities

4. Know modern equipment such as total station

5. Draft field notes from survey data

Course Outcomes:

Upon the successful completion of this course, the students will able to:

1. Handle various linear and angular measuring instruments

2. Measure the linear and angular measurements

3. Calculate the area and volume by interpreting the data obtained from surveying activities

4. Handle modern equipment such as total station

5. Prepare field notes from survey data

List of Field Works: A minimum of 10 experiments must be completed to fulfill the course requirements.

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey: finding the area of a given boundary by the method of Radiation
4. Fly levelling: Height of the instrument method (differential leveling)
5. Fly levelling: rise and fall method.
6. Determining the levels of contour
7. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
8. Theodolite survey: finding the distance between two in accessible points.
9. Theodolite survey: finding the height of far object.
10. Setting out a curve
11. Determination of area perimeter using total station.
12. Determination of distance between two inaccessible points by using total station.

II B.TECH	**STRENGTH OF MATERIALS LAB**	**L**	**T**	**P**	**C**
I SEMESTER		0	0	3	1.5

Course objectives: By the end of this course student will be able to

1. To determine the tensile strength and yield parameters of mild steel

2. To find out flexural strengths of Steel/Wood specimens and measure deflections

3. To determine the torsion parameters of mild steel bar

4. To determine the hardness numbers, impact and shear strengths of metals

5. To determine the load-deflection parameters for springs

Course Outcomes:

1. Conduct tensile strength test and draw stress-strain diagrams for ductile metals

2. Perform bending test and determine load-deflection curve of steel/wood

3. Able to conduct torsion test and determine torsion parameters

4. Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths

5. Able to conduct tests on closely coiled and open coiled springs and calculate deflections.

LISTOFEXPERIMENTS:

1. Study of stress-strain characteristics of Mild steel/HYSD bars by UTM.

2. Determination of modulus of elasticity of the material of the beam by conducting bending test on Cantilever beam.

3. Determination of modulus of elasticity of the material of the beam by conducting bending test on Simply Supported beam

4. Determination of modulus of rigidity by conducting torsion test on solid circular shaft.

5. Determination of hardness of the given material by Brinell's hardness test.

6. Determination of hardness of the given material by Rock well hardness test.

7. Determination of modulus of rigidity of the material of closely coiled helical spring.

8. Determination of modulus of rigidity of the material of Open coiled helical spring.

9. Determination of compressive strength of wood / concrete cube.

10. Determination of impact strength of the given material by conducting Charpy test.

11. Determination of impact strength of the given material by conducting Izod test.

12. Demonstration on electrical resistance strain gauges.

13. Deflection test on Continuous beam.

II B.TECH	BUILDING PLANNING AND	L	T	P	C
I SEMESTER	DRAWING	0	1	2	2

Course Objectives:

1. Initiating the student to different building bye-laws and regulations.

2. Imparting the planning aspects of residential buildings and public buildings.

3. Giving training exercises on various sign conventions and different building units.

4. Imparting the skills and methods of planning of various buildings.

Course Outcomes:

Upon successful completion of this course the students will be able to:

C01: Plan various buildings as per the building by-laws.

CO2: Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.

CO3: Draw signs and bonds.

CO4: Draw different building units.

CO5: Learn the skills of drawing building elements and plan the buildings as per requirements.

List of Exercises: - At least 10 exercises out 12 from must be drawn using AutoCAD.

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
5. Drawing of Line Diagram of 2BHK Residential Buildings by using Building Bye- Laws.
6. Drawing of Line Diagram of 3BHK Residential Buildings by using Building Bye- Laws.

7. Drawing of Plan, Elevation & Section for MIG house.

8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.

9. Drawing of Plan, Elevation & Section for Educational building.

10. Drawing of Plan, Elevation & Section for Hotel/Motel building.

11. Drawing of Plan, Elevation & Section for Hospital Building.

12. Drawing of Plan, Elevation & Section for Industrial Building.

Text Books:

1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M. Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books:

1. National Building Code 2016 (Volume- I & II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, NewDelhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.

II B.TECH	ENVIRONMENTAL SCIENCE	L	T	P	C
I SEMESTER		2	0	0	-

CourseObjectives:

- To make the students to ge tawareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

CourseOutcomes:

- Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources.
- Understand flow and bio-geo-chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste landreclamation.
- Casus of population explosion, value education and welfare programmes.

UNIT–I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources :Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems–Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies– Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.–Energy resources:

UNIT–II

Ecosystems: Concept to fan ecosystem. –Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the

ecosystem – Ecological succession – Food chains, food webs and ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassl and ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India –Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT–III

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT–IV

Social Issues and the Environment: From Unsustainable to Sustainable development– Urban problems related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions–Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wastel and reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act–Wild life Protection Act–Forest

Conservation Act–Issues involved in enforcement of environment allegislation–Public awareness.

UNIT–V
Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education– HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies. Field Work:Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site- Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc..

Text books:
1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy,"Environmental Studies",Pearson education
3. S.AzeemUnnisa,"Environmental Studies" Academic Publishing Company.
4. K.RaghavanNambiar,"Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt.Ltd.

Reference Books:
1. DeekshaDave and E.SaiBabaReddy, "Text book of Environmental Science",CengagePublications.
2. M.AnjiReddy,"Text book of Environmental Sciences and Technology",BSPublication.
3. J.P.Sharma,Comprehensive Environmental studies,Laxmi publications.
4. J.GlynnHenryandGaryW.Heinke,"Environmental Sciences and Engineering",Prentice Hall of India Private limited
5. G.R.Chatwal,"A Text Book of Environmental Studies"Himalaya Publishing House
6. Gilbert M.Masters and WendellP.Ela,"Introduction to Environmental Engineeringand Science,Prentice Hall of India Private limited.

II B.TECH	MANAGERIAL ECONOMICS AND	L	T	P	C
II SEMESTER	FINANCIAL ANALYSIS	2	0	0	2

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

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

CO1: Define the concepts related to Managerial Economics, financial accounting and management.

CO2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets and apply these concepts for effective business decision

CO3: understand the Nature of Competition, Characteristics of Pricing in the different market structure and know the different forms of Business organization

CO4: Analyze how to invest their capital and maximize returns and evaluate the capital budgeting techniques

CO5: Develop the accounting statements and evaluate the financial performance of business entity.

UNIT - I

Introduction to Managerial Economics

Definition of Managerial Economics and Scope – Managerial Economics with other subjects -Demand Concept, types, Law of Demand-Demand Elasticity-Types - Measurement. Demand Forecasting- Factors governing Forecasting, Methods.

UNIT - II

Production and Cost Analysis

Introduction - Production Function – Cobb-Douglas Production Function Least- cost combination - short run and long run Production Function-Isoquants and Isocosts, MRTS - - Laws of Returns - Internal and External Economies of scale.

Cost & Break-Even Analysis - Cost concepts- opportunity costs - Fixed costs, Variable Costs and Total costs - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT - III

Introduction of Markets, Pricing Policies and Business Organizations

Introduction -meaning, Types of Markets -Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition - Oligopoly- Pricing Methods and Strategies.

 Forms of Business Organizations-Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises.

UNIT - IV

Capital Budgeting

Introduction - Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting - Features, Proposals, Methods and Evaluation. Projects - Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV), Internal Rate Return (IRR) Method (sample problems).

UNIT - V

Financial Accounting and Analysis

Introduction - meaning, significance -Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:
1. Aryasri: Business Economics and Financial Analysis, 1/e, MGH, 2020.
2. Aryasri: Managerial Economics and Financial Analysis, 4/e, MGH, 2019.
3. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2014.

Reference Books:
1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2019.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

Online Learning Resources:
1. https://www.slideshare.net/123ps/managerial-economics-ppt
2. https://www.slideshare.net/rossanz/production-and-cost-45827016
3. https://www.slideshare.net/darkyla/business-organizations-19917607
4. https://www.slideshare.net/balarajbl/market-and-classification-of-market

II B.TECH	ENGINEERING GEOLOGY	L	T	P	C
II SEMESTER		3	0	0	3

Course Objectives:

1. To know the importance of Engineering Geology to the Civil Engineering.
2. To enable the students, understand what minerals and rocks are and their formation and identification.
3. To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
4. To enable the student, realize its importance and applications of Engineering Geology in Civil Engineering constructions.
5. concepts of Groundwater and its geophysical methods.

Course Outcomes:

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

CO1: Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.

CO2: Identify and understand the properties of Minerals and Rocks.

CO3: Understand the concepts of Groundwater and its geophysical methods.

CO4: Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.

CO5: Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.

UNIT-I:

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies, weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT-II

Mineralogy and Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink,

gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III
Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV
Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques. Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.
Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-V
Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

TEXT BOOKS:
1. Engineering Geology by N. Chenna Kesavulu, Laxmi Publications. 2ndEdn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th 2023

REFERENCES:

1. Engineering Geology by SubinoyGangopadhay Oxford University press 1st edition, 2012.
2. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2nd Edn , 2017,

3. Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edn., 2013) Pearson publications.
4. 'Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill

Publications.

Web Materials:

1. http://nptel.iitm.ac.in/video.php?subjectId=105105106
2. http://nptel.iitm.ac.in/video.php?courseId=1055&p=1
4. http://nptel.iitm.ac.in/video.php?courseId=1055&p=3
5. http://nptel.iitm.ac.in/video.php?courseId=1055&p=4

II B.TECH	CONCRETE TECHNOLOGY	L	T	P	C
II SEMESTER		3	0	0	3

Course Learning Objectives

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

1. Learn materials and their properties used in the production of concrete

2. Learn the behavior of concrete and tests at fresh stage

3. Learn the behavior of concrete and tests at hardened stage

4. Learn the physical properties of concrete and learn special concretes

5. Learn the mix design methodology

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

CO1 Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.

CO2 Understand the basic concepts of concrete manufacturing, tests on fresh concrete properties, RMC and shotcrete.

CO3 Study the properties of hardened concrete and evaluate the hardened concrete properties through lab and field test results.

CO4 Understand the physical properties of concrete and distinguish between various types of special concretes.

CO5 Familiarize the basic concepts of mix design and quality control of concrete. Design the concrete mix by BIS method.

Detailed Syllabus:

UNIT- I

CEMENT & ADMIXTURE: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substances – Soundness – Alkali aggregate

reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Maximum aggregate size- Quality of mixing water.

UNIT-II

FRESH CONCRETE: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete – Workability – Factors affecting workability – Measurement of workability by different tests, setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete.

UNIT-III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel/space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression test – Tension test – Factors affecting strength – Flexure test – Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT-IV

ELASTICITY, CREEP & SHRINKAGE: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

SPECIAL CONCRETES: Light weight aggregates – Lightweight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres– Factors affecting properties & Applications of F.R.C – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete & Applications – High performance concrete – Self consolidating concrete – SIFCON.

UNIT-V

MIX DESIGN: Factors in the choice of mix proportions – Quality control of concrete- Statistical methods – Acceptance Criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

TEXT BOOKS

1. Properties of Concrete by A.M. Neville – PEARSON – 4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
   5th edition 2013.
3. Concrete Technology by Job Thomas, Cengagae Publications, 1st edition, 2015

REFERENCES

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio, McGraw Hill 4th edition 2014
2. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
3. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi

II B.TECH	STRUCTURAL ANALYSIS	L	T	P	C
II SEMESTER		3	0	0	3

Course Learning Objectives

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

1. Learn energy theorems and analysis of indeterminate Truss.

2. Analysis of fixed and Propped Cantilever beams

3. Analysis of continuous beams

4. Learn about slope-deflection method and Moment–distribution method

5. Learn about Gravity Load and Lateral Load analysis of Frames by using Approximate Methods.

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

1. Apply energy theorems to analyze trusses and Analysis of indeterminate structures by using Castigliano's–II theorem

2. Analysis of Propped Cantilever and fixed beams

3. Analysis of continuous beams

4. Analyze continuous beams and portal frames by using slope-deflection method and Moment–distribution method

6. Analyze Gravity Load and Lateral Load analysis of Frames by using Approximate Methods.

UNIT–I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem -Deflections of simple beams and pin jointed trusses.

ANALYSIS OF INDETERMINATE TRUSSES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with up to two degrees of internal and external indeterminacies – Castigliano's–II theorem.

UNIT-II

ANALYSIS OF PROPPED CANTILEVER AND FIXED BEAMS:

Analysis of Propped Cantilever beams subjected to simple loading- uniformly distributed load, central point load, eccentric point load, concentrated moment– SFD, BMD and deflection (Elastic curve).

Analysis of Fixed beams subjected to simple loading- uniformly distributed load, central point load, eccentric point load, concentrated moment, Rotational slip at support– SFD, BMD and deflection (Elastic curve).

UNIT-III

CONTINUOUS BEAMS: Introduction - Clapeyron's theorem of three moments- Analysis of continuous beams with and without settlement of supports-subjected to simple loading (Uniformly distributed load, central point load and eccentric point load, concentrated moment, Triangular load on different spans, Different EI) and far ends hinged/fixed/overhang-SFD and BMD.

UNIT-IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations- application to continuous beams with and without settlement of supports-subjected to simple loading (Uniformly distributed load, central point load and eccentric point load, concentrated moment, Triangular load on different spans, Different EI) and far ends hinged/fixed/overhang-SFD and BMD- Analysis of single bay portal frames without sway.

MOMENT DISTRIBUTION METHOD: Introduction-Application to continuous beams with and without settlement of supports -subjected to simple loading (Uniformly distributed load, central point load and eccentric point load, concentrated moment, Triangular load on different spans, Different EI) and far ends hinged/fixed/overhang-SFD and BMD -Analysis of single bay storey portal frames without sway.

UNIT-V

LATERAL LOAD ANALYSIS USING APPROXIMATE METHODS: Application to building frames with two bay two storeys. (i) Portal Method (ii) Cantilever Method.

INFLUENCE LINES: Influence lines for simply supported beams -Definition of influence line for SF, Influence line for BM- load position for maximum SF at a Section-Load position for maximum BM at a sections, single point load, U.D. load longer than the span, U.D. load shorter than the span.

Textbooks:

1. Analysis of Structures–Vol-I&II by V.N.Vazirani & M.M.Ratwani,Khanna Publications,
2. NewDelhi.
3. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.3rdedition 2017.

Reference Books:

1. Structural analysis by Aslam Kassimali Cengage publications 6thedition 2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathanand , Dr. P Perumal–Laxmi publications. 3rd 2016
3. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
4. Structural Analysis– D.S. Prakasarao - Univeristypress.
5. Strength of Materials and Mechanics of Structures by B.C. Punmia, Khanna Publications, New Delhi.

II B.TECH	HYDRAULICS AND HYDRAULIC MACHINERY	L	T	P	C
II SEMESTER		3	0	0	3

Pre-requisite: Fluid Mechanics Course Objectives:

1. To Introduce concepts of laminar and turbulent flows
2. To teach principles of uniform flows through open channel.
3. To teach principles of non-uniform flows through open channel.
4. To impart knowledge on design of turbines.
5. To impart knowledge on design of pumps

Course Outcomes:

On Completion of the course, the students will be able to:

COs	STATEMENTS	Blooms level
CO1	Understand the characteristics of laminar and turbulent flows.	L2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	L3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	L3
CO4	Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine	L5
CO5	Understand the principles, losses and its efficiencies of centrifugal pumps	L2

UNIT – I

HYDRAULIC SIMILITUDE:

Dimensional Analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic Similarities-Dimensionless numbers – model and prototype relations.

UNIT - II

Uniform flow in Open Channels: Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channel flow, Velocity and pressure distribution of channel section.

Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

UNIT – III

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow.

Rapid Varied flow: Hydraulic Jump and classification - Elements and characteristics- Relationship between depth of flow before and after Jump-Energy losses.

UNIT - IV

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; Pelton wheel and Franci's turbine and their working principle, heads, work done, efficiencies and design considerations - Draft tube: theory - characteristic curves of hydraulic turbines.

UNIT – V

Pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed.

Reciprocating Pumps: Classification, working principle, work done, indicator diagram and slip

TEXT BOOKS: -
1. R.K.Rajput A textbook of Fluid Mechanics and Hydraulic Machinery, S Chand &Company Ltd , New Delhi

2.P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard
Book House 22nd,
2019.
3.
3.K. Subrahmanya, Theory and Applications of Fluid
Mechanics, Tata McGraw Hill, 2nd edition 2018

Reference Books:
1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines,
   Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th
   edition, 2022.
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics
   and Machinery, Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by S K Som,
   Gautam Biswas, S Chakraborty 3rd edition 2011

Online Learning Resources: https://nptel.ac.in/courses/105105203
https://archive.nptel.ac.in/courses/112/106/112106300/
https://archive.nptel.ac.in/courses/112/103/112103249/

II B.TECH	CONCRETE TECHNOLOGY LAB	L	T	P	C
II SEMESTER		0	0	3	1.5

Course Learning Objectives
Upon successful completion of this course, the student will be able to
To test basic properties of ingredients of concrete fresh and hardened concrete
properties
Course Outcomes: At the end of the course, the student will be able to
CO1 Outline importance of testing cement and its properties
CO2 Assess different properties of Aggregates
CO3 Assess fresh concrete properties and their relevance to hardened concrete
CO4 Assess hardened concrete properties

Tests on Cement
1. Determination of specific gravity of cement.
2. Determination of fineness of cement by dry sieving
3. Determination of normal Consistency of Cement
4. Determination of initial and final setting time of cement.
5. Determination of compressive strength of cement.
6. Determination of soundness of cement.
7. Determination of fineness of cement by air permeability method.

Tests on Aggregate
8. Determination of specific gravity of fine aggregate
9. Determination of specific gravity and water absorption of coarse aggregate
10. Determination of grading and fineness modulus of fine aggregate and coarse aggregate by sieve analysis.
11. Determination of bulking of sand.

Tests on fresh Concrete
12. Determination of workability of concrete by slump test
13. Determination of workability of concrete by compaction factor method.
14. Determination of workability of concrete by Vee-bee consistency test.

Tests on hardened Concrete
15. Determination of compressive strength of concrete
16. Determination of split tensile strength of concrete.
17. Determination of young's modulus of concrete. (Demonstration)
18. Non-Destructive testing on concrete using rebound hammer

II B.TECH	ENGINEERING GEOLOGY LAB	L	T	P	C
II SEMESTER		0	0	3	1.5

Course Objectives:

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection

Course Outcomes:

Upon successful completion of this course the students will be able to:

CO1: Identify Megascopic minerals & their properties.

CO2: Identify Megascopic rocks & their properties.

CO3: Identify the site parameters such as contour, slope & aspect for topography.

CO4: Know the occurrence of materials using the strike & dip problems.

List of Exercises:

1. Physical properties of minerals: Mega-scopic identification of

   a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite,

   Gypsum, etc…

   b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…

2. Megascopic description and identification of rocks.

   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.

   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.

   c) Metamorphic   rocks   – Biotite –   Granite

Gneiss,   Slate, Muscovite   &Biotiteschist,   Marble, Khondalite, etc.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.

5. Bore hole data.

6. Strength of the rock using laboratory tests.

7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology

REFERENCES:

1.'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.

2. Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

II B.TECH	REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEM	L	T	P	C
II SEMESTER		0	1	2	2

Course Learning Objectives:

The course is designed to

- Introduce the basic principles of Remote Sensing and GIS techniques and its application to Civil Engineering.
- Learn various types of sensors and platforms and understand the principles of spatial analysis techniques in GIS.
- Introduce GIS software to understand the process of digitization, creation of thematic map from topo-sheets and maps.

Course outcomes

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

CO1: Acquire knowledge about concepts of remote sensing, sensors and their characteristics.

CO2: familiarize with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.

CO3: digitize and create thematic map and extract important features to calculate geometry.

CO4: perform surface analysis over Contour to develop digital elevation model.

CO5: use GIS software to perform simple analysis in water resources and transportation engineering.

SYLLABUS:

UNIT – I

Introduction to Remote sensing: History of Remote Sensing, Electromagnetic Radiation,

Electromagnetic Spectrum, Energy Interaction with Atmosphere, Energy Interaction with the Earth Surfaces - Characteristics of Remote Sensing Systems, Sensor Resolutions, Advantages & Limitations - Platforms: Types

of Sensors, Airborne Remote Sensing, Space borne Remote Sensing - IRS, LANDSAT, SPOT & Recent satellite.

UNIT – II

Digital Image analysis: Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) - Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

UNIT – III

Introduction to Geographic Information System: Principles, Components and Applications of GIS - Map projections, Spatial Data Structures, Raster and Vector Data Formats, Data Inputs, Data Manipulation, Data Retrieval, Data Analysis - Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum path analysis.

TEXT BOOKS:

1. BasudebBhatta (2021). 'Remote sensing and GIS', 3rdedn., Oxford University Press.
2. S. Kumar, (2016) 'Basics of Remote sensing & GIS', Laxmi Publications.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2022) 'Remote Sensing and Image Interpretation', 7thedn., Wiley India Pvt. Ltd.
4. Demers, M.N, (2013) 'Fundamentals of Geographic Information Systems', 4thedn., Wiley India Pvt. Ltd.

List of Experiments:

Expt. 1: Geo-referencing a Toposheet or Map
Expt. 2: Digitization and Attribute table creation.
Expt. 3: Creation of Thematic Map
Expt.4: Calculation of Feature geometry – Length, Area & Perimeter.

Expt. 5: Contour map – developing TIN & DEM from Contour.

Expt. 6: Stream network – Stream ordering map.

Expt. 7: Watershed - calculate Hydro-geomorphological parameters.

Expt. 8: Transportation Network Map – Route analysis.

GIS SOFTWARE: QGIS / ArcGIS

Textbook for Practical
1. QGIS User Guide
2. ArcGIS User Manual by ESRI

REFERENCES:
1. Schowengerdt, R. A (2006) 'Remote Sensing', Elsevier publishers.
2. Burrough P A and R.A. McDonnell, (1998) 'Principals of Geographical Information Systems', Oxford University Press.
3. George Joseph (2013) 'Fundamentals of Remote Sensing', Universities Press.

Web references:
1. https://nptel.ac.in/courses/10510319

II B.TECH	DESIGN THINKING &	L	T	P	C
II SEMESTER	INNOVATION	1	0	2	2

Course Objectives: The objectives of the course are to
- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

UNIT – I Introduction to Design Thinking
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT – II Design Thinking Process
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development
Activity: Every student presents their idea in three minutes, every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT – III Innovation
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.
Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV Product Design
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.
Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V Design Thinking in Business Processes
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition,

Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:
1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:
1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Online Learning Resources:
- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

II B.TECH	BUILDING MATERIALS &	L	T	P	C
II SEMESTER	CONSTRUCTION	3	0	0	-

Course objectives:

The main objectives are

1. Identify various building materials and their structural requirements.

2. Review different types of masonry construction.

3. Explain the significance of cement and lime in construction.

4. Identify the suitable material for construction and various building components.

5. Discuss about various building services and finishing.

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

CO1 Identify suitability of stones, bricks, tiles, glass and steel as building materials. {Understand level, KL2}

CO2 Make out the appropriate masonry to be used for building construction and importance of wood {Apply level, KL3}

CO3 Recognize the importance of lime and cement as building materials. {Understand level, KL2}

CO4 Pick up the appropriate building components for comfortable construction. {Apply level, KL3}

CO5 Identify the appropriate type of finishing techniques and building services which are generally used in buildings. {Understand level, KL2}

UNIT I: BUILDING MATERIALS-I

Stones: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone

Aggregates: Classification of aggregate – Coarse and fine aggregates

Bricks: Composition of good brick earth, various methods of manufacturing of bricks.

UNIT II: BUILDING MATERIALS-II

Tiles: Characteristics of good tile - manufacturing methods, types of tiles. Steel: General; Manufacture of steel; Uses of steel; Market forms of steel. Glass: Manufacture of glass

Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber

UNIT III: BUILDING MATERIALS-III

Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.

Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance

UNIT IV: BUILDING COMPONENTS AND MASONRY

Building Components: Lintels, arches, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, Types of roofs – King and Queen post Trusses. R.C.C Roofs, Pre-fabricated roofs.

Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls

UNIT V: BUILDING SERVICES AND FINISHES

Building Services: Plumbing services, water distribution, sanitary lines and fittings, ventilators, functional requirements.

Finishing: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Formwork, Scaffolding

Text books:

1. Engineering Materials by S.C.Rangwala

2. Building Materials, B. C. Punmia, Laxmi Publications private ltd.

3. Building Construction, B.C. Punmia, Laxmi Publications (p) ltd.

Reference books:
1. S.K. Duggal "Building Materials"- New age International Publisher,
2. R.K. Rajput "Engineering Materials (Including construction materials)"-, S.Chand Publications.
3. P.C Varghese "Building Construction" Prentice-Hall of India Private Ltd.

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