Programme Ordinance, POs, PSOs &Course Outcomes (COs)

DEPARTMENT OF AGRICULTURAL ENGINEERING
FACULTY OF ENGINEERING & TECHNOLOGY
CCS CAMPUS UNIVERSITY MEERUT

2020-21

PROGRAMME ORDINANCE

1. ADMISSION

1.1 Admission to B.Tech. First year in 1st semester and lateral admission in B.Tech. Second year in 3rd semester (for diploma holder/B.Sc. candidates only) will be made as per the rules prescribed by the Academic Council of CCSU Meerut.

1.2 Admission on migration of a candidate from any other University to the University is not permitted.

2. ELIGIBILITY FOR ADMISSIONS

2.1 Admission to B. Tech. First Year through Entrance Examination:

(a) Eligibility for admission to under graduate courses in First year shall be as per guidelines of All India Council for Technical Education (AICTE) / Related Council and according to the latest U.P. Government notifications/rules.

2.2 Admission to B.Tech. Second Year through Lateral Entry Scheme:

(a) Candidates who have passed 3/4-year Diploma (with minimum 60% marks) from institutions recognized by the U.P. Board of Technical Education in any branch of Engineering/Technology except Agriculture Engineering are eligible for admission to Second year in any branch of Engineering. /Technology except Agriculture Engineering

(b) Candidates who have passed 3/4-year Diploma (with minimum 60% marks) from institutions recognized by the U.P. Board of Technical Education in Agriculture Engineering are only eligible for admission to Second year of Agriculture Engineering.

2.3 Direct admission on vacant seats at institution/college level: The eligibility criteria for direct admission on seats remaining vacant in first year after entrance examination counseling shall be such as may be notified from time to time.

2.4 The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 2.1. & 2.2, as per the guidelines of AICTE.

3. ATTENDANCE

3.1 Every student is required to attend all the lectures, tutorials, practical's and other prescribed curricular and co-curricular activities. The attendance can be condoned up to 25% on medical grounds or for other genuine reasons beyond the control of students.

3.2 A further relaxation of attendance up to 15% for a student can be given by Head of Institution/college provided that he/she has been absent with prior permission of the Head of the institution/college for the reasons acceptable to him.

3.3 No student will be allowed to appear in the end semester examination if he / she do not satisfy the overall average attendance requirements of Clause Nos. 3.1, and 3.2. and such candidate(s) shall be treated as having failed due to detained and will be further governed by clause no. 4.2 & 4.3 and annexure I.

3.4 In each semester, the attendance shall be counted from the date of admission in the college or start of academic session whichever is later.

4. DURATION OF COURSES

4.1 Total duration of the B.Tech. Course shall be 4 years, each year comprising of two semesters. Each semester shall normally have teaching for the 90 working days or as prescribed by A.I.C.T.E. from time to time.

4.2 The student admitted to 1st year B.Tech shall complete the course within a period of seven academic years from the date of first admission, failing which he/she has to discontinue the course. The students admitted under lateral entry scheme (2nd Year B.Tech) shall complete the course within a period of six academic years from the date of first admission, failing which he/she has to discontinue the course.

4.3 A candidate, who has failed twice in first year due to any reason (either due to his/her non-appearance or he/she being not permitted to appear in semester examinations) shall not be allowed to continue his/her studies further. Provided further that if a student wishes to continue third time in first year he/she may be allowed on the terms and conditions laid down by the University for such permission but the maximum time allowed for completing the course will remain the same as in clause 4.2.

4.4 The minimum credit requirement for B.Tech degree is 160 credits.

5. CURRICULUM

5.1 The 4 year curriculum has been divided into 8 semesters and shall include lectures, tutorials, practicals, seminars and projects etc. in addition to industrial training and educational tour etc. as defined in the scheme and executive instructions issued by the University from time to time.

5.2 The curriculum will also include such other curricular, co-curricular and extracurricular activities as may be prescribed by the University from time to time.

6. CHANGE OF BRANCH

6.1 Change of branch may be allowed against the vacant seats in the following two stages, provided criteria at following sub clauses is satisfied:

(a) In first year, after the last date of admission to the B.Tech. I$_{st}$ semester, on the basis of merit of entrance examination on vacant seat subject to clause 6.2.

(b) In the second year, on the basis of merit at the B.Tech. first year examination for those who are pass without any carry over paper subject to clause 6.2.

6.2 After change of branch, number of students in branch(s) shall neither increase over the intake approved by A.I.C.T.E. nor it will decrease below 75% of intake approved by A.I.C.T.E.

6.3 Change of branch facility is not applicable to following: -

(a) Candidates admitted in B.Tech. Agricultural Engineering/Biotechnology courses.

(b) Candidates admitted in second year of B.Tech. courses as per clauses 2.2

6.4 The change of branch if allowed will become effective from B.Tech. IIIrd semester.

6.5 The Branch change process must be completed by 30th August of each academic session. Further change of branch shall not be permitted.

7. CHANGE OF COLLEGE

7.1 Change of College shall not be permitted.

7.2 Change of study center shall not be permitted.

8. EXAMINATION

8.1 The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/tutorials, quizzes/viva-voce and attendance. The marks for continuous assessment (Sessional marks) shall be awarded at the end of the semester. The end semester examination shall be comprised of written papers, practicals and viva-voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.

8.2 The distribution of marks for sessional, end semester theory papers, practicals and other examinations, seminar, project and industrial training shall be as prescribed. The practicals, viva-voce, projects and reports shall be examined/evaluated through internal and external examiners as and when required.

8.3 The marks obtained in a subject shall consist of marks allotted in end semester theory paper and sessional work.

9. ELIGIBILITY OF PASSING

9.1 A student who obtained Grades A^{+} to E shall be considered as passed. If a student secured "F" grade, he /she has to reappear for the examination. It is mandatory for a student to earn the-required credits as mentioned in each semester.

(a) For a pass in a Theory Subject, a student shall secure minimum of 30% of the maximum marks prescribed by the University in the end semester examination and 40% of aggregate marks in the subject including sessional marks. i.e. Minimum Passing Grade is

"E".

(b) For a pass in a Practical/Internship/Project/Viva-voce examination, a student shall secure a minimum of 50% of the maximum marks prescribed by the University in the relevant Practical/Internship/Project/Viva-voce examination and 40% of marks in the aggregate in

the Practical/Internship/Project/Viva-voce including sessional marks. i.e. Minimum Passing Grade in a course is "E".

(c) For a pass in the subject which has only sessional component and No End semester exam component, such as Seminar, a student shall secure a minimum of 40% of the maximum marks prescribed. i.e. Minimum Passing Grade is "E".

(d) For a pass in a subject having Theory and Practical component, a student shall secure minimum of 30% of the maximum marks prescribed by the University in theory examination and 50% of marks in practical examination; in addition the student must secure 40% of marks in the aggregate in the subject including theory, practical, theory sessional and practical sessional marks. i.e. Minimum Passing Grade in a course is "E"..

9.2 The students who do not satisfy the condition 9.1 or the student who remains absent shall be deemed to have failed in that subject and may reappear for the University examination in the subsequent examinations. However, the Sessional marks awarded to the student/s at previous attempt in the concerned subject will be carried forward.

9.3 A student may, at his/her desire, opt to abandon his/her performance of a semester in following manner.

(a) A student may opt to abandon his/her performance only in end semester examination of university for a given semester.
(b) A student may opt to abandon his/her Total Performance of a Semester which includes performance in university end semester examination and sessional marks of all theory and practical subjects.
(c) A student may opt to abandon his/her performance in University Examination of any or both semesters of the same academic year only.
(d) A student shall be allowed to abandon the performance maximum twice during the entire course of study.
(e) Performance of a semester, once abandoned, cannot be claimed again.

9.4 The student, who opts to abandon the performance of a semester as per clause 9.3, shall abandon performance in all the courses of that semester, irrespective of the fact whether the student has passed or failed in any subject of that semester.

9.5 A student, who opts to abandon the total performance of the semester including sessional marks as per 9.3(b) and 9.3(c), has to take readmission for the relevant semester(s). Readmission to the First semester in such cases shall not be considered as fresh admission i.e., the student will continue to have the same University Roll Number, which was allotted earlier.

9.6 The student, who opted to abandon his / her performance only in the university end semester-examination of a semester and does not desire readmission, shall be permitted to re-appear for examinations of all the subjects of the semester in the subsequent examinations as an Ex-

Student. However, the sessional marks obtained by the student in the abandoned semester shall be retained.

9.7 Such students who opted to abandon the performance at any stage of his/her study and has clearedany paper in more than one attempt are eligible for the award of *DIVISION* at the B.Tech. degree level but are not eligible for the award of RANKS and HONOURS degree.

9.8 The student who passes a course of a semester as per 9.1 shall not be allowed to appear for the same again, unless he/she opts for *abandoning of results* as per 9.3-9.7.

9.9 A student shall be declared to have completed the program of B.Tech. degree, provided the student has undergone the stipulated course work as per the regulations and has earned at least 160 Credits.

10. ELIGIBILITY FOR PROMOTION

10.1 There shall not be any restriction for promotion from an odd semester to the next even-semester.

10.2 For promotion from even semester to the next odd semester (i.e. of the next academicye-ar) the student has secured either of the semester of an academic year is fully cleared or earned the credit greater than or equal to minimum credit of either of the semester for example.

Example 1

1. **A Student of 1st year earned 10 credits in I semester and 8 credit in II semes-ter. The total credit of I semester is 17.5 and II semestersare 20.5.**

Minimum Credit Threshold for Promotion Check Point	Credit* Threshold
First Year to Second Year	**17.5 credits in** First Year (I&II sem.)

Total credit earned by student is 18(10+8) therefore he / she is eligible for promotion from 1st to 2nd year.

Example 2

A Student of 1st year earned17.5 credit in I semester and 18 credit in II semester. The to-tal credit of I semester is 17.5 and II semester is 20.5.

Minimum Credit Threshold for Promotion Check Point	Credit* Threshold
First Year to Second Year	**17.5 credits in First** Year (I&II sem.)

His / Her I semester is fully cleared therefore he / she is eligible for promotion to 2nd year.

10.3 In yearly result, a student shall be declared PASS only if he/ she secures"E" or above gradesin all the subjects and minimum Semester Grade Point Average (SGPA) of 5.0, in each semester of an academic year.

10.4 Student himself can decide to abandon the performance of any or both the semestersof-same academic year as per clause 9.3 and reappear in abandoned semester examination as per clauses 9.4, 9.5 & 9.6.

11. Carry over System

11.1 Following rules shall be followed for carry over papers:

(a) A candidate who satisfies the requirements of clause 9.1 appear in those theory papers / practical during respective end failed.

(a) and 9.1 (b) will be required to semester exams in which he/she

(b) A candidate satisfying clause 9.3 (a) shall be required to appear in theory papers / practical examination to fulfil the requirements of clause 9.1(a) and 9.1 (b).

(c) A candidate shall be required he/she desires to appear in requirements of clause 10.3.

to exercise his/her choice of minimum theory papers in which the examination for improvement of SGPA to fulfil the

(d) Candidate appearing for carry over paper in any semester shall be examined with the examination paper of that subject running in that semester.

11.2 All carryover examinations shall be held only with end semester examination.

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12. **RE-ADMISSION IN THE INSTITUTION/ COLLEGE**

A candidate may be allowed for re-admission provided he/she satisfies one of the following conditions:

(a) A candidate is declared fail.
(b) A candidate did not appear in a semester examination / or he/she was not granted permission to appear in the examination.
(c) A candidate has been detained by the institute and subsequently has been permitted to take re-admission.
(d) A candidate has own desire to abandon the performance of semester(s) as stated in clause 9.3 (b) and 9.3 (c).

13. COURSES

13.1There will be four types of courses.

(i) Foundation Courses: The Foundation Courses are of two kinds: *Compulsory Foundation* and *Elective foundation*.

"Compulsory Foundation": These courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines.

"Foundation Electives": These are value-based courses aimed at man making education.

(ii) Core Courses: This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study.

(iii) Elective Courses: This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills.

(iv) Mandatory Courses: These courses are mandatory for students joining B.Tech. Program and students have to successfully complete these courses before the completion of degree.

13.2 The minimum number of students to be registered for an Elective to be offered shall be not less than twenty.

13.3 A student shall exercise his option in respect of the electives and register for the same at the beginning of the concerned semester. The student may be permitted to opt for change of elective subject within 15 days from the date of commencement of the semester as per the calendar of the University.

14. COMPUTATION OF SGPA, YGPA AND CGPA

14.1 The Dr. A.P.J.AbdulKalam Technical University (APJAKTU) Lucknow adopts absolute-grading system wherein the marks are converted to grades and every semester results will be declared with semester grade point average (SGPA). Yearly Grade Point Average (YGPA) shall be calculated at each year by calculating from the formula given in section 14.4 (b) of an academic year. The Cumulative Grade Point Average (CGPA) shall be calculated at the end of last semester of the program. The grading system is with the following letter grades and grade points scale as given below:

Level	Outstanding	Excellent	Very Good	Good	Above Average	Average	Poor	Fail
Letter Grade	A^+	A	B^+	B	C	D	E	F
Grade Points	10	9	8	7	6	5	4	00
Score (Marks) Range (%)	≥ 90 (90-100)	<90 (80-89)	<80, ≥70 (70-79)	<70, ≥60 (60-69)	<60 ,≥50 (50-59)	<50, ≥45 (45-49)	<45, ≥40 (40-44)	< 40 (0-39)

14. 2

(a) A student obtaining Grade 'F' in a subject shall be considered failed in that subject and will be required to reappear in the examination. Such students after passing the failed subject in subsequent examination(s) will be awarded with grade according to marks he/she scores in the subsequent examination(s).

(b) If a student's SGPA in a semester is less than 5 to be declared pass in that semester as laid down by clause 10.3 of the ordinance, he/she shall be allowed to appear in the improvement examination of the theory subjects of that semester. Such student after passing the said subjects in subsequent examination(s) will be awarded with grade according to marks he/she scores in the subsequent examination(s).

14.3

(a) The University has right to scale/moderate the theory exam/practical exam/sessional marks of any subject whenever required for converting of marks in to letter grades on the basis of the result statistics of university as in usual practice.

(b) The modality for moderation of marks before the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG and Controller of Examination.

(c) The modality for moderation of marks if needed after the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG, Controller of Examination and an external member not below the rank of Professor nominated by the Vice Chancellor.

(d) If the candidate(s) appeared in the examination but theory marks are not available due to missing of copy by any reason, the average marks may be awarded as decided by the committee mentioned in 14.3(a). In case of missing/unavailable of sessional marks, Controller of Examination can take decision as per the provision laid down by the Examination Committee.

(d) The Committee defined in14.3 (a) shall also fix up the responsibility and recommend the punishment for occurrence of such case(s) in14.3(c).

(e) All the matters defined under 14.3(a) to 14.3 (d) shall be executed subject to the approval of Academic Council of the APJAKTU.

14.4 **Computation of SGPA, YGPA and CGPA**

The following procedure to compute the Semester Grade Point Average (SGPA), Yearly Grade Point Average (YGPA) and Cumulative Grade Point Average (CGPA):

(a) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by 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 (Si) = Σ (Ci x Gi) / ΣCi where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

(b) The YGPA(Yearly Grade Point Average) is calculated at end of each year as:

$$YGPA= (SGPA_{(odd)} * \sum C_{i(odd)} + SGPA_{(even)} * \sum C_{i(even)} / (\sum C_{i(odd)} + \sum C_{i(even)})$$

(c) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e., CGPA = Σ (Ci x Si) / Σ Ci where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

(d) The SGPA shall be calculated at end of each semester and YGPA shall be calculated at the end of each academic year. CGPA shall be calculated at the end of last semester of the Program and shall be rounded off to 2 decimal places and reported in the transcripts / grade Sheet.

Illustration for Computation of SGPA, YGPA and CGPA

Computation of SGPA of odd semester Illustration No.1

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	5.5	B^+	8	5.5x8 = 44
Course 2	4	C	6	4x6 = 24
Course 3	5	B	7	5x7 = 35
Course 4	3	A^+	10	3x10= 30
Total	17.5			**133**

Thus, SGPA= 133/17.5 =7.6

Computation of SGPA of even semester Illustration No.2

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	5.5	B^+	8	5.5x8 = 44
Course 2	4	C	6	4x6 = 24
Course 3	5	B	7	5x7 = 35
Course 4	3	A^+	10	3x10= 30
Course 5	3	F	0	3x0= 00
Total	20.5			**133**

Thus, SGPA= 133/20.5 =6.48

$$YGPA= (SGPA_{(odd)} * \sum C_{i(odd)} + SGPA_{(even)} * \sum C_{i(even)} / (\sum C_{i(odd)} + \sum C_{i(even)})$$

Thus, YGPA = 7.6 * 17.5+6.48 *20.5 / (17.5 +20.5) = 6.99

Illustration No.2a

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 5	3.0	E	4	3.0 x 4 = 12

C_i (First Attempt) + C_i (Subsiquent Attempt) = 133 + 12 = 145

Thus SGPA= 145/20.5 = 7.07

CGPA after Final Semester

Semester	I	II	III	IV	V	VI	VII	VIII
Credit	17.5	20.5	21.0	21.0	21.0	21.0	20	18.0
SGPA	7	8.5	9.2	6.86	8.18	7.73	8.68	9.4

Thus, CGPA= (17.5*x*7 + 20.5*x*8.5 + 21*x*9.2 + 21*x*6.86 + 21*x*8.18 + 21*x*7.73 + 20*x*8.68 + 18*x*9.4)/160 =8.66

14.5 Grade sheet: Based on the above recommendations on Letter grades, grade points, SGPA of each semester and YGPA of an academic year, a consolidated grade sheet indicating performance in a particular academic year.

14.6 CGPA (calculated at the end of the last semester of the program) shall be issued.

15. **CONVERSION OF CGPA INTO PERCENTAGE**

Conversion formula for the conversion of CGPA into Percentage is (CGPA-0.75) x 10 = Percentage of marks scored.

Illustration: (8.66-0.75) x 10 =79.1%

16. **AWARD OF DIVISION, RANK AND MEDALS**

16.1 Division and CGPA shall be awarded only afterthe eighth and final semester examination based on integrated performance of the candidate for all the eight semesters (six semesters for lateral entry) as per following details.

(a) After successful completion of 160 credits, a student shall be eligible to get under graduate degree in engineering/technology. A student will be eligible to get undergraduate degree with honours only, if he/ she voluntary completes additional University recommended courses only (equivalent to 20 credits offered by NPTEL of 4 weeks, 8 weeks and 12 weeks shall be of 2, 3 and 4 credits respectively) through MOOCs. For registration to MOOCs courses, the students shall follow NPTEL site http://nptel.ac.in/as per the NPTEL policy and norms. These students can register for their courses through NPTEL directly as per the course offering in odd/even semesters at NPTEL. The registration fees will be borned by the student. These NPTEL courses (recommended by the university) may be cleared during the B.Tech degree program (not necessary one course in each semester). After successful completion of these MOOCs courses the students, shall, provide their successful completion NPTEL status/ certificates to the university (COE) through their college of study only. The student shall

be awarded **First division with Honours** Degree only if he/she secures 7.50 or above CGPA and passed each subject of that degree program in single attempt without any grace marks, without any gap along with successful completion of MOOCS based course of 20 credits.

(b) The student shall be awarded **First division with Distinction** Degree only if he/she secures 7.50 or above CGPA and passed each subject of that degree program in single attempt without any grace marks and without any gap.

(c) A candidate who qualifies for the award of the degree by securing E or above grades in all subjects of all the semesters (eight semesters/six semesters) as applicable, and secures CGPA less than 7.5 and greater than or equal to 6.5 shall be declared to have passed the examination in FIRST DIVISION.

(d) All other candidates who qualify for the award of degree by securing E or above grades in all subjects of all semesters (eight semesters/six semesters as applicable) and secures CGPA below6.5 and greater than or equal to 5.0 shall be declared to have passed the examination in

SECOND DIVISION.

16.2 For award of ranks in a branch, a minimum of 10 students should have appeared in the 8th semester examination. The total number of ranks awarded shall be 10% of total number of students appeared in 8th semester or 10 students, whichever is less in that branch.

Illustration:

1. If 1028 students appeared for the 8th semester in Electronics and Communication Engineering Branch, the number of ranks to be awarded for Electronics and Communication Engineering will

10.

2. If 90 students appeared for the 8th semester in Biomedical Engineering Branch, the number of ranks to be awarded for Biomedical Engineering will be 09.

For award of rank in a branch of Engineering / Technology, the CGPA secured by the student from

(a) 1st to 8th semester for the students admitted to B.E./B.Tech. Program from 1st year, and

(b) 3rd to 8th semester for the students admitted to B.E./B.Tech. Program from 2nd year (Lateral Entry)

shall be considered.

A student shall be eligible for a rank at the time of award of degree in each branch of Engineering / Technology, provided the student

(a) Has passed 1st to 8th (students joining from 1st semester) or 3rd to 8th (in case of lateral entry) semester in all the subjects in first attempt only

(b) Has not repeated/rejected any of the lower semesters.

If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA;* but, if it is not resolved even at this stage, the number of times a student has obtained higher grades like A^+, A, B^+, B etc shall be taken into account in rank ordering of the students in a program.

16.3 The Gold, Silver and any other Medals as decided by the university shall be awarded to students falls in the top ranks of various courses as per university rules.

17. SCRUTINY AND RE-EVALUATION

17.1 Scrutiny and re-evaluation shall be allowed in only theory papers.

17.2 Revaluation of theory/practical papers is permitted only with certain conditions as laid down by university.

18. UNFAIR MEANS

Cases of unfair means shall be dealt as per the rules and regulations of the University (**ANNEXURE-II**).

19. AWARD OF SESSIONAL MARKS

Sessional marks for theory subjects, practicals and project shall be awarded as prescribed and at present the break-up of sessional marks shall be as follows:

(a) Theory Subjects:

(i) Class test which will comprise 30 % of total theory marks with two mid-term tests of equal weightage.

(ii) Teacher Assessment Tutorial/Assignment/ Quizzes/ Attendance comprises 20% of total theory marks.

(b) Practicals,

(i) Two mid-term viva-voce/tests of equal weightage 30% of total Practical marks.

(ii) Teacher Assessment: Lab, Record/ Attendance 20% of total Practical marks.

(c) Make-up test may be held only for those students who could not appear in any one of mid-term class tests due to genuine reasons for which the prior permission from the Head of Institution/College was taken. Make up test shall ordinarily be held about two weeks before the semester examination. The syllabus for the make-up test shall be the whole syllabus covered by the subject teacher upto that time.

20. AWARD OF SEMINAR INDUSTRIAL TRAINING, EDUCATIONAL TOUR MARKS AT INSTITUTION/COLLEGE LEVEL

20.1 The marks of Seminar, Industrial Training, Educational tour marks shall be awarded on the following basis:

(i) Write-up / Report 50%

(ii) Presentation 50%

20.2 The marks in Seminar, Industrial Training and Educational Tour shall be awarded by a committee consisting of following members:

(i) Head of the Department or his/her nominee.

(ii) Concerned Officer – Incharge.

(iii) Senior Faculty Member of the department nominated by the Head of Department.

21. CANCELLATION OF ADMISSION

The admission of a student at any stage of study shall be cancelled if :

(a) He / She is not found qualified as per AICTE / State Government norms and guidelines or the eligibility criteria prescribed by the University. or

(b) He / She is found unable to complete the course within the stipulated time as prescribed in clause 4.2 or

(c) He / She is found involved in creating indiscipline in the Institution / College or in the University.

(a) The Academic Council shall have the power to relax any provision provided in the ordinance in any specific matter/situation subject to the approval of Executive Council of the University.

PROGRAMME OUTCOMES(POs)

PO1: Fundamental Engineering perspective: Apply the possess knowledge to solve complex computer-scienceandengineeringprob-
lems,usingmathematics,science,engineeringfundamentalsandanengineeringspecialization.

PO2: Problem Tackling Skills: Based on the principles of mathematics, basic sciences, and engineering. Itidentifies,formulateandsolvescomplexengineeringissues.

PO3: Blueprint designing skills: For public health, safety, cultural, environmental and other specific-needs,itdevelopssystemcomponent,processesandprovidesolution.

PO4: Investigative Skills: Creating, identifying and implementing appropriate techniques, resources, and-modern engineering and IT tools including predicting and modeling complex engineering activities with anunderstandingof limitations.

PO5: Sensitive towards Society: Apply reasoning informed by contextual knowledge to assess so-cial,health,safety,legalandculturalissuesandtheresultingresponsibilitiesrelevanttoprofessionalengineering.

PO6: Environment enthusiast: Understanding the effect of technical engineering solutions in social an-denvironmentalcontextsanddemonstratingtheawarenessofsustainabledevelopmentandneeds.

PO7:SenseofProfessionaletiquettes: Itgeneratessenseaboutprofessionalethicsandresponsibility.

PO8:Teamwork:Workasanindividual,asamemberorleaderinallmultidisciplinaryenvironments.

PO9: Expressive: Communicate effectively with the engineering community and with society at-large on complex engineering practices, such as being able to understand and write effectivere-ports and documents on design,making effective presentations, and providing and obtainingclear-guidance.

PO10: Quality of life: Engineering skills are used for solving personal as well as social problem-sandimprovethequalityoflife.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Ability to exhibit logical and critical thinking along with essential analytical skills that are crucialfor understanding, analyzing and developing the software and hardware solutions in the field of computer-scienceandengineering.

PSO2: Ability to develop software systems to enable the convenient use of the computing system andpos-sessprofessionalskillsandknowledgeaboutsoftwaredesignprocess.

PSO3: Ability to acquire knowledge in various fields of computer science, and to apply for successfulca-reerinindustry,entrepreneurshipand/orhigherstudies.

PSO4: Ability to use the knowledge of ethical and management principles required for teamwork as well asforteamleadership.

PSO5: Ability to detect real life/social problems or any industrial automation problems and articulate andresolve them using advance computer technologies like data science and some specialized area of computerscienceintendingtoemulatehumanintelligencesuchasmachinelearning,computervision,patternrecognition,Naturallanguageprocessing.

Course Structure and Evaluation Scheme for B.Tech.

SEMESTER-I

	Subject Name	Subject Code	PERIODS			EVALUATION SCHEME				END SEMESTER		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Engineering Mathematics-I	BT-114	3	1	0	30	20	50	-	100	-	150	3
2.	Engineering Physics	BT-115	3	1	0	30	20	50	-	100	-	150	3
3.	Principles of Soil Science	BT-116	2	1	0	15	10	25	-	50	-	75	2
4.	Workshop Technology and Practices	BT-117	2	1	0	15	10	25	-	50	-	75	2
5.	Environmental Science and Disaster Management	BT-118	3	1	0	30	20	50	-	100	-	150	3
6.	Communication Skills and Personality Development	BT-119	2	1	0	15	10	25	-	50	-	75	2
7.	Engineering Physics Lab	BT-165	0	0	2	-	-	-	20		30	50	1
8.	Principles of Soil Science Lab	BT-166	0	0	2	-	-	-	20		30	50	1
9.	Workshop Technology and Practices Lab	BT-167	0	0	2	-	-	-	20		30	50	1
10.	Communication Skills and Personality Development Lab	BT-169	0	0	2	-	-	-	20		30	50	1
11.	Engineering Drawing Lab	BT-168	0	0	4	-	-	-	25		50	75	2
	Total											**950**	**21**

Abbreviations: CT -ClassTest

TA-Teacher'sAssessmentESE-EndSemesterExamination

SEMESTER-II

	Subject Name	Subject Code	PERIODS			EVALUATION SCHEME				END SEMESTER		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Engineering Chemistry	BT-214	3	1	0	30	20	50	-	100	-	150	3
2.	Engineering Mechanics	BT-215	3	1	0	30	20	50	-	100	-	150	4
3.	Engineering Mathematics – II	BT-216	3	0	0	30	20	50	-	100	-	150	3
4.	Surveying & Leveling	BT-217	3	1	0	30	20	50	-	100	-	150	4
5.	Thermodynamics, Refrigeration & Air-Conditioning	BT-218	2	0	0	15	10	25	-	50	-	75	2
6.	Introduction to Agronomy & Horticulture	BT-219	2	0	0	15	10	25	-	50	-	75	2
7.	Engineering Chemistry Lab	BT-264	0	0	2	-	-	-	20		30	50	1
8.	Engineering Mechanics Lab	BT-265	0	0	2	-	-	-	20		30	50	1
9.	Surveying & Leveling Lab	BT-267	0	0	2	-	-	-	20		30	50	1
10.	Thermodynamics, Refrigeration & Air-Conditioning Lab	BT-268	0	0	2	-	-	-	20		30	50	1
	Total											**950**	**22**

SEMESTER-III

	Subject Name	Subject Code	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Engineering Mathematics - III	BT – 327	3	1	0	30	20	50	-	100	-	150	4
2.	Strength of Materials	BT – 328	3	1	0	30	20	50	-	100	-	150	3
3.	Principles of Horticulture Crops and Plant Protection	BT – 329	3	1	0	30	20	50	-	100	-	150	4
4.	Web designing and Internet Applications	BT – 330	2	1	0	15	10	25	-	50	-	75	2
5.	Heat & Mass Transfer	BT – 331	2	1	0	15	10	25	-	50	-	75	2
6.	Electrical Machines and Power Utilization	BT – 332	3	1	0	30	20	50	-	100	-	150	4
7.	Web designing and Internet Applications Lab	BT – 380	0	0	2	-	-	-	20	-	30	50	1
8.	Heat & Mass Transfer Lab	BT – 381	0	0	2	-	-	-	20	-	30	50	1
9.	Electrical Machines and Power Utilization Lab	BT – 382	0	0	2	-	-	-	20	-	30	50	1
	Total											**900**	**22**

SEMESTER-IV

	Subject Name	Subject Code	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Fluid Mechanics and open Channel Hydraulics	BT – 428	3	1	0	30	20	50	-	100	-	150	4
2.	Applied Electronics & Instrumentation	BT – 429	3	1	0	30	20	50	-	100	-	150	4
3.	Theory of Machines	BT – 430	3	1	0	30	20	50	-	100	-	150	4
4.	Soil Mechanics	BT – 431	2	1	0	15	10	25	-	50	-	75	3
5.	Entrepreneurship Development and Business Management	BT – 432	3	0	0	30	20	50	-	100	-	150	3
6.	Computer Programming and Data Structure	BT – 433	2	1	0	15	10	25	-	50	-	75	3
7.	Soil Mechanics Lab	BT – 481	0	0	2	-	-	-	20	-	30	50	1
8.	Fluid Mechanics and open Channel Hydraulics Lab	BT – 478	0	0	2	-	-	-	20	-	30	50	1
9.	Auto CAD Applications Lab	BT – 480	0	0	2	-	-	-	20	-	30	50	1
10.	Applied Electronics & Instrumentation Lab	BT – 479	0	0	2	-	-	-	20	-	30	50	1
11.	Computer Programming and Data Structure Lab	BT – 483	0	0	2	-	-	-	20	-	30	50	1
	Total											**1000**	**26**

SEMESTER-V

No.	Subject Name	Subject Code No.	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Watershed Hydrology	BT – 528	3	1	0	30	20	50		100		150	4
2.	Post HarvestEngineering of Cereals, Pulses & Oil seeds	BT – 529	3	1	0	30	20	50		100		150	4
3.	Machine Design	BT – 530	3	1	0	30	20	50		100		150	4
4.	Irrigation & Drainage Engineering	BT – 531	3	1	0	30	20	50		100		150	4
5.	Tractor Systems Controls	BT – 532	3	1	0	30	20	50		100		150	4
6.	Watershed Hydrology Lab	BT – 578	0	0	2				20		30	50	1
7.	Post HarvestEngineering of Cereals, Pulses & Oil seeds Lab	BT – 579	0	0	2				20		30	50	1
8.	Irrigation & Drainage Engineering Lab	BT – 581	0	0	2				20		30	50	1
9.	Mini Project/Internship **	BT – 580	0	0	2				50				1
	Total		**15**	**5**	**8**							**950**	**24**

** The Mini Project or Internship (4weeks) conducted during summer break after IVth Semester and will be assessed during Vth Semester.

SEMESTER-VI

No.	Subject Name	Subject Code No.	Periods			Evaluation Scheme			End Semester			Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Farm Machinery and Equipment – I	BT – 631	3	1	0	30	20	50		100		150	4
2.	Post Harvest Engineering of Horticultural Crops	BT – 632	3	1	0	30	20	50		100		150	4
3.	Soil and Water Conservation Engineering	BT – 633	3	1	0	30	20	50		100		150	4
4.	Fundamental of Renewable Energy Sources	BT – 634	3	1	0	30	20	50		100		150	4
5.	Building Construction and Cost Estimation	BT – 635	3	1	0	30	20	50		100		150	4
6.	Farm Machinery and Equipment – I Lab	BT – 681	0	0	2				20		30	50	1
7.	Post Harvest Engineering of Horticultural Crops Lab	BT – 682	0	0	2				20		30	50	1
8.	Soil and Water Conservation Engineering Lab	BT – 683	0	0	2				20		30	50	1
	Total		**15**	**5**	**6**							**900**	**23**

SEMESTER-VII

S. No.	Subject	Code No. Theory	Theory Max. Marks	Theory External	Theory Internal	Code No. Practical	Practical Max. Marks	Practical **External**	Practical **Internal**
1.	Farm Machinery Design	BT-731	150	100	50	-	-	-	-
2.	Dairy And Food Engineering	BT-732	150	100	50	-	-	-	-
3.	Ground Water Well & pump Engineering	BT-733	150	100	50	-	-	-	-
4.	Renewable energy	BT-734	75	50	25	-	-	-	-
5.	Soil &Water Conservation Structure	BT-735	75	50	25	-	-	-	-
6.	Elective –I Food Engineering / Watershed Management	BT-736/ BT -737	75	50	25				
7.	Dairy And Food Engineering Lab					BT-782	50	30	20
8.	Project	-	-	-	-	BT-784	100	-	100
9.	Training Seminar	-	-	-	-	BT-781	75	-	75
10.	Ground Water Well & pump Engineering Lab	-	-	-	-	BT-783	50	30	20
11.	General Proficiency	-	-	-	-	GP	50	-	50

SEMESTER-VIII

S. No.	**Subject**	**Code No. Theory**	**Theory Max. Marks**	**Theory External**	**Theory Internal**	**Code No. Practical**	**Practical Max. Marks**	**Practical External**	**Practical Internal**
1.	Irrigation & Drainage Equipment Design	BT-831	150	100	50	-	-	-	-
2.	Process Equipment Design	BT-832	150	100	50	-	-	-	-
3.	Advance Farm Power	BT-833	150	100	50	-	-	-	-
4.	Elective-II (MICAD)/ Food Industry Management	BT-834/ BT-835	75	50	25	-	-	-	-
5.	Irrigation & Drainage Equipment Design	-	-	-	-	BT-881	50	30	20
6.	Process Equipment Design	-	-	-	-	BT-882	50	30	20
7.	Project	-	-	-	-	BT-883	325	225	100
8.	General Proficiency	-	-	-	-	GP	50	-	50

BT - 114
EngineeringMathematics-I

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Use matrices, determinants and techniques for solving systems of linear equations in the differentareas of Linear Algebra, Understand the definitions of Vector Space and its linear Independence,SolveEigenvalueproblemsandapplyCayleyHamiltonTheorem.
- Study the functions ofmore than one independentvariable and calculate partial derivatives alongwiththeirapplications
- Explore the idea for finding the extreme values of functions and integrate a continuous function oftwoorthree variablesovera boundedregion.
- Understand Curl, divergence and gradient with their applications and have the idea of directionalderivativesandderivetheequationsof tangentplanesandnormallines.
- Calculate line integral, surface integral and volume integral and correlate them with the application ofStokes,GreenandDivergencetheorem.

UNIT-I

Differential calculus
Asymptotes- curves and curvature, partial differentiation - Euler's theorem, total differential coefficient.

UNIT-II

Taylor's theorem for two variables, maxima and minima, Lagrange's multiplier

UNIT-III

Integral calculus: Application of integral calculus, area enclosed by curves, length of arc. Volume and surface of solids of revolution, Evaluation of double and tripple integrals

UNIT-IV

Gamma and Beta functions- Dirichlet's integral. Simple tests of convergence of integrals

UNIT-V

Infinite series:Convergence and divergence of series, tests of convergence, Alternating series, Absolutely and conditionally convergent series, uniform convergence.

TextBooks:

1. E. Kreyszig, AdvancedEngineeringMathematics,John-Wiley& Sons
2. B.V.Ramana,HigherEngineeringMathematics,TataMeGraw-HillPublishingCompanyLtd.
3. R.K.Jain&S.R.K.lyenger.AdvanceEngineeringMathematics,NarosaPublishingHouse.

ReferenceBooks:

1. B.S.Grewal,HigherEngineeringMathematics,KhannaPublishers.
2. Peter V. O'Neil, AdvancedEngineeringMathematics,Thomas(Cengage)Learning.
3. Thomas&Finley, Calculus,NarosaPublishingHouse
4. Rukmangadachari,EngineeringMathematics-1,PearsonEducation.
5. A.C.Srivastava&P.K.Srivastava,EngineeringMathematics,Vol.l,PHILearningPvt.Limited,NewDelhi.

BT - 116
PRINCIPLE OF SOIL SCIENCE

L	T	P
2	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Students will gain knowledge on concepts and principles of Soil Science
- Comprehensive knowledge on rocks and minerals, their composition and the types of soils formed from different parent materials.
- Understand the role of soil forming factors and processes in soil formation
- Understand various soil physical, chemical and biological properties and their impact on plant growth.
- The knowledge gained in this course will be useful in understanding the behavior of soils in crop production and management

UNIT-I

Definition of soil, Rocks and minerals.Soil formation and classification.Soil survey methods. Land use capability and mapping. Major soil types of India,

UNIT-II

soil texture, classification of soil particles and their determination, bulk density, particle density and porosity, soil structure, types of soil structure and management,

UNIT-III

forms of soil water, retention and movement, saturated and unsaturated flow. Soil moisture contents, soil temperature and soil air.

UNIT-IV

Soil colloids, cation and anion exchange in soils, soil reactions and buffering capacity. Soil humus and its formation, C:N ratio. Saline and alkali soils and their reclamations.Significance of macro and Micro nutrients, Soil and water testing, Soil fertility management.Important fertilizers

BT-115
Engineering Physics

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course ,students are expected to have the ability to

- Todeveloptheconceptofrelativistic mechanicsandtoexplain itindifferentdomains.
- TodeveloptheunderstandingofModernPhysicsandtheirapplicationin-variousmicroandmacrosystems.
- To develop the understanding of Interference and Diffraction with different experi-mentalresults.
- To illustrate the nature of EM waves and to apply the ideas of production of different type-sof polarized light and to know about the components and types of laseri.e pulsed andcon-tinuouswave.
- Todeveloptheunderstandingofcomponentsandtypesofopticalfiberwith-lightpropagationmechanismand toillustrateconstructionand reconstructionofholograms.

UNIT-I

Surface tension- angle of contact, excess of pressure inside a spherical surface, capillary rise, determination of surface tension by Jaegers' method.Viscosity- Streamline and turbulent motion, coefficient of viscosity, critical velocity, Poiseuille's equation for flow of liquid through a tubes, viscometer.

UNIT-II

Interference-thin films- testing of the optical planeness of surfaces, Youngs' double slit experiment- coherent sources- lasers, intensity in youngs' experiment, interference in thin films, Newton's ring and Michelson interferometer.

Diffraction-Fraunhofer- diffraction at single slit, diffraction at a circular aperture, diffraction at double slit, diffraction gratings, resolving and dispersive power of a grating.

UNIT-III

Polarisation- Production and detection of circularly and elliptically polarised light. Quarter and half wave plates, optical activity, specific rotation, Lonentz half shade polarimeter. Determination of specific rotation and strength of sugar solution.

Lasers- Coherence temporal and spatial, Einstein's coefficient, spontaneous and stimulated emission, population inversion, laser gain, (pumping), spectral narrowing in lasers, coherence length, different types of laser source and their applications.

UNIT-IV

Crystal structure - Seven systems of crystals.Bravais space, lattice, crystal structure (bcc, fee and sc), lattice dimensions, lattice planes, miller indices and their significance, x-raysabsorption of X-rays diffraction-Bragg's law, Bragg's X-ray spectrometer. Nuclear radiations - Interaction of nuclear radiation with matter, scattering of charged particles from nucleus. Detection of radiation using G.M. counter and scintillation counter, radiation hazards, dosimetry.

UNIT-V

Quantum theory - Wave particle duality uncertainty principle, Schrodinger equation and its application to particle in box and harmonic oscillator.Ultrasonics- production, application in ranging, cleaning and drilling.Production and measurement of vacuum- Mechanical pumps (rotary vacuum pump), diffusion and condensation pumps, Gettestand measurement; Manometer, mecleod gauge, piram gauge. Measurement of temperature- Thermo e.m.f, measurement of thermo e.m.f. by potentiometer, higher temperature measurement by using pyrometers and resistance theorem.

BT-118
Environmental Science and Disaster Management

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Get the information about environment, ecosystem and also about its functions like Foodchain, Ecologicalpyramidsetc.
- Get the complete information about EIA- Environmental Impact Assessment in which thestudent will get the knowledge about the projects and the process involved in getting theprojects.
- Get the knowledge about the different types of resources like land, water, mineral and energyand also about the effects of environment by the usage of these resources. Also get theknowledgeabouttheanalysisof pollutedwater.
- Gain the knowledge about different types of pollution and their treatment techniques likewastewatertreatment, solidwastemanagementetc.,
- Get thecompleteinformationabouttheall legalaspectsofenvironment protection.

Unit-I

Environmental Studies: Scope and importance. Natural Resources: Renewable and nonrenewable resources Natural resources and associated problems.

Unit-II

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles. Ecosystems: Concept, Structure, function, Producers, consumers, decomposers, Energy flow, ecological succession, food chains, food webs, ecological pyramids. Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit-III

Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity and biogeographical 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. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.Pollution case studies.

Unit-IV

Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation.Consumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act.

Unit-V

Disaster Management:Natural Disasters and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

BT - 119
Communication Skills and Personality Development

L	T	P
2	1	0

CourseOutcomes(COs):

After the completion of the course ,students are expected to have the ability to

- Understandthecommunicationsystemforspecificpurpose.
- Beabletocommunicateprofessionally.
- Beabletocommunicateacrossorganizationallevelsandcultureseffectively.
- Beabletonegotiate withthe oddsandbringinbestoftheresultswithspecificsuccess.
- Beabletounderstandthe humanneedsandadjustaccordinglythesetgoals

UNIT I

Communication skills: Structural and functional grammar; Meaning and process of communication; Verbal and nonverbal communication; Listening and note taking; Writing skills; Oral presentation skills; Field diary and lab record; Indexing, footnote and bibliographic procedures; Reading and comprehension of general and technical articles;

UNIT II

Precise writing, summarizing, abstracting; Individual and group presentations; Impromptu presentation; Public speaking; Group discussion and interviews; Organizing seminars and conferences.

UNIT III

Voice modulation basics and their usage for meaningful impact on people; Attributes of an effective leader; Stress and conflict management; Time management: Personal organization, prioritizing and balancing; Cosmopolitan culture; Impact of non verbal communication; Science of body language; Role of team work.

BT – 117
WORKSHOP TECHNOLOGY AND PRACTICES

L	T	P
2	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Build thorough knowledge of various tools, machines, devices used in engineering practice.
- Acquire thorough knowledge of carrying out various operations in mechanical engineering workshop.
- Utilize measuring skills gained in workshop practice.
- Acquire "Hands on" training and practice to students for use of various tools, devices and machines.
- Acquire skills in basic engineering practice for creating objects from raw materials.
- Utilize practical skills in guiding works the trades.

UNIT-I

Carpentry shop- Seasoning and preservations of timber, glues, paints, varnishes and polish.

UNIT-II

Foundry- Nature of work done in foundry shop, preparation of sands like - Green, dry sand, molasses sand, hand tools and equipments used in a foundry shop, moulding, casting, patterns types, materials and allowances, moulding sands and moulding methods, casting practices, casting defects.

UNIT-III

Welding shop- Submerged arc welding, plasma welding, TIG and MIG welding, tools and equipments welding faults. Precaution taken while welding.

UNIT-IV

Machine shop- Introduction of computer in machine shop, necessity of numerical controlled machines, parts of NC machines, features of NC machines, advantage of NC machine over conventional milling machines, NC programming, computer numerical control machines, its advantage over NC machines, difference between CNC and DNC machines and its features.

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BT - 214
ENGINEERING CHEMISTRY

L	T	P
3	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- The students will gain knowledge of basic theories of solid materials, nano-materials and liquidcrystals.
- To demonstrate the knowledge of synthesisof polymeric material, which are required forengineeringapplications.
- Applybasicknowledge ofScience andfundamentalaspectofcellworking, equationsinsolving electrochemistry problems, functioning of lubricants and the techniques controlling thecorrosion.
- Analyze the water sample parameters & identify the impurities and its effects. Able to designprocess forpurificationofwaterthat isconcernwithsafetyofpublichealth& environment.
- Apply basic knowledge of fuels and experimental techniques used in identification of structureoforganic/inorganicmoieties.

UNIT-I

Water- Hardness, determination of hardness by complexim etric (EDTA) method, degree of hardness, Chloride dissolved oxygen, dissolved carbondioxide and sulphate, calorimetric methods for the determination of pH, control of pH of water used in industry Chemical.

UNIT-II

Fuels- Classification of fuels, solid fuels, coal- origin and its classification, proximate and ultimate analysis of coal. Significance of constituents, Gross and net calorific values, Determination of Calorific value by Bomb Calorimeter. Liquid Fuels- Advantages, Petroleum- origin, classification, refining of Petrol, Gasoline, knocking- octane number, chemical structure and knocking- Anti-knock agents, cracking. Gaseous Fuels-Advantages, manufacture, composition and calorific value of Coal gas and oil gas. Determination of Calorific value of gas by Junker's Calorimeter.Fuel gas analysis by Orsat apparatus. Calculations based on combustion.

UNIT-III

Corrosion- Defnation and its significance, theories of corrosion, Galvanic cell and concentration cell.Pitting and stress corrosion, Protection of corrosion.Use of inhibitors and passivasion.Alloying, protective coatings - Metallic, inorganic anil Organic.Cement- Manufacture of Portland cement, vertical shaft kiln technology, Chemistry of setting and hardening.Refractories- Definition, Properties, Classification, Properties of Silica and Fireclays refractories.Glass- preparation, varieties and uses.

UNIT-IV

Polymers: Plastics- Types of Plastics, Compounding of plastics and their fabrication. Rubber- Natural rubber, vulcanisation, elastomers and their uses.Fibers- Natural and synthetic fibers and use of Nylon, Terylene and Rayon. Lubricants- Classification, types of lubrication, properties and tests. (Viscosity and viscosity index. Flash and Fire point, cloud and pour point Emulsification)

UNIT-V

Chemical Kinetics- Order and molecularity of reaction, first and second order reaction.Derivation of equations for first order and second order reactions.Determination of order of reaction.Energy of activation and Arrhenus equation.Numericals of first and second order reactions.

BT - 215
ENGINEERING MECHANICS

L	T	P
3	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Problemsbyapplyingthefundamentalprinciplesofengineeringmechanicsandtoproceedtodesignanddevelopmentofthemechanicalsystems.
- Understandtherepresentationofforcesandmoments.
- Understandtheconcept ofstaticequilibriumofparticlesand rigidbodies.
- Abletounderstand theconceptofstressandstrain.

UNIT-I

Fundamentals of engineering mechanics, vector and scalar quantity.Conditions of equilibrium, Applications of principle of moments and couples. Study of coplaner and non coplaner force systems using analytical, vector and graphical approach.

UNIT-II

Internal forces in frames and trusses. Reactions of supports of frame. Free body diagram related problem. Analysis of frame, method of sections.Principle of virtual work.

UNIT-III

Application of laws of friction, wedge and block, screw jacks and brakes. Machines, reversible machine and non-reversible machine.Law of machine.Velocity ratio, mechanical advantage and efficiency of simple lifting machines.

UNIT-IV

Linear motion, velocity, acceleration.Projectile.Angular and curvi-linear motion.Laws of motion, relative velocity, rotational and translation motion. Centre of gravity, centroid, Moment of Inertia, radius of gyration, Newton's laws of motion. Work, power and Energy.

UNIT-V

Laws of conservation of energy and momentum.Collision of elastic bodies.Loss of kinetic energy on impact. Centrifugal and centripetal forces, super elevation, Governors, Simple harmonic motion, rope and belt drive, transmission of power by belts.

BT-216
ENGINEERING MATHEMATICS –II

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Use matrices, determinants and techniques for solving systems of linear equations in the differentareas ofLinear Algebra, Understand the definitions of Vector Space and its linear Independence, Solve EigenvalueproblemsandapplyCayleyHamiltonTheorem.
- Study the functions ofmore than one independentvariable and calculate partial derivatives alongwiththeirapplications.
- Explore the idea for finding the extreme values of functions and integrate a continuous function oftwoorthree variablesovera boundedregion.
- Understand Curl, divergence and gradient with their applications and have the idea of directionalderivativesandderivetheequationsof tangentplanesandnormallines.
- Calculate line integral, surface integral and volume integral and correlate them with the application ofStokes,GreenandDivergencetheorem.

UNIT-I

Vector calculus: Differentiation of vectors- directional derivatives, line, surface and volume integrals statement of Gauss, Green's and Stake's theorems and their application.

UNIT-II

Differential equations: Differential equations of first order first degree- Linear differential equations with constant coefficients- Homogeneous equations with variable coefficients.

UNIT-III

Application to practical problems, BesseFs and Legendres differential eqns, partial differential equations.

UNIT-IV

Matrices: Basic properties transpose, adjoins inverse and rank of a matrix. Solution of evaluation.Elementary transformation-characteristic equation, Cayley- Hamilton theorem.

BT-217
SURVEYING AND LEVELLING

L	T	P
3	1	2

CourseOutcomes(COs):

After the completion of the course ,students are expected to have the ability to

- Students will summarize surveying techniques that will remain correct for long period of time.
- Students will experiment about different methods using instrument such as Chain, Compass, Leveling, minor instruments like planimeter, etc.
- Students will learn about Area & Volume calculation.
- Students will evaluateabout Trigonometrically leveling.
- Students will analyze about simple & complex problems of different instrument methods of Survey.
- They will interpret different modern techniques using Surveying instrument such as Total Station, GPS etc.

UNIT-I *(Surveying)*

Principle and basic concepts of surveying Plans and maps• Classification of surveying• Basic measurements• Units of measurement• Types of Scales• Recording the measurement• Principal of chain surveying• Types of Chains• Types of Ranging and Chaining• Chain and tape errors•& corrections Selection of survey station and lines• Offset measurement• Cross Staff Optical Square-Prism Square• Obstacles in chaining and ranging•

UNIT-II *(Traversing)*

Methods of traversing• Prismatic compass• Surveyors compass• Angle and bearing•Quadrantal system• Local attraction• Dip of angle• magnetic declination• Plotting a traverse survey• Errors In compass survey• Bow ditch's rule• Transit rule•

UNIT-III *(Plane Tabling)*

Plane tabling instruments and accessories• Methods and principal•Two points problem• Three points problem• Errors in plane tabling•Planimeter Sextant Band level, Abney level• Clinometer, Pentameter• Computation of areas methods•

UNIT-IV *(Leveling)*

Definition , Basic principal of levelling• Benchmark• Types of levels optical• Principal causes telescopes sensitivity of bubble tubes• Leveling staff• Temporary adjustment, Permanent adjustment of levels• Field book entries• Reduction of levels missing entries ,• Types of levelling• Simple and differential levelling• Check leveling•& reciprocal leveling Precise levelling• profile leveling•

UNIT-V

Theodolite traversing• Theodolite Surveying • Ranging by theodolite• Temporary•& Permanent adjustment of theodolite.

BT-218
Thermodynamics, Refrigeration & Air-Conditioning

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Apply energy balance to systems and control volumes, in situations involving heat and work interactions.
- Evaluate changes in thermodynamic properties of substances.
- Evaluate the performance of energy conversion devices.
- Differentiate between high grade and low grade energies.

UNIT-I

Thermodynamics properties, closed and open system, flow and non-flow processes, gas laws,laws of thermodynamics, internal energy. Application of first law in heating and expansion ofgases in non-flow processes. First law applied to steady flow processes. Carnot cycle, Carnottheorem.Entropy, physical concept of entropy, change of entropy of gases in thermodynamicsprocess.Otto, diesel and dual cycles.

UNIT-II

Principles of refrigeration, - units, terminology, productionof low temperatures, air refrigerators working on reverse Carnot cycle and Bell Coleman cycle.Vapour refrigeration-mechanism, P-V,P-S,P-H diagrams, vapor compression cycles, dry and wetcompression, super cooling and sub cooling. Vapour absorption refrigeration system. Commonrefrigerants and their properties. Design calculations for refrigeration system Cold storage plants.

UNIT-III

Thermodynamic properties of moist air, perfect gas relationship for approximate calculation,adiabatic saturation process, wet bulb temperature and its measurement, psychometric chart andits use, elementary psychometric process.

UNIT-IV

Air conditioning – principles –Type and functions ofair conditioning, physiological principles in air conditioning, air distribution and duct designmethods, fundamentals of design of complete air conditioning systems – humidifiers anddehumidifiers – cooling load calculations, types of air conditioners – applications.

BT-219
Introduction to Agronomy & Horticulture

L	T	P
2	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Agronomy is basically innovation in farming system.
- It plays major roles in agriculture and preservation of natural resources with sustainable land use.
- It emphases on agro climatology and modeling systems.
- It also provides ecological pest control and utilization of bio pesticides.
- Risk assessment for food eco toxicological management.

UNIT-I

Agronomy, scope and its role in crop production-Major Field crops of India classification,area, distribution and productivity of major Field crops. Farming and cropping systems mono, sole and multiple cropping, relay, sequential and inter cropping.

UNIT-II

Tillage- definitionobjectives– types of tillage- tillage implements –tilth - characteristics of good tilth– Soilproductivity and fertility- Crop nutrition – nutrients –classification – Nutrient sourcesorganicmanures – fertilizers – biofertilizers- Integrated Nutrient Management-Importance ofwater in plant growth- Soil properties influencing moisture availability – texture, structure and organic matter status

UNIT-III

Weed control – definition and characteristicsof weeds, classification of weeds – damages due to weeds - benefits of weeds. -Control vsprevention of weeds – methods of weed control-Classification of herbicides– Integrated weedmanagement.

UNIT-IV

Soil and its management-Definitions and importance of horticulture- Economicimportance and classification of horticultural crops and their culture and nutritive value- areaand production- exports and imports- fruit, vegetables, plantation and spice crops-soil andclimate–principles-planning and layout- management of orchards- planting systems andplanting densities- Principles and methods of pruning and training of fruit, plantation cropsuseof growth regulators in horticulture crops-Horticultural zones of state and country.

BT- 327
ENGINEERING MATHEMATICS –III

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Solve problems in engineering domain related to Linear Algebra using matrices.
- Analyze and solve engineering problems using Cauchy Riemann equations.
- Analyze and solve engineering problems using Fourier series.
- Solve engineering problems using Complex Integration.

UNIT-I

Laplace transforms

Standard unit step functions, periodic functions - convolution theorem, application of ordinary differential equations with constant coefficients.

UNIT-II

Complex variables

Analytic functions - Cauchy Riemann equations- complex integration. Cauchy fundamental theorem - residues - residue theorem- Cauchy Lemma and Jordenslemma contour integration,

UNIT-III

Fourier series- Dirichlet's condition, Errors and approximation in numerical computations.

UNIT-IV

Method of finite differences- finite difference operators- integration - first and second order linear finite difference equations with constant coefficients. Interpolation methods for solving simultaneous linear algebraic equations.

BT-329
Principles of Horticulture Crops and Plant Protection

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Identify and practice safe use of tools, equipment and supplies used in horticulture careers.
- Propagate, grow, and maintain plants in horticulture production systems
- Identify and prescribe sustainable options in horticulture which benefit the environment while maintaining productivity and economic viability.
- Apply horticultural skills and knowledge to operate various business entities found in the horticultural industry.
- Apply relevant mathematical principles and calculations inherent in all aspects of the Horticultural Industry.

UNIT-I

Introduction of horticulture, Scope of horticultural crops. Soil and climatic requirements for fruits, vegetables and floriculturecrops, improved varieties.

UNIT-II

Criteria for site selection, layout and planting methods, nursery raising,commercial varieties/hybrids, sowing and planting times and methods.

UNIT-III

Seed rate and seedtreatment for vegetable crops; macro and micro propagation methods, plant growing structures,pruning and training, crop coefficients.

UNIT-IV

Harvesting, grading and packaging, post harvest practices, Gardentools, management of orchard, Extraction and storage of vegetables seeds.Major pests and diseasesand their management in horticulture crops, food preservation, jam, jelly, pickels, canning.

BT-328
STRENGTH OF MATERIALS

L	T	P
3	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Understand the concepts and effects of materials under various loads and the effect of loads.
- Analyze structural designs subject to various forces and loads.
- Analyze columns and pressure vessels under various loads.
- Understand engineering responsibility and ethics as it applies to the design of machine parts and structures.
- Illustrate the concepts of stress and strain at a point and the stress/strain relationship.

UNIT-I

Elasticity- stress and strain- elastic limit- Hooke's law- Young's modulus- stresses in bar due to its own weight, varying sections and uniformly tapering circular bars- primary and secondary strain- bulk and shear modulus and their relationship- volumetric strain in a body, Principle stresses and strains, Mohr's circle.

UNIT-II

Temperature stresses, Resilience. Shear force and bending moment diagram for simply supported beams and cantilever beamscentroid of different cross sectional laminae, moment of inertia, parallel axis theorem and perpendicular axis theorem- moment of inertia of different cross sectional laminae.

UNIT-III

Stresses in thin cylinder and spherical shells-derivation of equations for circumferential and longitudinal stresses in shells and their applications- combined bending and direct thrust- middle third rule- eccentricity of load- stability of dam profile,

UNIT-IV

columns and struts assumptions made in Euler's theory- derivation of buckling load equation for both the ends hinged, one end fixed and the other end free- empirical formulae for columns,

UNIT-V

Derivation of torsional equation- bending stress in beams- derivation of bending equation- shearing stresses in beams-derivation of shearing stresses equation- deflection- derivation of double order differential equation- Macanlay's method

BT-330
Web designing and Internet Applications

L	T	P
2	1	2

CourseOutcomes(COs):
After the completion of the course, students are expected to have the ability to

- Be able to use the HTML programming language.
- Resolves written HTML codes.
- Runs the page he/she has designed using HTML codes.
- Be able to use the Design Programs.
- Uses Microsoft Expression Web 4 programme.
- Designs site and page via Microsoft Expression Web 4 programme.
- Uses the program Web Page Maker

Unit-I
Basic principles in developing a web designing, Planning process, Five Golden rules of webdesigning,

Unit-II
Designing navigation bar, Page design, Home Page Layout, Design Concept. Basics inWeb Design, Brief History of Internet.

Unit-III

World Wide Web, creation of a web site, Web Standards,Audience requirement.

Unit-IV
Introduction to Java Script, variables & functions, Working with alert,confirm and prompt, Connectivity of Web pages with databases; Project.

BT-331
HEAT AND MASS TRANSFER

L	T	P
2	1	0

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Ability to understand and solve conduction, convection and radiation problems
- Ability to design and analyze the performance of heat exchangers and evaporators
- Ability to design and analyze reactor heating and cooling systems

Unit-I

Modes of heat transfer, thermal conductivity of materials, General differential equation of conduction, One dimensional steady state conduction through plane and composite walls, tubes and spheres without heat generation. Insulation materials, critical thickness of insulation.

Unit-II

Introduction to Fins, Free and forced convection, Heat transfer coefficient in convection. Newton's law of cooling. Dimensional analysis of free and forced convection. Equation of laminar boundary layer on flat plate and in a tube, Laminar forced convection on a flat plate and in a tube, combined free and forced convection.

Unit-III

Introduction to absorptivity, reflectivity and transmissivity of radiation. Black body and monochromatic radiation, Planck's law, Stefan-Boltzman law, Kirchoff's law, grey bodies and emissive power, solid angle, intensity of radiation. Introduction to mass transfer, Fick's law, and mass transfer coefficients.

Unit-IV

Introduction to Heat Exchanger, types of heat exchangers, log mean temperature difference, heat exchanger performance, transfer units. Heat exchanger analysis restricted to parallel and counter flow heat exchangers

BT-332
Electrical Machines and Power Utilization

L	T	P
3	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Explain the theory of ideal synchronous machines and, basic machine relation.
- Analyze and apply the concept of steady state analysis and electrical transients in polyphase machines.
- Examine the starting and running performance of single phase induction motor and revolving field theory.
- Make use of various speed control system for AC motors.
- Evaluate the basic operation and performance of special machines and can select special machines for different purpose.

Unit-I

Electro motive force, reluctance, laws of magnetic circuits, determination of ampere-turns forseries and parallel magnetic circuits, hysteresis and eddy current losses, Transformer: principle ofworking, construction of single phase transformer, EMF equation, phasor diagram on load, leakagereactance, voltage regulation, power and energy efficiency, open circuit and short circuit tests,principles,

Unit-II

operation and performance of DC machine (generator and motor), EMF and torqueequations, armature reaction, commutation, excitation of DC generator and their characteristics,DC motor characteristics, starting of shunt and series motor, starters, speed control methods-fieldand armature control, polyphase

Unit-III

induction motor: construction, operation, phasor diagram, effectof rotor resistance, torque equation, starting and speed control methods, single phase inductionmotor: double field revolving theory, equivalent circuit, characteristics, phase split, shaded polemotors, various methods of three phase power measurement; power factor, reactive and apparentpower,

Unit-IV

Concept and analysis of balanced poly-phase circuits; Series and parallel resonance.

BT-428
Fluid Mechanics and open Channel Hydraulics

L	T	P
3	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Apply properties of fluids like viscosity, density, specific weight etc.
- Apply pressure in fluid-flowing pipes and vessels
- Evaluate various kind of pressure measuring instruments.
- Creativecontinuity equation and energy equations in flow measurement.
- Analyses of open channels for irrigation purposes.

UNIT-I

Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal's law, pressureforces on plane and curved surfaces, center of pressure, buoyancy, meta center and meta centricheight, condition of floatation and stability of submerged and floating bodies;

UNIT-II

Kinematics offluid flow: Lagrangian and Eulerian description of fluid motion, continuity equation, path lines,streak lines and stream lines, stream function, velocity potential and flow net. Types of fluid flow,translation, rotation, circulation and vorticity, Vortex motion; Dynamics of fluid flow, Bernoullistheorem, venturimeter, orifice meter and nozzle, siphon; Laminar flow: Stress strain relationships,flow between infinite parallel plates both plates fixed, one plate moving, discharge, averagevelocity;

UNIT-III

Laminar and turbulent flow in pipes, general equation for head loss Darcy, Equation,Moody's diagram, Minor and major hydraulic losses through pipes and fittings, flow throughnetwork of pipes, hydraulic gradient and energy gradient;

UNIT-IV

Flow through orifices (Measurementof Discharge, Measurement of Time),Flow through Mouthpieces, Flow over Notches , Flow overweirs, Chezy's formula for loss of head in pipes, Flow through simple and compound pipes, Openchannel design and hydraulics:

UNIT-V

Chezy's formula, Bazin's formula, Katter's Manning's formula,Velocity and Pressure profiles in open channels, Hydraulic jump; Dimensional analysis andsimilitude: Rayleigh's method and Buckingham's `Pi' theorem, types of similarities, dimensionalanalysis, dimensionless numbers. Introduction to fluid machinery.

BT-429
Applied Electronics & Instrumentation

L	T	P
3	1	2

CourseOutcomes(COs):

After the completion of the course, students are expected to have the ability to

- Recognize the evolution and history of units and standards in Measurements.
- Identify the various parameters that are measurable in electronic instrumentation.
- Employ appropriate instruments to measure given sets of parameters.
- Practice the construction of testing and measuring set up for electronic systems.
- To have a deep understanding about instrumentation concepts which can be applied to Control systems.
- Relate the usage of various instrumentation standards.

Unit-I

Semiconductors. p—n junction. V—I characteristics of p—n junction. diode as a circuitelement. rectifier. clipper. damper, voltage multiplier, capacitive filter. diode circuits for OR &AND(both positive and negative logic), bipolar junction transistor: operating point. classification (A.B& C) of amplifier. various biasing methods (fixed. self potential divider). h-parameter model ofa transistor. analysis of small signal.

Unit-II

CE amplifier. phase shift oscillator, analysis of differentialamplifier using transistor. ideal OP-AMP characteristics. linear and non-linear applications ofOP-AMP (adder. subtractor. integrator, active rectifier. comparator. differentiator. differential,instrumentation amplifier and oscillator).

Unit-III

Zener diode voltage regulator. transistor series regulator.current limiting. OP-AMP voltage regulators. Basic theorem of Boolean algebra.

Unit-IV

Combinationallogic circuits(basic gates. SOP rule and Kmap). binary ladder D/A converter, successiveapproximation A/D converter, generalized instrumentation, measurement of displacement.temperature.

Unit-V

velocity, force and pressure using potentiometer. resistance thennometer.thermocouples. Bourclen tube. LVDT. strain gauge and tacho-generator.

BT-430
Theory of Machines

L	T	P
3	1	0

Course Outcomes(COs):

After the completion of the course ,students are expected to have the ability to

- Distinguish kinematic and kinetic motion.
- Identify the basic relations between distance, time, velocity, and acceleration.
- Apply vector mechanics as a tool for solving kinematic problems.
- Create a schematic drawing of a real-world mechanism.
- Determine the degrees-of-freedom (mobility) of a mechanism.
- Use graphical and analytic methods to study the motion of a planar mechanism.
- Use computer software to study the motion of a mechanism.
- Design basic gear trains.
- Design basic cam systems.

Unit-I

Elements, links, pairs, kinematics chain, and mechanisms.Classification of pairs andmechanisms.Lower and higher pairs. Four bar chain, slider crank chain and their inversions.Determination of velocity and acceleration using graphical (relative velocity and acceleration)method. Instantaneouscenters.

Unit-II

Types of gears.Law of gearing, velocity of sliding between twoteeth in mesh. Involute and cycloidal profile for gear teeth. Spur gear, nomenclature, interferenceand undercutting.Introduction to helical, spiral, bevel and worm gear. Simple, compound,reverted, and epicyclic trains. Determining velocity ratio by tabular method. Turning momentdiagrams, coefficient of fluctuation of speed and energy, weight of flywheel, flywheel applications.

Unit-III

Belt drives, types of drives, belt materials. Length of belt, power transmitted, velocity ratio, beltsize for flat and V belts. Effect of centrifugal tension, creep and slip on power transmission, Chaindrives. Types of friction, laws of dry friction. Friction of pivots and collars. Single disc, multipledisc, and cone clutches. Rolling friction, anti friction bearings.

Unit-IV

Types of governors. Constructionaldetails and analysis of Watt, Porter, Proell governors. Effect of friction, controlling force curves.Sensitiveness, stability, hunting, iso-chronism, power and effort of a governor. Static and dynamicbalancing. Balancing of rotating masses in one and different planes.

BT-431
SOIL MECHANICS

L	T	P
2	1	2

Course Outcomes(COs):

After the completion of the course, students are expected to have the ability to

- Explain the importance of advanced concepts and theories in soil mechanics
- Predict the suitability of clayey soil for various geotechnical applications
- Familiarity with advanced equipments.
- Analyze and interpret the state of stress in soil and evaluate various failure criteria for soils
- Knowledge on critical state model for the deformation and strength of soils
- To impart the knowledge of basic properties of soil, analysis of stresses, bearing capacity of soil etc.

UNIT-I

Introduction of soil mechanics, field of soil mechanics, phase diagram, physical and indexproperties of soil, classification of soils, effective and neutral stress, elementary concept ofBoussinesq and Wester guards analysis, new mark influence chart. Seepage Analysis;

UNIT-II

Quickcondition-two dimensional flow-Laplace equation, Velocity potential and stream function, Flownet construction. Shear strength, Mohr stress circle, theoretical relationship between principlestress circle, theoretical relationship between principal stress, Mohr coulomb failure theory,effective stress principle. Determination of shear parameters by direct shear test, triangle test &vane shear test. Numerical exercise based on various types of tests.

UNIT-III

Compaction, compositionof soils standard and modified protector test, abbot compaction and Jodhpur mini compactiontest field compaction method and control. Consolidation of soil: Consolidation of soils, onedimensional consolidation spring analogy,

UNIT-IV

Terzaghi's theory, Laboratory consolidation test,calculation of void ratio and coefficient of volume change, Taylor's and Casagrande's method,determination of coefficient of consolidation. Earth pressure: plastic equilibrium in soils, activeand passive states,

UNIT-V

Rankin's theory of earth pressure, active and passive earth pressure for cohesivesoils, simple numerical exercises. Stability of slopes: introduction to stability analysis of infiniteand finite slopes friction circle method, Taylor's stability number.

BT-432
Entrepreneurship Development and Business Management

L	T	P
2	1	0

Course Outcomes(COs):

After the completion of the course, students are expected to have the ability to

- To explain concepts of Entrepreneurship and build an understanding about business situations in which
- entrepreneurs act.
- To qualify students to analyze the various aspects, scope and challenges under an entrepreneurial venture.
- To explain classification and types of entrepreneurs and the process of entrepreneurial project development.
- To discuss the steps in venture development and new trends in entrepreneurship.

Unit-I

Entrepreneurship, management – Management functions – planning- Organizing -Directing motivation – ordering – leading – supervision-Communication and control – Capital – Financialmanagement – importance of financial statements – balance sheet – profit and loss statement,Analysis of financial statements – liquidity ratios – leverage ratios, Coverage ratios – turnoverratios – profitability ratios, Agro-based industries – Project – project cycle – Project appraisaland evaluation techniques – undiscounted measures – payback period – proceeds per rupee ofoutlay, Discounted measures –

Unit-II

Net Present Value (NPV) – Benefit-Cost Ratio (BCR) – InternalRate of Return (IRR) – Net benefit investment ratio (N / K ratio) – sensitivity analysis-Importanceof agribusiness in Indian economy International trade-WTO agreements – Provisions related toagreements in agricultural and food commodities. Agreements on agriculture (AOA).

Unit-III

Domesticsupply, market access, export subsidies agreements on sanitary and phyto-sanitary (SPS) measures,Trade related intellectual property rights (TRIPS). Development (ED): Concept of entrepreneurand entrepreneurship Assessing overall business environment in Indian economy– Entrepreneurialand managerial characteristics- Entrepreneurship development Programmes (EDP)- Generationincubation and commercialization of ideas and innovations- Motivation and entrepreneurshipdevelopment-

Unit-IV

Globalization and the emerging business entrepreneurial environment- Managingan enterprise: Importance of planning, budgeting, monitoring evaluation and follow-up managingcompetition. Role of ED in economic development of a country- Overview of Indian social, politicalsystems and their implications for decision making by individual entrepreneurs.

Unit-V

Economicsystem and its implications for decision making by individual entrepreneurs- Social responsibilityof business. Morals and ethics in enterprise management- SWOT analysis- Government schemesand incentives for promotion of entrepreneurship. Government policy on small and mediumenterprises (SMEs)/SSIs/MSME sectors- Venture capital (VC), contract farming (CF) and jointventures (JV), public-private partnerships (PPP)- Overview of agricultural engineering industry,characteristics of Indian farm machinery industry.

BT-433
Computer Programming and Data Structure

L	T	P
2	1	2

Course Outcomes(COs):

After the completion of the course, students are expected to have the ability to

- Classify different data structures such as stack, queues, linked list, trees and graphs.
- Analyze and implement various searching and sorting techniques.
- Implement linear and non-linear data structures.
- Apply appropriate data structures to solve specific problems.
- Evaluate algorithms and data.

Unit-I

Introduction and historical background: Review of computer technology; Processor, memory,secondary storage, display devices and other peripheral devices; Basic computer organization,future trends; Brief review of present-day applications, programming; Introduction to systemssoftware, applications software and programming language; Algorithms and flow-charts: Inputprocessing-output model of a computer program; Role of the compiler and the integrateddevelopment environment.

Unit-II

Introduction to C: Structure of a C program, simple data types,declarations, operators and expressions; The assignment statement; Library functions; ControlStructures: Conditional and iterative execution of statements; Importance of documentation;Nesting of control structures and the use of indentation to indicate nesting levels; Labels andthe “go to” statement; Arrays; Single and multi-dimensional arrays: Character strings andstring functions; Functions: Scope rules; Argument passing by reference and by value; Storageclasses; Use of function prototypes.

Unit-III

Structures, unions and user-defined types; Operations onfiles: Concept of standard input and output files; Formatting of data on input and output; Useof include files; Introduction to high level languages; Primary data types and user defined datatypes.

Unit-IV

Variables, typecasting, operators, building and evaluating expressions, standard libraryfunctions, managing input and output, decision making, branching, looping, arrays, user definedfunctions, passing arguments and returning values, recursion, scope and visibility of a variable,string functions, structures and union, pointers, stacks, push/pop operations, queues, insertionand deletion operations, linked lists.

BT-528
Watershed Hydrology

L	T	P
3	1	2

Course Outcomes(COs):

After the completion of the course, students are expected to have the ability to

- Describe watersheds, its classes and characteristics.
- Explain hydrological processes.
- Explain watershed management.
- Describe how watershed plays crucial role in determining food.
- Social, and economical security and provides life support services to rural people.

Unit-I

Hydrologic cycle, precipitation and its forms, rainfall measurement and estimation of meanrainfall, frequency analysis of point rainfall. Mass curve, hyetograph, depth-area-duration curves andintensity-duration-frequency relationship.

Unit-II

Hydrologic processes-Interception, infiltration –factorsinfluencing, measurement and indices. Evaporation - Estimation and measurement. Runoff -Factors affecting, measurement, stage - discharge rating curve, estimation of peak runoff rateand volume, Rational method, Cook's method and SCS curve number method.

Unit-III

Geomorphologyof watersheds – Linear, aerial and relief aspects of watersheds- stream order, drainage densityand stream frequency. Hydrograph - Components, base flow separation, unit hydrograph theory,S-curve, synthetic hydrograph, applications and limitations. Stream gauging - discharge ratingcurves, flood peak, design flood and computation of probable flood.

Unit-IV

Flood routing – channel andreservoir routing. Drought – classification, causes and impacts, drought management strategy.

BT-529
Post-Harvest Engineering of Cereals, Pulses & Oil seeds

L	T	P
3	1	2

Course Outcomes(COs):

After the completion of the course, students are expected to have the ability to

- Use the different types of sorting, grading, peeling, slicing, blanching and other equipment for processing of fruits and vegetables.
- Identify the suitable equipment, materials, and methods for storage, processing, packaging, and value addition of fruits and vegetables.
- Develop at least 4 types of value-added products from fruits and vegetables.
- Understand the technical and management aspects of the operation of fruits and vegetable processing industries.

Unit-I

Cleaning and grading, aspiration, scalping; size separators, screens, sieve analysis, capacity and effectiveness of screens. Various types of separators: specific gravity, magnetic, disc, spiral, pneumatic, inclined draper, velvet roll, colour sorters, cyclone, shape graders. Size reduction: principle, Bond's law, Kick's law, Rittinger's law, procedure (crushing, impact, cutting and shearing), Size reduction machinery: Jaw crusher, Hammer mill, Plate mill, Ball mill.

Unit-II

Material handling equipment. Types of conveyors: Belt, roller, chain and screw. Elevators: bucket, Cranes & hoists. Trucks (refrigerated/ unrefrigerated), Pneumatic conveying. Drying: moisture content and water activity; Free, bound and equilibrium moisture content, isotherm, hysteresis effect, EMC determination, Psychrometric chart and its use in drying.

Unit-III

Drying principles and theory, Thin layer and deep bed drying analysis, Falling rate and constant rate drying periods, maximum and decreasing drying rate period, drying equations, Mass and energy balance, Shedd's equation, Dryer performance, Different methods of drying, batch-continuous; mixing-non-mixing, Sunmechanical, conduction, convection, radiation, superheated steam, tempering during drying, Different types of grain dryers: bin, flat bed, LSU, columnar, RPEC, fluidized, rotary and tray.

Unit-IV

Mixing: Theory of mixing of solids and pastes, Mixing index, types of mixers for solids, liquid foods and pastes. Milling of rice: Conditioning and parboiling, advantages and disadvantages, traditional methods, CFTRI and Jadavpur methods, Pressure parboiling method, Types of rice mills, Modern rice milling, different unit operations and equipment.

Unit-V

Milling of wheat, unit operations and equipment. Milling of pulses: traditional milling methods, commercial methods, pre-conditioning, dry milling and wet milling methods: CFTRI and Pantnagar methods. Pulse milling machines, Milling of corn and its products. Dry and wet milling. Milling of oilseeds: mechanical expression, screw press, hydraulic press, solvent extraction methods, preconditioning of oilseeds, refining of oil, stabilization of rice bran., Extrusion cooking: principle, factors affecting, single and twin screw extruders. By-products utilization.

BT-530
Machine Design

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Enable students to attain the basic knowledge required to understand, analyze, design and select machine elements

required in transmission systems.

- Reinforce the philosophy that real engineering design problems are open-ended and challenging Impart design skills to the students to apply these skills for the problems in real life industrial applications.
- Inculcate an attitude of team work, critical thinking, communication, planning and scheduling through design

projects

- Create awareness amongst students about safety, ethical, legal, and other societal constraints in executionof their

design projects.

- Develop an holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems

Unit-I

Meaning of design, Phases of design, design considerations. Common engineering materialsand their mechanical properties. Types of loads and stresses, theories of failure, factor of safety,selection of allowable stress.

Unit-II

Stress concentration. Elementary fatigue and creep aspects. Cotterjoints, knuckle joint and pinned joints, turnbuckle. Design of welded subjected to static loads.

Unit-III

Design of threaded fasteners subjected to direct static loads, bolted joints loaded in shear andbolted joints subjected to eccentric loading. Design of shafts under torsion and combined bendingand torsion. Design of keys. Design of muff, sleeve, and rigid flange couplings. Design of helicaland leaf springs.

Unit-IV

Design of flat belt and V-belt drives and pulleys. Design of gears. Design of screwmotion mechanisms like screw jack, lead screw, etc. Selection of anti-friction bearings.

BT-531
Irrigation & Drainage Engineering

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Remember about the irrigation schemes and present status of water resources in India. Also understand the various methods for the measurement of irrigation water.
- Analyze the design of open channel water conveyance system, underground pipe conveyance system & control and distribution of on-farm structures for water conveyance.
- Solve the real world problem of land grading and understand the soil-water-plant relationship.
- Apply the concept of ET to determine the water requirement of crops. Also able to remember the adaptability merits, demerits,specification and analyze the design considerations of border, check basin, furrow irrigation, drip and sprinkler irrigation methods.
- Analyze agricultural land drainage problems and suggest scientific remedial measures for them.

Unit I

Definition, need of irrigation, Purpose of irrigation, importance of irrigation, sources of irrigation water, present status of development and utilization of different water resources of the country; common irrigation terminology.

Unit II

Soil-water- plant-relationship, soil properties influencing irrigation management, soil water movement, concept of evapo-transpiration, soil moisture constants, measurement of soil moisture, depth of irrigation, frequency of irrigation, irrigation scheduling.

Unit III

Water and irrigation requirement of crops, measurement of irrigation water, weir, notches, flumes and orifices and other methods; water conveyance, irrigation efficiencies.

Unit IV

Irrigation methods of water application, border, check basin, furrow and contour irrigation; sprinkler and drip irrigation method, merits, demerits, selection and layout.

Unit V

Water logging- causes and impacts; drainage, need of drainage, Purpose of drainage, importance of drainage objectives of drainage, types of surface drainage, design of surface drains; sub-surface drainage: purpose and benefits, conjunctive use of fresh and saline water.

BT-532
Tractor Systems Controls

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Understand tractor system and mechanisms of different parts.
- Understand various types of brakes, steering and hydraulic systems of a tractor. • tap power through different power outlets such as drawbar, PTO and belt pulley.
- Enhancing employability & higher study scope in tractor chassis design and traction theory.
- Increase skills of students by study of ergonomial and safety considerations in Tractor.

Unit-I

Study of need for transmission system in a tractor. Transmission system – types, majorfunctional systems. Study of clutch – need, types, functional requirements, construction andprinciple of operation. Familiarization with single plate, multi-plate, centrifugal and dual clutchsystems. Study of Gear Box – Gearing theory, principle of operation, gear box types, functionalrequirements, and calculation for speed ratio.

Unit-II

Study of differential system – need, functionalcomponents, construction, calculation for speed reduction. Study of need for a final drive.Study of Brake system – types, principle of operation, construction, calculation for brakingtorque. Study of steering system – requirements, steering geometry characteristics, functionalcomponents, calculation for turning radius.

Unit-III

Familiarization with Ackerman steering. Steeringsystems in track type tractors. Study of Hydraulic system in a tractor – Principle of operation,types, main functional components, functional requirements.

Unit-IV

Familiarization with the Hydraulicsystem adjustments and ADDC. Study of tractor power outlets – PTO. PTO standards, types andfunctional requirements. Introduction to traction. Traction terminology. Theoretical calculationof shear force and rolling resistance on traction device. Study of wheels and tyres– Solid tyres andpneumatic tyres, tyre construction and tyrespecifications. Study of traction aids. Study of tractormechanics – forces acting on the tractor. Determination of CG of a tractor.

Unit-V

Determination andimportance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stabilityespecially at turns. Determination of maximum drawbar pull. Familiarization with tractor as aspring-mass system. Ergonomic considerations and operational safety. Introduction to tractortesting. Deciphering the engine test codes.

BT-631
Farm Machinery and Equipment-I

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- It can handle more areas per unit of time.
- It works faster and more efficient.
- It reduces cost of labor and total cost of production.
- It is not affected by disease.

UNIT-I

Introduction to farm mechanization. Classification of farm machines. Unit operations incrop production. Identification and selection of machines for various operations on the farm.Hitching systems and controls of farm machinery. Calculation of field capacities and fieldefficiency. Calculations for economics of machinery usage, comparison of ownership with hiringof machines. Introduction to seed-bed preparation and its classification.

UNIT-II

Familiarization with landreclamation and earth moving equipment. Introduction to machines used for primary tillage,secondary tillage, rotary tillage, deep tillage and minimum tillage. Measurement of draft of tillagetools and calculations for power requirement for the tillage machines.

UNIT-III

Introduction to tillagemachines like mould-board plough, disc plough, chisel plough, sub-soiler, harrows, cultivators,Identification of major functional components. Attachments with tillage machinery. Introductionto sowing, planting & transplanting equipment.

UNIT-IV

Introduction to seed drills, no-till drills, and striptilldrills. Introduction to planters, bed-planters and other planting equipment. Study of types offurrow openers and metering systems in drills and planters. Calibration of seed-drills/ planters.Adjustments during operation. Introduction to materials used in construction of farm machines.

UNIT-V

Heat treatment processes and their requirement in farm machines. Properties of materials usedfor critical and functional components of agricultural machines. Introduction to steels and alloysfor agricultural application. Identification of heat treatment processes specially for the agriculturalmachinery components.

BT-632
Post-Harvest Engineering of Horticultural Crops

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

Use the different types of sorting, grading, peeling, slicing, blanching and other equipment for processing of fruits and vegetables.

• Identify the suitable equipment, materials, and methods for storage, processing, packaging, and value addition of fruits and vegetables.

• Develop at least 4 types of value-added products from fruits and vegetables.

• Understand the technical and management aspects of the operation of fruits and vegetable processing industries.

UNIT-I

Importance of processing of fruits and vegetables, spices, condiments and flowers.Characteristics and properties of horticultural crops important for processing, Peeling: Differentpeeling methods and devices (manual peeling, mechanical peeling, chemical peeling, and thermalpeeling), Slicing of horticultural crops: equipment for slicing, shredding, crushing, chopping,juice extraction, etc., Blanching: Importance and objectives; blanching methods, effects on food(nutrition, colour, pigment, texture), Chilling and freezing:

UNIT-II

Application of refrigeration in differentperishable food products, Thermophilic, mesophilic& Psychrophilic micro-organisms, Chillingrequirements of different fruits and vegetables, Freezing of food, freezing time calculations,slow and fast freezing, Equipment for chilling and freezing (mechanical & cryogenic), Effect onfood during chilling and freezing, Cold storage heat load calculations and cold storage design,refrigerated vehicle and cold chain system,

UNIT-III

Dryers for fruits and vegetables, Osmo-dehydration,Packaging of horticultural commodities, Packaging requirements (in terms of light transmittance,heat, moisture and gas proof, micro organisms, mechanical strength), Different types of packagingmaterials commonly used for raw and processed fruits and vegetables products, bulk and retailpackages and packaging machines,

UNIT-IV

Handling and transportation of fruits and vegetables, Packhouse technology, Minimal processing, Common methods of storage, Low temperature storage,evaporative cooled storage, Controlled atmospheric storage, Modified atmospheric packaging,Preservation Technology, General methods of preservation of fruits and vegetables,

UNIT-V

Briefdescription and advantages and disadvantages of different physical/ chemical and other methodsof preservation, Flowcharts for preparation of different finished products, Important parametersand equipment used for different unit operations, Post harvest management and equipment forspices and flowers, Quality control in fruit and vegetable processing industry. Food supply chain.

BT-633
Soil and Water Conservation Engineering

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- To sustain the production from natural resources to meet the basic requirement of food, shelter and clothing of growing population.
- To preserve top soil to reduce deterioration in soil of fertility and the water holding capacity
- To check the formation of rills and gullies due to soil erosion in the field.
- To increase the ground water recharge
- To control the deterioration of ecosystems in the soil loss.

UNIT-I

Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agentsof soil erosion, water erosion: Forms of water erosion. Gully classification and control measures.

UNIT-II

Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principlesof erosion control: Introduction to contouring, strip cropping.

UNIT-III

Contour bund. Graded bund andbench terracing. Grassed water ways and their design. Water harvesting and its techniques.

UNIT-IV

Winderosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion controland its control measures.

BT-634
Fundamental of Renewable Energy Sources

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Able to understand the renewable energy sources available at present.
- Able to understand the solar energy operation and its characteristics.
- To educate the wind energy operation and its types.
- To educate the tidal and geothermal energy principles and its operation.
- Able to understand the biomass energy generation and its technologies.

UNIT-I

Concept and limitation of Renewable Energy Sources (RES), Criteria for assessing thepotential of RES, Classification of RES, Solar, Wind, Geothermal, Biomass, Ocean energy sources,Comparison of renewable energy sources with non-renewable sources.

UNIT-II

Solar Energy: Energyavailable from Sun, Solar radiation data, solar energy conversion into heat through, Flat plateand Concentrating collectors, different solar thermal devices, Principle of natural and forcedconvection drying system, Solar Photo voltaics: p-n junctions. Solar cells, PV systems, Stand alone,Grid connected solar power station, Calculation of energy through photovoltaic power generationand cost economics.

UNIT-III

Wind Energy: Energy available from wind, General formula, Lift and drag.Basis of Wind energy conversion, Effect of density, Frequency variances, Angle of attack, Windspeed, Types of Windmill rotors, Determination of torque coefficient, Induction type generators,Working principle of wind power plant.

UNIT-IV

Bio-energy: Pyrolysis of Biomass to produce solid, liquidand gaseous fuels. Biomass gasification, Types of gasifier, various types of biomass cook stovesfor rural energy needs. Biogas: types of biogas plants, biogas generation, factors affecting biogasgeneration and usages, design consideration, advantages and disadvantages of biogas spent slurry.

BT-635
Building Construction and Cost Estimation

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Topographical Survey & Geotechnical investigation of soil and submission of Recommendations for review.
- Site Clearing / Grading
- RCC /Paver Block pavements, Roads, Footpath.
- Boundary wall / Chain Link fencing & Entry Gate, etc.
- Approach Road for Stations.

UNIT-I

Building Materials: Rocks, Stones, Bricks Properties and varieties of Tiles, Lime, Cement,Concrete, Sand. Glass, Rubber, Plastics, iron, Steel, Aluminium, Copper, Nickle. Timber.

UNIT-II

Buildingcomponents: Lintels, Arches, stair cases, Different types of floors, Finishing: Damp Proofing and-water proofing, Plastering, pointing, white washing and distempering – Painting, Building design,Design procedures, Technology, building construction,

UNIT-III

Types of agricultural buildings andrelated needs, application of design theory and practice to the conservation, sloped and flatroof buildings, construction economics: Preliminary estimates, Detailed Estimates of Buildingssource of cost information, use of cost analyses for controlling design, Factors affecting buildingcosts; cost evaluation of design and planning alternatives for building and estate development,

UNIT-IV

Measurement and pricing, Economic methods for evaluating investments in buildings andbuilding systems: cost-in-use, benefit-to-costs and savings-to-investment ratios, rate of return,net benefits, payback

BT – 731

FARM MACHINERY DESIGN

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- To equip the students with technical knowledge of plant protection and intercultural equipments.
- To train the students with skills required for the operation, maintenance and evaluation of harvesting, threshing machineries needed for agricultural farms.
- To abreast the students with mathematical, experimental and computational skills for solving different field problems.

UNIT-I
Materials of construction of farm machinery and their properties.

UNIT-II
design of power transmission components and systems in agricultural machines; fits and tolerances.

UNIT-III
Design parameters of agricultural implements; force analysis of primary tillage tools and their hitching systems.

UNIT-IV
Design considerations of reapers, mowers, harvesters and threshing equipment.

UNIT-V
application of design methods to the systems of selected farm machinery; bill of materials and construction cost in project design.

BT – 732
DAIRY AND FOOD ENGINEERING

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Acquaint the students with various dairy engineering operations such as homogenization, pasteurization, thermal processing, evaporation, freezing, and drying of milk.
- Understand the different types of equipment and their working principles used for processing and dairy and food products.
- Learn to design a dairy plant layout

UNIT-I
Properties of dairy food products.

UNIT-II
Unit operation of various dairy and food processing Systems.

UNIT-III
Process flow charts for product manufacture.

UNIT-IV
Working principles of equipment for receiving, pasteurisation, sterilisation,homogenisation,

UNIT-V
Filling and packaging, butter manufacture, evaporation, drying, freezing, juice extraction, filtration, membrane' separation, thermal processing, plant utilities requirement.

BT – 733
GROUND WATER WELL & PUMP ENGG.

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Student will know the different terminologies related with hydrology.
- Student will assess ground water potential.
- Acquire knowledge in modeling and uses of different methods used for estimation of ground water potential.
- Get basic knowledge on different types of wells and pumps.
- Identify the different components of pumps.

UNIT-I

Occurrence of groundwater - confined and unconfined aquifers, groundwater movement.

UNIT-II

Hydraulics of wells - Equilibrium and Non-equilibrium flow conditions - surface and subsurface investigations of groundwater.

UNIT-III

Darcy's Law-Aquifer characteristics - Jacobs, Dupits and other methods - Specific yield - safe yield - qualities - artificial recharge of ground water - seawater intrusion.

UNIT-IV

Type of wells - Dug, bore, filter, point wells and deep wells - well logging and analysis - well screen - casing pipes - Development of wells - well testing - well design and yield - protection of wells.

UNIT-V

Selection of wells - geological features - Dip strike - folds and joints - geological condition for artesian wells.

BT – 734
RENEWABLE ENERGY

L	T	P
2	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Able to understand the renewable energy sources available at present.
- Able to understand the solar energy operation and its characteristics.
- To educate the wind energy operation and its types.
- To educate the tidal and geothermal energy principles and its operation.
- Able to understand the biomass energy generation and its technologies.

UNIT-I

Introduction to conventional and non-conventional energy sources, Patterns of fuel consumption, potential of solar, wind, biogas, biomass, geothermal and other renewable energy sources.

UNIT-II

Characteristics of the sun, the solar constant. Heat transfer for solar energy utilization, solar refrigeration, Heat conduction through plate, typical fin problem. Radiative heat transfer coefficient, beam and diffuse radiation, Determination of solar time and problems related to it. Introduction to solar energy measuring instruments. Introduction to solar gadgets viz., Solar Cooker, Water Heater, Drier, Still, PV system.

UNIT-III

Aerobic and anaerobic bio-conversion process, principles and raw materials, properties of biogas, Benefits of biogas viz., Manure, domestic fuel, sanitation and health, motive power, numerical problems on selection of size of biogas plants. Biogas appliances

UNIT-IV

Production of Biomass, broad classification, conversion of solid, liquid and gaseous fuels. Pyrolysis, gasification and their economics. Wind energy potential, study of various types of wind machines

BT – 735
SOIL & WATER CONSERVATION STRUCTURES

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Describe the concept of soil, wind and water erosion and their conservation practices
- Comprehend the concept of irrigation water measurement, micro irrigation, underground pipeline system along with their designs
- Demonstrate various water harvesting techniques and their role in current climate change scenario,

UNIT-I

Introduction, Classification of structure & their for functional requirements, types of open channel flow, energy equation, moment principles, specific energy, specific force.

UNIT-II

Hydraulic jump, its types and applications, energy dissipation, jump efficiency, relative loss of energy, runoff measuring structure, H – Flume, parshall Flume, weirs.

UNIT-III

Drop spillway-its functional use etc. drop spillway - hydrologic design, drop spillway - hydraulic design, drop spillway - structural design, free board & wave freeboard.

UNIT-IV

Chute spillway, drop inlet spillway Farm ponds.

BT – 737
WATERSHED MANAGEMENT

L	T	P
2	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Describe watersheds, its classes and characteristics.
- Explain hydrological processes.
- Explain watershed management.
- Describe how watershed plays crucial role in determining food.
- Social, and economical security and provides life support services to rural people.

UNIT-I

Watershed, concept, objectives of watershed management, selection of priority areas

UNIT-II

Aerial photography and remote sensing, Planning Principles, Components of study, soil and moisture conservation

UNIT-III

Groundwater recharge, Water harvesting, storage and recycling, farm pond, supplemental irrigation pond, Evaporation suppression, seepage reduction, water balance studies

UNIT-IV

Dry farming techniques, River valley projects, runoff and sedimentation, Hill area development, Watershed based rural devilment

BT – 736
FOOD ENGINEERING

L	T	P
2	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Ability to apply principles of food engineering in industry.
- Understand, identify and analyze a problem related to food industry and ability to find an appropriate solution for the same.
- Design, implement and evaluate a research based project to meet demands of the society.
- Use appropriate techniques, skills, and modern tools in the food industry and in academic profession.
- Understanding of professional, ethical, legal, security and social issues and responsibilities for entrepreneurship skills.
- Ability to function effectively as an individual and in a group.

UNIT-I

Heat processing – methods of applying heat to food, sterilization, thermo bacteriology, evaporation, evaporator capacity, overall heat transfer – co efficient evaporator economy, capacity, Extrusion cooking.

UNIT-II

Multiple effect system dehydration and drying, free moisture, equilibrium moisture content and water activity. Estimation – BETequation.

UNIT-III

Classification of dryers, tray drum and spray drier for liquids and pastes, freeze drying, vacuum drying, concentration, freeze concentration, membrane concentration, freezing frozen products.

UNIT-IV

Preservation techniques, low temperature preservation, irradiation- of foods, microwave heating, dielectric heating of foods.

BT – 833
ADVANCED FARM POWER

L	T	P
3	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- The student will acquire knowledge regarding makes and models of tractors, different systems and periodic maintenance tractors.
- Tractor driving with and without two wheeled trailer and about driving safety rules.
- Getting knowledge of Farm Mechanization scenario and report writing.
- Learning selection of farm machinery on the basis of various requirements, their costing and replacement

UNIT-I

Tractor performance characteristics; torque, speed, power and specific fuel consumption;

UNIT-II

Traction theory; chassis mechanics stability; steering and turning, Ackerman's steering geometry.

UNIT-III

Tractor hitches and hydraulic systems; tractor testing and controls.

UNIT-IV

Human factors in tractor design and operational safety.

BT – 832
PROCESS EQUIPMENT DESIGN

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Display an understanding of the principles of process equipment design, the mechanical aspects of the design and operation of process equipment, including safety considerations
- Students will have completed detailed designs of several unit operations
- Students should be able to develop process flow sheets and lay out of equipment and pipelines in chemical process plants

UNIT-I
Application of design engineering for processing equipments

UNIT-II
Design parameters, codes and materials selection.

UNIT-III
Design of handling and milling equipments, dryers.

UNIT-IV
Heat exchangers, Pressure vessels, Optimisation of design with respect to process efficiency, energy and cost; Application of computer techniques in design optimization.

BT – 831
IRRIGATION AND DRAINAGE EQUIPMENT DESIGN

L	T	P
3	1	2

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Design of sprinkler irrigation and its types.
- Design of drip irrigation system and its types.
- Fertigation its advantages and limitations.

UNIT-I

Design of irrigation wells - open well and tube wells - well diameter , thickness of casing, pipe and screens , openings of well screen, gravel packing design;

UNIT-II

Centrifugal pumps - design of components, power requirement, pump characteristics, pump selection

UNIT-III

Design of sprinkler irrigation - components, size of pipes, nozzles and matching pumping system.

UNIT-IV

Design of drip irrigation - components, size of pipes, emitters.

UNIT-V

Design of sub surface drainage system - tube diameter and perforation, filter design, outlet design.

BT - 834
MINOR IRRIGATION AND COMMAND AREA DEVELOPMENT

L	T	P
2	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Remember about the irrigation schemes and present status of water resources in India. Also understand the various methods for the measurement of irrigation water.
- Analyze the design of open channel water conveyance system, underground pipe conveyance system & control and distribution of on-farm structures for water conveyance.
- Solve the real world problem of land grading and understand the soil-water-plant relationship.
- Apply the concept of ET to determine the water requirement of crops. Also able to remember the adaptability merits, demerits,specification and analyze the design considerations of border, check basin, furrow irrigation, drip and sprinkler irrigation methods.
- Analyze agricultural land drainage problems and suggest scientific remedial measures for them.

UNIT-I

Minor irrigation - definition, necessity, advantages and disadvantages, storage and diversion works, duty of water requirement of various crops, computation, conveyance, storage and application efficiencies.

UNIT-II

Design of border strip and furrows and other irrigation methods- design and layout of sprinkler irrigation – Design and layout of drip irrigation- Evapotranspiration irrigation scheduling.

UNIT-III

Command area development – components of CADA, various CADA programmers in India- Land consolidation-infrastructure development, organization and maintenance, on farm development works.

UNIT-IV

Development- organization and application losses- remedial measures, farmer's role in system in system operation – farmer's committee for water distribution, strategic outlet command- stream size for efficiency, rotational irrigation system.

BT - 835
FOOD INDUSTRY MANAGEMENT

L	T	P
2	1	0

Course Outcomes (COs):

After the completion of the course, students are expected to have the ability to

- Ability to apply principles of food engineering in industry.
- Understand, identify and analyze a problem related to food industry and ability to find an appropriate solution for the same.
- Design, implement and evaluate a research based project to meet demands of the society.
- Use appropriate techniques, skills, and modern tools in the food industry and in academic profession.
- Understanding of professional, ethical, legal, security and social issues and responsibilities for entre-preneurship skills.
- Ability to function effectively as an individual and in a group.

UNIT-I

Definition and classification of food industries- responsibilities qualities of management, characteristics and labor efficiency ,wages and incentives decision making and production management

UNIT-II

Production planning- production control manufacturing systems ,job production ,batch ,mass production and process charts, routing and scheduling ,time and motion study, line of balance technique.

UNIT-III

Inventory control- types of inventory ,economic lot size ,raw materials management- economic order quan-tity ,ABC Analysis ,plant location ,factors- plant layout- types ,advantages- characteristics of an efficient layout-techniques of plant layout

UNIT-IV

Product selection and development - Introduction of new product, stages of product development, speciali-zation, diversification sales forecasting techniques, investment and replacement, concept of present value future worth and internal rate of return, quality control and inspection, acceptance sampling, control charts, variable and attributes, optimization techniques in transportation,