SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

REGULATIONS – 2020 (R-20)

For B.Tech – Regular / Lateral Entry / Honours / Major-Minor

Henceforth, these shall be known as Regulations **R-20** and shall be applicable from the batch admitted in the academic year 2020-2021 through the State level EAMCET and ECET. They shall be applicable to B.Tech Lateral Entry admitted in 2021-2022 at the second year level (for Second, Third and Fourth years of study).

1 System

The system is a flexible Choice Based Credit System (CBCS) permitting students

a) To choose electives from a wide range of courses offered by the Institute or on-line platforms
b) To undergo additional courses
c) To adopt an inter-disciplinary approach

2 Programs

The University offers Regular B.Tech programs in

i) Chemical Engineering (ChE)
ii) Civil Engineering (CE)
iii) Electrical & Electronics Engineering(EEE)
iv) Electronics & Communication Engineering (ECE)
v) Mechanical Engineering (ME)
vi) Computer Science & Engineering (CSE)

In addition, meritorious students will have the option to choose B.Tech (Honours) or B.Tech (Major-Minor), both with extra courses and credits, in addition to those prescribed for B.Tech (Regular). Different Major-minor combinations are offered by the Institute subject to certain conditions specified herein this document.

3 Duration

ALL PROGRAMS ARE OF FOUR YEARS DURATION, each academic year consisting of two semesters, making a total of 8 semesters.

Each semester shall consist of 18 weeks with a typical academic work of 30 hours / week of instruction, equivalent to 90 instruction days. Number of instruction days may be reduced, when necessary, with an increased number of instruction hours per week per course

4 Instruction

Instruction is imparted in the following format

i) Basic Courses in Sciences and Basic Engineering to form the conceptual base

ii) Professional Core Courses intended knowledge development and enhancement in the chosen discipline of study.

iii) Elective Courses, both Professional and Open, intended to (a) to provide extended knowledge in the discipline of study, (b) to provide a broadened scope in the same discipline, (c) to enable an exposure to some other disciplines and (d) to enhance students' proficiency/skill.

iv) Audit Courses intended to provide awareness of the contemporary societal issues

5 Course Code

Each course shall be identified by an alpha-numeric course code, consisting of 2 alphabets followed by three numerals. XXxyy

XX denotes the department which offers the course.

x denotes the semester in which the course is offered

yy denotes a serial number assigned by the course offering department

CE : Civil Engineering	CO : Commerce
CH : Chemical Engineering	CY : Chemistry
CS : Computer Science and Engineering	EO : Economics
EC: Electronics and Communication Engineering	EN : English
EE : Electrical and Electronics Engineering	MA : Mathematics
ME : Mechanical Engineering	PH : Physics
	HU : Humanities
	BO: Biological Sciences
	MG : Management

6 Scheme of Instruction & Syllabus

6.1 A Board of Studies (Pass) of each department, constituted by the University, with experts from internal and external academic departments , industry, society, alumni and students shall formulate the Scheme of Instruction and Evaluation of a program and the detailed syllabus content of the courses.

6.2 All the Boards of Studies (Pass) shall together formulate the scheme of instruction and examinations, and detailed syllabi for all the courses of the First and Second Semesters which shall be mostly common for all the branches of study.

7 Attendance Requirement

7.1 A student is required to complete the study of the Program satisfying the attendance requirements in all the Semesters within a maximum period of eight academic years from the year of admission to become eligible for the award of B.Tech degree, failing which he/she forfeits his/her admission.

7.2 A student shall be detained in a Semester if he/she fails to satisfy the attendance requirements given below:

i) A student shall attend a minimum of 50 percent of the hours of instruction taken by the teacher, in each course (Theory + Tutorial)

ii) A student shall attend a minimum of 75 percent of total instruction hours conducted during that semester – Theory + Tutorial + Practical (excluding the attendance in non-credit audit courses).Attendance in Audit Courses shall not be considered for calculation of attendance requirements

iii) However, a committee, headed by the Principal, can condone shortage of attendance, due to ill health of the student, up to 10 percent (65 – 75 %) for those students, who attend a minimum of 65 percent of total instruction hours with a minimum 50 percent in each course.

iv) A student who fails to satisfy the attendance requirements specified in clauses 7.2 (i, ii, iii) shall be detained and will have to repeat that Semester in the subsequent academic years with the written permission of the Principal subject to the clause 7.1

v) A student shall not be permitted to study any semester more than three times during the entire Programme of study

vi) A student who satisfies the attendance requirements specified in either of the clauses 7.2 (ii or iii) in any semester may be permitted to repeat that semester cancelling the previous attendance and sessional marks of that semester with the written permission of the Principal. However, this facility shall not be extended to any student more than twice during the entire Programme of study as specified in clause 7.1

8 Credit -

This is the unit by which the course work is measured. It determines the number of hours of instructions required per week. It is a weightage index, used in the computation of Grade Point Average, indicative of the student performance.

Theory / Tutorial .... 1 hr /week .... 1 credit

Practical ... 2 hr/week .... 1 credit

Credit requirement for the Award of Degree : Successful performance in

B.Tech (Regular)	160 credits
B,Tech (Lateral Entry)	123 credits (II, III & IV years only)
B,Tech (Honors)	160 + 20 additional credits in the same discipline
B.Tech (Major-Minor)	160 (Major discipline) + 20 credits in another (Minor) discipline

9 **Examination – Evaluation**

9.1 Evaluation shall be carried out through Internal Tests and Semester End Examination.

9.2 For each theory course, there shall be two sessional tests. Each test is of two hours duration carrying 40 marks. Internal Test I will be conducted around the middle of the semester, on 50 % of the course content. Internal Test II will be at the end of the semester on the second 50% of the course syllabus.

It is mandatory for a student to attend both the sessional tests in each theory course. The weighted average of the marks secured in two tests is awarded as sessional marks. A weightage of 0.8 shall be assigned for the better performance of the two tests whereas for the other test it shall be 0.2. If a student is absent for any of the internal tests for whatsoever reason, the marks awarded for that test shall be zero.

Students are permitted to verify their internal test scripts after valuation. The valuation and verification of answer scripts of Sessional Tests shall be completed within fifteen days after the conduct of the respective Sessional Tests.

9.3 End-Semester Examination is of 3 hours duration carrying 60 marks. It shall be conducted after the last working day of the semester covering the entire syllabus prescribed for that course.

The question paper for end-semester examination shall be set by an external paper setter. The Chairman, BoS shall recommend a panel comprising at least six external paper setters for each theory course to the University. The University shall arrange for setting the question paper by appointing one external paper setter from that panel

Model Question Paper for each theory course shall be prepared by the concerned teacher within 30 days from the commencement of the Semester and the same shall be forwarded to the Controller of Examinations through the Chairman, BOS concerned.

Two questions shall be set from each unit of the syllabus, out of which one question shall be answered by the student. Each question of the unit carries a maximum of 12 marks.

However, the Chairman, BoS shall accord exception in question paper format, if necessary. The question papers shall assess the understanding of the concepts and their applications in solving problems and at least 50% of the questions shall be numerical. Further, the question papers of design-oriented courses shall assess the abilities of analysing and evaluating design alternatives

The valuation of End-Semester Examination answer scripts shall be arranged by the Controller of Examinations as per the University procedures in vogue.

9.4 For each practical course except project work, the sessional marks for a maximum of 40 shall be awarded based on the continuous assessment of practical work by the teacher concerned. An End-Semester Examination of 3 hours duration carrying 60 marks shall be conducted by two examiners, one external and one internal appointed by the Principal. The Principal shall appoint the external examiner from among the panel of examiners recommended by the Chairman, BoS concerned. He shall appoint the internal examiner nominated by the Head of the Department concerned

9.5 For Project work, the guide shall assess the progress of project work continuously and award marks for a maximum of 40. A committee consisting of one external examiner and two internal examiners from the department shall value the project work and conduct viva-voce for a maximum of 60 marks. The Principal shall appoint the external examiner, from among the panel of examiners recommended by the Chairman, BoS concerned. He shall appoint the internal examiner nominated by the Head of the Department concerned.

9.6 Advanced supplementary examinations in courses of final year (VII & VIII semesters) shall be conducted for regular students, who fail in these courses, soon after the announcement of final year results, to help students save one academic year.

10 **Course Performance**

10.1 In each semester, every student who satisfies the attendance requirements has to register for the semester-end examination, failing which he/she shall not be promoted to the next semester. Any such student who has not registered for the semester-end examination in a semester shall repeat that semester in the next academic year with the written permission of the Principal.

10.2 To pass a course in the program, a student has to secure a minimum of 40% of maximum marks in the semester-end examination and a minimum Grade of P overall (both sessional and semester-end examination marks put together). A student obtaining Grade F shall be considered failed and shall be required to reappear for the semester-end examination. A student shall not be allowed to reappear for the semester-end examination in a course which he/she has already passed the course to improve the score

10.3 A student who has failed in a course shall be allowed to reappear for the semester-end examination as and when it is conducted in the normal course. The Sessional Marks obtained by the student shall be carried over for declaring the results

10.4 semester-end examination in any course of a particular regulation shall be conducted three times. Thereafter, the students who failed in that course shall take the semester-end examination in the equivalent papers of the subsequent regulation, suggested by the Chairman, BoS concerned.

10.5 Instant supplementary semester end examinations shall be conducted after announcement of IV year results for outgoing students in courses listed for IV year to save an year of time for outgoing students

11 Promotion Rules

11.1 Astudentshallbepromotedfromfirstyeartosecondyearifhefulfilstheminimum attendance requirements.

11.2A student will be promoted from II year to III year if he fulfils the academic requirement of 40% of credits up to either III Semester (II year) or IV-Semester (II year) from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in IV Semester (II year).

11.3 A student shall be promoted from III year to IV year if he fulfils the academic requirements of 40% of the credits up to either V Semester (III year) or VI Semester (III year) from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester

12 Student Performance - Grading and Grade Points

12.1 Letter Grade – Grade Point

Letter Grade is an index of the performance of students in a said course.
Grade Point is a numerical weight allotted to each letter grade on a 10-point scale

Letter Grade	Range of Marks (Internal + End-Sem)	Grade Point
O (Outstanding)	91 - 100	10
A+ (Excellent)	81 – 90	9
A (Very Good)	71 – 80	8
B+ (Good)	61 - 70	7
B (Above Average)	51 - 60	6
C (Average)	41 - 50	5
P (Pass)	40	4
F (Fail)	<40	0
Ab (Absent)	-	0

A student obtaining Grade F or Absent for a semester end examination shall be considered failed in that course and he / she shall have to reappear in the Semester- end examination as and when it is conducted in the normal course.

In the Grade sheet, against an audit course, satisfactory (> 40 marks) or unsatisfactory (less than 40 marks) will be indicated. No letter grade /marks shall be allotted for non-credit (zero credit) audit courses. This will in no way affect the CGPA of the Student.

12.2 Grade Point Average

Semester Grade Point Average **(SGPA)**: It is a measure of student's performance in a semester.

Cumulative Grade Point Average **(CGPA)**: It is a measure of overall performance of a student over all semesters.

Computation of SGPA and CGPA

SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses and the sum of the number of credits of all the courses in the semester.

SGPA $(S_i) = \sum_{i=1}^{N} (C_i \times G_i) / \sum_{i=1}^{N} C_i$

where C_i is the number of credits of the i^{th} course, G_i is the grade point scored in the i^{th} course and N is the number of courses in the semester

CGPA = $\sum_{i=1}^{M}(C_i \times S_i) / \sum_{i=1}^{M} C_i$

where S_i is the SGPA of the i^{th} semester, C_i is the total number of credits in that semester and M is the number of semesters.

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

12.3 Award of Class:

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

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

Equivalent percentage is (CGPA – 0.5) multiplied by 10.

13 **MOOCs (Online courses)**

Certain prescribed courses will have to be pursued on Online platforms. This is recommended to encourage students to tap these resources and to prepare them for self-study.

1) **A**ll open elective courses are to be successfully completed on SWAYAM online portal of Government of India
2) Courses offered by the concerned Department as Program Core / Program Elective / Audit courses shall not be opted as open elective.
3) A student is free to opt for any course relating to (a) Domain Engineering (b) General Engineering (c) management and (d) functional / technical English, in consultation with his / her Department. It should not be a course offered by the Department.
4) Opted course shall carry 3 credits and of 12 or more weeks of duration
5) A student is free to enrol and complete an online course from III semester to VII semester of his / her B.Tech program, under permission of the concerned Head of the Department.
(6) Head of the Department concerned shall make arrangement for collection and consolidation of performance certificates in online courses for onward transmission to the University.

14 **Summer Internship**

All students shall have to undergo Internship during summer vacation breaks, of duration of 6 weeks after 4th or 6th semester. They shall submit a certificate from the organization concerned and present a seminar on the internship in the beginning of seventh semester for its assessment and inclusion in the 7th semester Marks Statement.

15 **Gap Year**

Gap year(s) shall be availed by the student himself/herself who wants to pursue entrepreneurship by taking a break of one year at any time after completing II year of study. A committee shall be constituted to evaluate the proposal submitted by the student and to decide on permitting the student to avail the Gap Year. Students shall be permitted to re-join the succeeding year from the date of commencement of class work and shall be under the academic regulations in force at that time

Gap year may be extended by another year (i.e. a total of two years) and shall not be counted for the maximum period of eight academic years for the completion of the program

16 **Ranks & Awards**

16.1 Ranks shall be awarded in each branch of study on the basis of Cumulative Grade Point Average (CGPA) for the top three students.

16.2 The students who have become eligible for the award of the degree by passing regularly all the eight Semesters shall only be considered for the award of ranks.

16.3 Award of prizes, scholarships and other honours shall be according to the rank secured by the student and in conformity with the desire of the Donor.

17 **Grievance Redressal Committee**

The Principal shall constitute a Grievance Redressal Committee of three Professors from the faculty of the college for a period of two years. The senior most among them shall be convener of the committee who receives the grievances from the students and places the same before the committee for its consideration. The committee shall submit its redressal recommendations to the Principal for his consideration

18 **Amendment to Regulations**

Sri Venkateswara University reserves the right to amend the regulations at any time in future without any notice. Further, the interpretation of any of the clauses of the regulations entirely rests with the University

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B.Tech (Honors) Program

Additional Regulations for B.Tech (Honours) Program

H1 Students of a Department/Discipline are eligible to opt for B.Tech (Honours) Program offered by the same Department/Discipline, to be completed within the stipulated period of 4 years.

H2 A student shall be permitted to register for B.Tech(Honours) during IV semester, provided that the student has acquired a minimum of 8.25 CGPA in the preceding 3 semesters without any backlogs. (only III Semester for lateral entry)

A student will have to consistently perform and at any later point of time, if his/her overall CGPA falls below 8.25, his/her registration for B.Tech (Honours) will be cancelled and such students will continue with the regular Program.

The credits earned in additional courses till that time will be treated as extra credits.

H3 Students can select additional and advanced courses offered by their respective department in which they are pursuing the degree and get an honours degree in the same discipline.

H4 In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honours) degree. This is in addition to the credits essential for obtaining the Under-Graduate Degree in Major Discipline (i.e. 160 credits).

H5 Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be discipline-specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies

H6 It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

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B.Tech (Major-Minor) Program

Additional Regulations for B.Tech (Major-Minors) Program

MM1 Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses/credits in another specified engineering discipline from among the combinations offered by the Institute.

Such a program is referred to as B.Tech (Major) in discipline A and Minor in discipline B.

MM2 Combinations will be decided, based on the compatibility, relevance, and the trend in technology, by the Boards of Studies of the participating Disciplines of Engineering. The list of combinations may alter from time to time.

MM3 A student shall be permitted to register for B.Tech(Major – Minor) during IV semester, provided that the student has acquired a minimum of 8.25 CGPA in the preceding 3 semesters without any backlogs. (only III Semester for lateral entry)

A student will have to consistently perform and at any later point of time, if his/her overall CGPA falls below 8.25, (both major and minor combined) his/her registration for B.Tech (Major-Minor) will be cancelled and such students will continue with the regular major program. The credits earned in additional courses till that time will be treated as extra credits.

MM4 The students registered for B.Tech (Major-Minors) shall have to successfully complete 160 credits (in the major discipline) and 20 additional credits (in the minor discipline) subject to clause **MM3**.

MM5 Scheme for 160 credits in the major discipline shall be the same as that of B.Tech regular program. For the additional 20 credits, BOS of the minor degree component shall prescribe the courses, in consultation with the Chairperson, BOS of the major discipline

MM6 Of the 20 additional Credits to be acquired in the minor discipline, 16 credits shall be earned by undergoing specified four courses listed, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be minor discipline-specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies

MM7 Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

MM8 In case of heavy competition for any combination(s), College Council shall take an appropriate decision on registration, ensuring equitable distribution among the disciplines.

SRI VENKATESWARA UNIVERSITY

COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021

SCHEME OF INSTRUCTION (I Year)

Mandatory Induction program

- For All disciplines of Engineering
- Right at the start of the first year.
- 3 weeks duration
- This includes
  - ✓ Physical activity
  - ✓ Creative Arts
  - ✓ Universal Human Values
  - ✓ Literary
  - ✓ Proficiency Modules
  - ✓ Lectures by Eminent People
  - ✓ Visits to local Areas and
  - ✓ Familiarization to Dept./Branch & Innovations

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

B.Tech. (Chemical Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
CY 102	Basic Sci	Chemistry for Chemical Engg - I	3	1	-	4	**4**
EN103	Humanities	English	2	-	-	2	**2**
EE104	Basic Engg	Basic Electrical and Electronics Engineering	3	1	-	4	**4**
ME105	Basic Engg	Engineering Graphics and Design	2	-	3	5	**3.5**
EN 106	Humanities Lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
PY 202	Basic Sci	Engineering Physics	3	1	-	4	**4**
CS 203	Basic Engg	Programming for Problem Solving	2	1	-	3	**3**
CY 204	Basic Sci	Chemistry for Chemical Engineering II	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS206	Basic Engg Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 207	Audit	Environmental Science	4	-	-	4	**0**
		TOTAL	13	3	6	22	**18**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021
B.Tech. (Civil Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA 101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
CY 101	Basic Sci	Engg. Chemistry	3	1	-	4	**4**
EN103	Humanities	English	2	-	-	2	**2**
EE104	Basic Engg	Basic Electrical & Electronics Engineering	3	1	-	4	**4**
ME105	Basic Engg	Engineering Graphics and Design	2	-	3	5	**3.5**
EN 106	Humanities Lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
PY 202	Basic Sci	Engineering Physics	3	1	-	4	**4**
CS 203	Basic Engg	Programming for Problem Solving	2	1	-	3	**3**
CE 204	Basic Engg	Engineering Mechanics	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 206	Basic Engg Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 207	Audit	Environmental Science	4	-	-	4	**0**
		TOTAL	13	3	6	22	**18**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021
B.Tech. (Mechanical Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
CY 101	Basic Sci	Engg Chemistry	3	1	-	4	**4**
EN103	Humanities	English	2	-	-	2	**2**
EE104	Basic Engg	Basic Electrical and Electronics Engineering	3	1	-	4	**4**
ME105	Basic Engg	Engineering Graphics and Design	2	-	3	5	**3.5**
EN 106	Humanities	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
PY 202	Basic Sci	Engineering Physics	3	1	-	4	**4**
CS 203	Basic Engg	Programming for Problem Solving	2	1	-	3	**3**
CE 204	Basic Engg	Engineering Mechanics	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 206	Humanities Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 207	Audit	Environmental Science	4	-	-	4	**0**
		TOTAL	13	3	6	22	**18**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021
B.Tech. (Electrical and Electronics Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
PY 102	Basic Sci	Modern Physics	3	1	-	4	4
CS 103	Basic Eng	Programming for Problem Solving	2	1	-	3	**3**
CE 104	Basic Eng	Engineering Mechanics	3	1	-	4	**4**
ME 105	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 106	Basic Engg. Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 107	Audit Course	Environmental Science	4	-	-	4	**0**
		TOTAL	15	4	6	25	**18**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
CY 202	Basic Sci	Engineering Chemistry	3	1	-	4	**4**
EN 203	Humanities	English	2	-	-	2	**2**
EE 204	Basic Eng	Electrical Circuits	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Engineering Graphics and design	2	-	3	5	**3.5**
EN206	Humanities Lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021
B.Tech. (Electronics& Communication Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
PY 102	Basic Sci	Modern Physics	3	1	-	4	**4**
CS 103	Basic Eng	Programming for Problem Solving	2	1	-	3	**3**
EC 104	Basic Eng	Electronic Devices	3	1	-	4	**4**
ME 105	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 106	Basic Engg. Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 107	Audit Course	Environmental Science	4	-	-	4	**0**
		TOTAL	15	4	6	25	**18**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
CY 202	Basic Sci	Engineering Chemistry	3	1	-	4	**4**
EN 203	Humanities	English	2	-	-	2	**2**
EE 205	Basic Eng	Basic Electrical Engineering	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Engineering Graphics and design	2	-	3	5	**3.5**
EN206	Humanities lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

R-20 – Scheme of Instruction effective from the academic year 2020-2021
B.Tech. (Computer Science & Engineering)

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
PY 102	Basic Sci	Modern Physics	3	1	-	4	**4**
CS 103	Basic Eng	Programming for Problem Solving	2	1	-	3	**3**
MA 104	Basic Sci	Probability & Statistics	3	1	-	4	4
ME 105	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 106	Basic Engg. Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 107	Audit Course	Environmental Science	4	-	-	4	**0**
		TOTAL	15	4	6	25	**18**

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
CY 202	Basic Sci	Engineering Chemistry	3	1	-	4	**4**
EN 203	Humanities	English	2	-	-	2	**2**
CS 204	Basic Eng	Data Structures	3	-	-	3	**3**
ME 205	Basic Engg. Lab	Engineering Graphics and design	2	-	3	5	**3.5**
EN206	Humanities lab	English Communication Lab	-	-	3	3	**1.5**
CS 207	Basic Engg lab	Data Structures Lab	-	-	2	2	**1**
		TOTAL	13	3	6	22	**19**

- All courses - 40 marks (Internal) + 60 marks (Univ. Semester End)
- Audit Course – 100 marks (Internal) - Zero Credits

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SRI VENKATESWARA UNIVERSITY
COLLEGE OF ENGINEERING: TIRUPATI 517 502

SYLLABUS – I & II Semesters B.Tech

I Semester **MA 101MATHEMATICS –I**

(I Semester - Common for all branches)

Instruction: 3(L) +1(T) /week **Credits:4** **Assessment: 40 + 60**

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

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

1. analyze differential equations and solve them
2. apply differential equations to engineering problems.
3. Use transformation to convert one type into another type presumably easier to solve.
4. use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
5. solve an initial value problem for an n^{th} order ordinary differential equation using the Laplace transform.
6. expand functions as power series using Maclaurin's and Talor's series
7. optimize the problems related to OR, Computer science, Probability and Statistics
8. draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
9. use multiple integral in evaluating area and volume of any region bounded by the given curves.

I & II Semesters CY 101/ CY 202 ENGINEERING CHEMISTRY

(I Semester - CY 101 for Civil & Mechanical Engg)

(II Semester -CY 202 for EEE, ECE & CSE)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Atomic and molecular structure (**12 lectures**)

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cellpotentials, the Nernst equation and applications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular

geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, **Organic reactions and synthesis of a drug molecule**

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistryby P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.
7. Principles of physical chemistry, Puri, Sharma and Pattania

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

1. analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. rationalize bulk properties and processes using thermodynamic considerations.
3. distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. list major chemical reactions that are used in the synthesis of molecules.

I Semester CH 102 CHEMISTRY FOR CHEMICAL ENGINEERING – I

(I Semester –For Chemical Engineering)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I Introduction to quantum theory for chemical systems:
Schrodinger equation, Applications to Hydrogen atom, Atomic orbitals, many electron atoms

UNIT II Chemical bonding in molecules:
MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronic spectra and magnetic properties of complexes with relevance to bio-inorganic chemistry, organ metallic chemistry

UNIT III Introduction to Stereochemistry:

Stereo descriptors – R, S, E, Z. Enantiomers and Diastereomers. Racemates and their resolution. Conformations of cyclic and acyclic systems.

UNIT IV Reactivity of organic molecules:
Factors influencing acidity, basicity, and nucleophilicity of molecules, kinetic vs. thermodynamic control of reactions

UNIT V Strategies for synthesis of organic compounds:
Reactive intermediates substitution, elimination, rearrangement, kinetic and thermodynamic aspects, role of solvents.

Text / Reference Books:

1. Physical Chemistry: G.W.Castellan, Narosa
2. Organic Chemistry: Finar; I.L. — Vol — I & II, Pearson Education
3. Organic Chemistry: Morrison & Boyd; PHI/Pearson Education.
4. Physical Chemistry: P. W. Atkins: Oxford.
5. A Text book of Physical Chemistry: K. L. Kapoor: Macmillan
6. A guide Book to Mechanism in Organic Chemistry: Peter Sykes
7. Organic Chemistry: Loudon: Oxford

Course Outcomes: At the end of the course, **s**tudents will be able to
1. appreciate quantum theory of chemical systems
2. appreciate aliphatic chemistry and stereochemistry
3. write simple mechanisms

I & II Semesters **EN 103/ EN 203 ENGLISH**

(I Semester - EN 103 forChE,CE & ME)

(II Semester - EN 203 for EEE, ECE & CSE)

Instruction: 2(L) **Credits: 2** **Assessment: 40 + 60**

UNIT I Vocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II Basic Writing Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNIT III Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions - Redundancies -Clichés

UNIT IV Nature and Style of sensible Writing

Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion

UNIT V Writing Practices

Comprehension - Précis Writing –EssayWriting

Reference/Textbooks:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper ResourceBook. 2001
4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay KumarandPushpalata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

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

1. learn the elements of grammar and composition of English Language.
2. Learn literary texts such as Short stories and prose passages.
3. maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
4. develop communication skills by cultivating the habit of reading comprehension passages.
5. develop the language skills like listening, speaking, reading and writing.
6. Make use of self-instructed learner friendly modes of language learning through competence.

I Semester **EE104BASIC ELECTRICAL AND ELECTRONICS ENGG.**

(I Semester – for ChE, CE & ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit-I

Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations.
AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

Single Phase Transformers: Principle of Operation of a Single phase Transformer, EMF equation, regulation and Efficiency of a single phase transformer.
DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III

Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3-φ I.M., Torque-Speed Characteristics of 3-φ I.M.

UNIT-IV

p-n junction operation, diode applications, Zener diode as regulator.
Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications

UNIT-V

Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator.
Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:

1. Electrical Technology by Edward Hughes
2. Basic Electrical Engineering by Nagrath and Kothari

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

1. understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
2. understand the basic concepts of transformers and motors used as various industrial drives

3. understand the concept of power factor improvement for industrial installations and concepts of most economical power factor
4. understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

I & II Semesters

ME 105 / ME 205ENGINEERING GRAPHICS AND DESIGN
(I Semester - ME105 for ChE, CE & ME)
(II Semester - ME205 for EEE,ECE & CSE)

Instruction: 2(L) +3 (Drg) /week Credits: 3.5 Assessment: 40 + 60

Unit I Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo-cycloid and Involutes.

Unit II

Scales- Scales– construction of Plain &Diagonal Scales.

Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;

Question Paper
Modular – 4 questions from
Units I t0 IV, 15 marks each

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes

Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined

to both the Planes-Auxiliary Views

Unit IV

Isometric Projections& Orthographic projections
Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V Introduction to CAD
CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. Agrawal B. & Agrawal C.M.(2012),Engineering Graphics, TMH Publication
4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers
5. Corresponding set of) CAD Software Theory and User Manuals

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

1. make a distinction between first angle projection and third angle projection of drawing.
2. draw hyperbola, parabola, Involutes and Cycloidal curves.
3. draw sections of solids including cylinders, cones, prisms and pyramids.
4. draw projections of lines, planes, solids and sections of solids.
5. draw orthographic projections of lines, planes, and solids.

I & II Semesters EN 106 / EN 206 ENGLISH COMMUNICATION LAB

(I Semester - EN 106 for ChE, CE & ME)

(II Semester - EN206 for EEE, ECE & CSE)

Instruction: 0(L) +3(Lab) /week Credits: 1.5 Assessment: 40 + 60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
5. Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
6.Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

I Semester **PY 102 MODERN PHYSICS**
(for I Semester –EEE,ECE & CSE)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I

Quantum Mechanics : Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P. Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT II

Band Theory of Solids : Classical Free Electron Theory of Metals – Success and Failures – Quantum Free Electron Theory – Fermi Factor – Electron in Periodic Potential – Bloch Theorem – Kronig – Penney Model – Distinction between Metals , Insulators and semiconductors- Energy Band Structures.

UNIT III

Semiconductors – Introduction- Intrinsic and Extrinsic Semiconductors – Density of states – Carrier Concentrations at Equilibrium – Hall Effect. PN Junction Diode – Energy Band Diagram – Forward and Reverse Bias- Current – Voltage characteristics – Applications- Zener Diode – Light Emitting Diode- Photo diode -Solar Cell – Semiconductor Laser.

UNIT IV

Electromagnetism and magnetic properties of Materials:

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwell Equations – Polarization – Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization – Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and hysteresis, Applications of ferromagnetic materials.

UNIT V

NanoPhysics and Nanotechnology : Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials. 10 hrs.

Text Books / Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi

2. S.P.Basava Raju `` A Detailed Text Book of Engineering Physics" Sole Distributors, Subhash Stores Book Corner, Bangalore
3. HitendraK.Malik and A.K.Singh ``Engineering Physics" Tata MC Graw Hill Education PVt.Ltd., New Delhi

4. M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
5. John Allison, ``Electronic Engineering Materials and Devices" TataMcGraw Hill Publications.
6. B.L Theraja, "Modern physics", S.Chand& Company.
7. V. Raghavan "Material Science", Tata McGraw Hill Publications.
8. M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

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

1. develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply knowledge of band theory in the area of electronics and understanding the basic electron transportation phenomenon in microdevices.
5. understand the principles in electrostatics and electromagnetics and magnetic properties of materials.
6. understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
7. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
8. learn the basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
9. provide multidisciplinary experiences throughout the curriculum.

I & II Semesters CS 103 / CS203 PROGRAMMING FOR PROBLEM SOLVING

(I Semester –CS 103 for EEE, ECE & CSE)
(II Semester –CS 203 for ChE, CE & ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts and algorithms for the given problem
3. To learn how to write modular programs in C
4. To enable to use arrays, pointers, strings and structures in solving problems.
5. To explain the difference between object-oriented programming and procedural programming.
6. To understand principles of object-oriented programming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

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

1. Develop and test programs in C and correct syntax and logical errors.
2. Implement conditional branching, iteration and recursion.
3. Decompose a problem into functions and synthesize a complete program.
4. Use arrays, pointers, strings and structures to formulate algorithms and programs
5. Use files to perform read and write operations.
6. Handle programming assignments based on class,abstraction, encapsulation, overloading and inheritance.

Text Books

1. Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
5. Herbert Schildt,The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.
5. The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

I & II Semesters CE 104 / CE 204 ENGINEERING MECHANICS

(I Semester –CE 104 for EEE)

(II Semester –CE 204 for CE & ME)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non-coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses: Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

1. Ghose D.N. – Applied Mechanics and Strength of Materials.
2. Timoshenko & Young – Engineering Mechanics.
3. Junarkar SB – Mechanics of Structures – Vol. I.
4. Junarkar SB – Elements of Applied Mechanics.

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

1. apply the basic knowledge of force system.
2. know the types of supports occur in civil engineering structures
3. know the geometrical properties of different cross sections.
4. understand different types of stresses and strains, elastic constants.
5. understand the behavior of different internal forces under different types of loading.

I Semester **EC 104 ELECTRONIC DEVICES**

(I Semester - for ECE only)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I

Semiconductor Materials: Atomic structure, Electrons in periodic Lattices, Classifying Materials: Semiconductors, conductors and insulators, Semiconductor material groups, Covalent bonding, Energy Bandgaps, Energy bands in intrinsic and extrinsic silicon /Germanium, Density of Impurity States, Electrical Conductivity and Mobility, , Electronic Properties of N-type and P-type semiconductors, Carrier transport: diffusion current, drift current, mobility and resistivity; sheet

resistance, design of resistors. Generation and recombination of carriers; Poisson and continuity equation, P-N junction characteristics, I-V Characteristics, and small signal switching models, Diode resistances and diode capacitances.

UNIT II

Diode models, Avalanche breakdown, Zener diode, Schottky diode, Tunnel diode, Varactor diode and their applications, Testing a diode.

Rectifiers: Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, Full-wave and Bridge rectifiers, Analysis of filters (C, L, LC, and CLC) used with Full-wave rectifiers, line regulation and load regulation.

UNIT III

Bipolar Junction Transistors: Bipolar Junction Transistor action, PNP and NPN transistors, CB, CE, and CC configurations and their I-V characteristics, Analytical expressions for transistor characteristics, Typical junction voltages and maximum ratings. Determination of h-parameters from BJT characteristics, Ebers-Moll Model, Multi Emitter transistor.

UNIT IV

Bipolar Junction Transistor Biasing: Operating point, stabilization, thermal runaway.

Field Effect Transistors: Characteristics and parameters of JFET, Pinch off and saturation regions, MOS capacitor, Depletion and Enhancement type of MOSFET, I-V characteristics, and small signal models of MOS transistor, UJT and its I-V characteristics, Metal Semiconductor FET, FET biasing schemes.

UNIT V

Optoelectronic Devices: Principle of operation and characteristics of LED. LCD, LDR, Photoconductor, Photodiode, Phototransistor, Solar cell, PIN photodiode, Charge-Coupled Devices, APD (avalanche photodiode) and their applications.

Power Semiconductor Devices: Device structure, equivalent circuit and characteristics of PNPN Diode, SCR, DIAC and TRIAC.

Text /Reference Books:

1. Ben G. Steetman and Sanjay Kumar Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson Publishers, 2015.
2. Jacob Millman, Christos Halkias, Chetan D Parikh, “**Integrated Electronics**: Analog and Digital Circuits and Systems”, 2nd Edition, Tata Mcgraw Hill Education Private Limited, 2011.
3. **Allen Mottershead, “Electronic Devices and Circuits:** An Introduction”, PHILearning , 2011.
4. D. Neamen , D. Biswas "Semiconductor Physics and Devices", McGraw-Hill Education.
5. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley & Sons, 2006.
6. C.T. Sah, “Fundamentals of solid state electronics,” World Scientific Publishing Co. Inc, 1991.
7. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford University Press, 2011.

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

1. understand the principles of semiconductor physics of the intrinsic, *p* and *n* type materials.
2. understand the characteristics of the diode and some special function diodes and their application in electronic circuits.
3. use mathematics to analyze electronic devices typical of those in switching and rectifier circuits.
4. understand and utilize the mathematical models of semiconductor junctions and transistors for circuits and systems.
5. understand the characteristics of the Transistors and opto-electronic devices and their application in electronic circuits.
6. Apply thyristors in power switching and control circuits.

I Semester MA 104PROBABILITY AND STATISTICS
(I Semester - for CSE only)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Probability: Introduction, Axiomatic approach, Conditional probability, Baye's theorem, Stochastic process, Random variables, Discrete and Continuous distributions, Expectation, Variance, moments, Moments generating functions.

UNIT II

Distributions - Binomial, Poisson, Normal, Uniform, Exponential and Gamma. Properties and applications.

UNIT III

Estimator-Estimation of parameters by Method of moments and maximum likelihood-Testing of hypothesis-small sample tests-t-test, F-test and Chi-Square test.

UNIT IV

Correlation : Curve fitting by method of least squares-Linear, Quadratic and Exponential fitting-Correlation-rank correlation-Regression analysis-Multiple correlation.

UNIT V

Quality Control: Concept of quality of a manufactured product-Causes of variation-Principle of Shewart Control charts-X-Chart, R-Chart, p-Chart, np-chart and C-Chart.

Text Books:

1. S P Gupta, Statistical Methods, 38th Edition, Sultan Chand & Sons Educational Publishers,2009.
2. Y K V Iyengar, et al, Probability and Statistics 2nd Edition S. Chand & Company Ltd,2010.

3. S C Gupta and V K Kapur, Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand& Sons Educational Publishers.

I & II Semesters ME 105 / ME 205 WORKSHOP/MANUFACTURING PRACTICE

(ME 105 for EEE, ECE & CSE)

(ME 205 for ChE,CE & ME)

Instruction: 0(L) +3 (lab)/week Credits: 1.5 Assessment: 40 + 60

Workshop Practice: Five practices among

1. Machine shop 2.Fittingshop 3.Carpentry 4.Electrical wiring

5. Welding shop 6.Casting 7.Smithy 8.Plasticmoulding&GlassCutting

Examinations could involve the actual fabrication of simple components, utilizing one or

More of the techniques covered above.

Detailed Contents

1. ManufacturingMethods-casting,forming,machining,joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools.
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding. Glass cutting
7. Metal casting.
8. Welding(arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/ReferenceBooks:

1. HajraChoudhury S.K., HajraChoudhury A.K.andNirjharRoy S. K., Elements of Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
2. Kalpakjian S. and Steven S. Schmid ManufacturingFngineeringand Technology", 4th edition, PearsonEducationIndiaEdition,2002.
3. GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson Education,2008.
4. Roy A. Lindberg, Processes and Materials of Manufacture",4th edition, Prentice Hall India,1998.
5. RaoP.N., "ManufacturingTechnology",Vol. I & II,TataMcGrawHillHouse, 2017

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes : Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

I & II Sem CS 106/ CS206 PROGRAMMING FOR PROBLEM SOLVING LAB
(CS 106 for EEE, ECE & CSE)
(CS 206 for ChE, CE & ME)

Instruction: 0(L) +3 (Lab)) /week Credits: 1.5 Assessment: 40 + 60

Course Objectives:

1. To provide exposure to problem-solving through programming
2. To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

1. Programs on conditional control constructs.
2. Programs on iterative statements (while, do-while, for).
3. Programs on recursive procedures
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
6. Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
7. Programs using pointers (int pointers, char pointers) and pointer arrays.
8. Programs on structures and unions
9. Programs on File Processing.
10. Programs on Pointers to structures and Self-referential structures

Course Outcomes: After Completion of this course the student would be able to

1. Develop the C code for the given algorithm.
2. Understand, debug and trace the execution of programs written in C language.

Reference Books:

1.Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
2.Hanly J R &Koffman E.B, “Problem Solving and Program design in C”, Pearson Education, 2019.
3.R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4.Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

II Semester **MA 201MATHEMATICS II**

(II Semester - for all branches)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

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

1. use ranks of matrices to decide whether the system of linear equations is consistent or not
2. use Cayley-Hamilton theorem to find inverses or powers of matrices.
3. use Eigen values and vectors to reduce Quadratic forms to normal form.
4. to analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
5. use Green's theorem to evaluate line integrals along simple closed contours on the plane
6. use Stokes' theorem to give a physical interpretation of the curl of a vector field
7. use the divergence theorem to give a physical interpretation of the divergence of a vector field.

8. find the Fourier Series to represent a function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
9. Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
10. study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

II Semester **PY 202ENGINEERING PHYSICS**
(II Semester - for ChE, CE& ME)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I Wave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating –Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II Mechanics of Rigid Body

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending-Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III Electromagnetism and magnetic properties of Materials

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNIT IV Quantum Mechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P.Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave

Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V NanoPhysics and Nanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
2. S.L.Gupta and SanjeevGupta`UnifiedPhysics`Vol.I Jai PrakashNath& Co., Meerut.
3. HitendraK.Malik and A.K.Singh ``Engineering Physics" TataMCGraw Hill Education Pvt.Ltd., New Delhi
4. M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
5. B.L Theraja, "Modern physics", S.Chand& Company.
6. V. Raghavan "Material Science", Tata McGraw Hill Publications.
7. M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

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

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply the basic principles of Mechanics of rigid body and continuous media and their applicationsunderstand the principles in electrostatics and electromagnetics and magnetic properties of materials.
5. understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
6. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
7. Learnthe basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
8. provide multidisciplinary experiences throughout the curriculum.

II Semester CY203CHEMISTRY FOR CHEMICAL ENGINEERING-II

(II Semester - For ChE only)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I

Colloids: Classification of colloids; Size and shape; preparation of sols; Origin of charge in Colloidal particles: Stability of Colloids: Kinetic. Optical & electrical Properties: Electro kinetic phenomena: Electrical Double Layer; Ultracentrifuge and Molecular weight determination of Macromolecules. Viscosity: Definition of viscosity of a liquid; Determination of Viscosity; Surface Tension: Introduction: Origin of Surface Tension: Surface energy, Capillarity; Contact Angle; Measurement of Surface Tension by Capillary rise method; Variation of Surface Tension of a liquid with Temperature and Concentration.

UNIT II

Kinetic theory of gases: Van der Waals Equation of state, Maxwell distribution law, vapour-liquid equilibrium, Colligative property. Adsorption: Introduction; Gibb's adsorption equation; Surface Excess; Adsorption isotherms: Freundlich, Langmuir, BET adsorption equations: Surface Films: Langmuir Balance: two-dimensional equation of state.

UNIT III

Introduction to quantum mechanics: Spectral shape pf Blackbody radiation, Planck's equation and a concept of quanta, breakdown of the classical equipartition principle, basic postulates of quantum mechanics, Hamiltonian function &Hamiltonian operator, important properties of a Hamiltonian operator, Heisenberg's uncertainty principle.

UNIT IV

Common organic reactions and their mechanisms: Friedel-Crafts, Claisen Condensation, Cannizaro, Aldolcondensation. Fischer-Troapsch synthesis, Birch reduction, pekins reaction, Riemer Tiemer reaction Wolf KishnerReductio and Grignard reaction;

UNIT V

Aminoacids: Classification; General methods of preparation and properties of amino acids, polypeptide synthesis, General properties of proteins, colour tests, enzymes. Lipids, fats and steroids; nucleic acid, DNA & RNA - generation and structure. Carbohydrate: Classification, Glucose and fructose, Disaccharides: Sucrose, maltose.

Text / Reference Books:

1. Physical Chemistry: G.W.Castellan, Narosa
2. Organic Chemistry: Finar; I.L. — Vol — I & II, Pearson Education

3. Organic Chemistry: Morrison & Boyd; PHI/Pearson Education.
4. Physical Chemistry: P. W. Atkins: Oxford.
5. A Text book of Physical Chemistry: K. L. Kapoor: Macmillan
6. A guide Book to Mechanism in Organic Chemistry: Peter Sykes
7. Organic Chemistry: Loudon: Oxford

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

1. understand the theoretical principles underlying molecular structure, bonding and properties
2. know the fundamental concepts of structure and function in organic reactions, the use of Kinetics and thermodynamics to elucidate mechanisms of reactions
3. predict reactivity patterns and propose reasonable mechanisms

II Semester **EE 204 ELECTRICAL CIRCUITS**
(II Semester - For ECE only)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT-I

Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques– Kirchhoff's laws – Star-delta transformation – Network reduction techniques - Mesh and Nodal Analysis for D.C. Circuits– Concept of mutual inductance – Dot convention.

UNIT-II

Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits

A.C. Fundamentals: Periodic waveforms – Average and effective values of different waveforms - Form factor and crest factor.

UNIT-III

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor -Active and reactive power – Impedance Triangle-Power triangle – Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT-IV

Resonance: Series and Parallel Resonance – Resonant frequency, Half power frequencies, bandwidth and Quality Factor.

Locus diagrams: Current locus diagrams of RL and RC series circuits and two branch parallel circuits.

UNIT-V

Three Phase Circuits: Advantages of three phase systems – Phase sequence – Balanced and Unbalanced systems – Magnitude and phasor relationships between line and phase voltages and currents in balanced star and delta circuits – Analysis of balanced and unbalanced three phase circuits with star and delta connected loads, Measurement of three phase power – Two wattmeter method

Text Books:

1. Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
2. Ravish R. Singh, Network Analysis and Synthesis, Tata Mc. Graw Hill.
3. Abhijit Chakrabarti: Circuit Theory Analysis and Synthesis, 7th Revised Edition, Dhanpat Rai & Co

II Semester EE 205 BASIC ELECTRICAL ENGINEERING
(II Semester - for EEE only)

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT-I

Basic Circuit Concepts: Electrical circuit elements (R, L and C), Classification of Circuit elements, Voltage and Current sources, Source transformation Techniques– Kirchhoff's laws – Star-delta transformation – Network reduction techniques - Mesh and Nodal Analysis for D.C. Circuits– Concept of mutual inductance – Dot convention.

UNIT-II

Network Topology: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits
A.C. Fundamentals: Periodic waveforms – Average and effective values of different waveforms - Form factor and crest factor.

UNIT-III

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance and admittance – Power factor -Active and reactive power – Impedance Triangle-Power triangle - Steady State analysis of single-phase A.C. circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel) – Phasor diagrams. Mesh and Nodal Analysis for A.C. Circuits.

UNIT-IV

D.C. Machines: Construction of a D.C. Machine, **D.C. Generator:** Operation, Classification and EMF equation. **D.C. Motor:** Operation, Back E.M.F, Types, and Applications.

Single Phase Transformers: Principle of Operation, Types, EMF equation.

UNIT-V

Three Phase Induction Motor: Production of Rotating Magnetic Field, Construction and operation of 3-Phase Induction Motor.

Alternators: Construction and working of Alternators.

Text Books:

1. Sudhakar and Shyammohan, Circuits and Networks: Analysis and Synthesis, 5th Edition, Tata McGraw-Hill
2. Ravish R. Singh, Network Analysis and Synthesis, Tata Mc. Graw Hill.
3. Nagrath and Kothari,Basic Electrical Engineering, 4th Edition, Tata Mc. Graw Hill.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill.

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

1. understand and analyze basic electric and magnetic circuits.
2. study the working principles of electrical machines and power converters.
3. introduce the components of low-voltage electrical installations.

II Semester **CS 204 DATA STRUCTURES**
(II Semester – for CSE only)

Instruction: 3 hr / week **Credits: 3** **Assessment: 3**

Course objectives:

1. Develop skills to design and analyze linear and nonlinear data structures.
2. Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
3. Develop recursive algorithms as they apply to trees and graphs.
4. Strengthen the ability to identify and apply the suitable data structure for the given real world problem
5. Understand the various techniques of sorting and searching

UNIT I

Introduction: Data types/Objects/Structures, Abstract definition of Data Structures, Overview of linear and nonlinear data structures, Analysis of algorithms, Algorithm specification, Asymptotic notation, Time-Space trade-off, Searching: Linear, Binary and Fibonacci search and their complexity analysis.

Arrays: Definition, Multidimensional arrays, Pointer arrays, Representation of arrays – Row major and Column major orders, Application of arrays – Polynomials, Sparse matrices representation.

UNIT II

Stacks and Queues: Introduction, ADT, Array representation, Operations and Applications of Stacks - Evaluation of expressions, Code generation for stack machines, Implementation of recursion, Factorial calculation and Towers of Hanoi; Circular Queue, Priority Queue, Double ended queue, Applications of Queues - Simulation, CPU Scheduling; Multiple stacks and queues

UNIT III

Linked Lists: Singly linked lists and chains, Circular linked list, Doubly linked list, Circular doubly linked list, Complexity analysis of the same, Linked representation of Stacks and Queues, Applications of linked lists - Polynomial representation, Sparse matrix multiplication, Dynamic storage management; Generalized list representation, Recursive algorithms for lists, Recursive lists

UNIT IV

Trees: Basic tree terminologies, Binary trees – Definition, Properties, ADT, Representations, Operations and Applications; Binary Search Trees, Heap Trees, Threaded binary trees, Height balanced trees – AVL Trees, Red black tree, Splay tree Their operations and complexity analysis.

UNIT V

Sorting Techniques: Insertion sort, Selection sort, Bubble sort, Quick sort, Radix sort Merge sort, External sort – Introduction, K-way Merge sort.

Graphs: Basic terminologies, Representations, ADT, Operations on graphs – DFS, BFS, Spanning trees, Biconnected components, Minimum cost spanning trees.

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

1. Choose appropriate data structure for the specified problem definition.
2. Implement linear and non-linear data structures viz. stacks, queues, linked list, trees, graphs.
3. Apply the concept of trees and graph data structures for the real world problems.
4. Comprehend the implementation of sorting and searching algorithms

Text Books:

1. Ellis Horowitz and Sartaj Sahani, “Fundamentals of Data Structures”, Computer Science Press.
2. Ellis Horowitz, SartajSahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
3. DebasisSamanta, Classic Data Structures, Second Edition, Prentice Hall of India

Reference Books:

1. Aaron M. Tenenbaum,YedidyahLangsam and Moshe J. Augenstein “Data Structures Using C and C++”, PHI Learning Private Limited
2. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill.
3. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education

II Semester **CS 207 DATA STRUCTURES LAB**
(for CSE only)

Instruction: 2 (Lab) hr / week **Credits: 1** **Assessment: 3**

Course Objectives:

1. To understand the practical application of linear and nonlinear data structures.
2. To develop and execute programs in C++/C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, and graphs.
3. To develop and execute programs in C to implement various sorting and searching techniques

1. Develop an algorithm to implement stack using arrays. Code it in C++.
2. Develop an algorithm to evaluate a given postfix expression using stack. Code it in C.
3. Develop an algorithm to convert a given infix expression to postfix form using stacks. Code it in C.
4. Develop algorithms to implement i) Linear queue and ii) Circular queue using arrays. Code it in C++.
5. Develop an algorithm to implement double ended queue (de queue) using arrays. Code it in C++.
6. Develop algorithms using dynamic variables and pointers, to construct a singly linked list consisting of the following information in each node: student id (integer), student name (character string) and semester (integer). The operations to be supported are:
    a. Inserting a nodei) at the front of a list ii) at the rear of the list ii) at any position in the list
    b. Deleting a node based on student id. If the specified node is not present in the list, an error Message should be displayed.
    c. Searching a node based on student id. If the specified node is not present in the list an error message should be displayed.
    d. Displaying all the nodes in the list.

    Code the same in C++.

7 Develop an algorithm using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations:

i) Push, ii) Pop iii) Display (The program should print appropriate messages for stack overflow and stack empty). Code the same in C++.

8 Develop an algorithm using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert
b. Deletec. Display. The program should print appropriate messages for queue full and queue empty. Code the same in C++.

9 Develop an algorithm to support the following operations on a doubly linked list where each node consists of integer data object:

    a. Create a doubly linked list
    b. Insert a new node
    c. Delete the specific node
    d. Display the contents of the list.

Code the same in C++.

10 Develop algorithms to
   a. Construct a binary tree of integers.
   b. Traverse the binary tree using inorder, preorder and postorder. (both recursive and non-recursive versions)
   c. Display the elements in the tree.

   Code the same in C++.

11 Develop algorithms to create a binary search tree (BST) and perform the following operations on it. Find (a) Minimum element (b) Maximum element (c) Search for a given element (d) Find predecessor of a node (e) Find successor of a node (f) Delete a node with specific key value. Code the same in C++.
12 Develop an algorithm to construct an AVL tree for the given set of elememnts. Code it in C++.
13 Develop algorithms to Sort the given list of elements (i.e. numbers or strings)
   (a) Insertion sort (b) Merge sort (c) Quick sort (d) Heap sort
   Code the same in C.
14 Develop algorithms to implement of graph traversals by applying:
   (a) BFS (b) DFS. Code the same in C/C++.
15 Develop algorithms to find out a minimum spanning tree of a simple connected undirected graph by applying: (a) Prim's algorithm (b) Kruskal's algorithm
   Code the same in C/C++.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Identify the appropriate data structure for given problem.
2. Have practical knowledge on the application of data structures.
3. Analyze the time and space efficiency of the data structure.

Text Books:

1. Object Oriented Programming with ANSI & Turbo C++, Ashok N.Kamthane, PearsonEducation
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. Ellis Horowitz, SartajSahni and Dinesh Mehta, Fundamentals of Data Structures in C++ Universities Press, Second Edition.
4. Data Structures using C and C++, YedidyahLangsam.MosheJ.Augenstein Aaron M.Tenenbaum, 2nd Edition,PHI
5. ADTs, Data Structures and Problem Solving with C++, Larry Nyhoff, Pearson Education.

CE 107 / CE 207 **ENVIRONMENTAL SCIENCE** ***Audit Course***
(CE 107 for EEE, ECE &CSE) ***No Univ.Exam***
(CE 207 for ChE, CE & ME)

Instruction: 4(L) **Credits: 0(Zero)** **Assessment: 40 + 60**

UNIT I

Environmental Studies and Natural Resources

Definition, Scope and importance of Environment, Environmental studies, Need for public awareness

Components of Environment- Atmosphere, Hydrosphere, Lithosphere.

Renewable and **Non-Renewable Resources and associated problems**

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem.

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

Biodiversity and its conservation:

Definition, genetic species and ecosystem diversity, Biogeographically 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-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami.

Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

1. AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers, 2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
6. SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
7. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
8. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

Course Outcomes:

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

1. acquire knowledge in
    - diverse components of environment and natural resources
    - ecosystem and biodiversity & its conservation methods
    - population growth and human health
    - green technology
2. identify and resolve the issues related to sources of different types of pollutions
3. provide solutions to individuals, industries and government for sustainable development of natural resources
4. apply environmental ethics in protection of diversified ecosystems.

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