# R-20

## B.Tech

## Program Regulations

Scheme of Instruction & Syllabus

for I Year

(Effective from the batch admitted in 2020-2021)

**COLLEGE OF ENGINEERING**
**SRI VENKATESWARA UNIVERSITY**
**TIRUPATI-517 502**

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<br>MA: Mathematics |
| EE : Electrical and Electronics Engineering | PH : Physics |
| ME : Mechanical Engineering | 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 A student shall be promoted from first year to second year if he fulfils the minimum attendance requirements.

11.2 A 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.

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

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



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

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 Distinctione | ≥ 7.5 |
| First Classe | ≥ 6.5 < 7.5 |
| Second Classe | ≥ 5.5 < 6.5 |
| Pass Classe | ≥ 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) fun-tional / 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 timeGap 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.

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## 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

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



**SRI VENKATESWARA UNIVERSITY**

**COLLEGE OF ENGINEERING : TIRUPATI 517 502**

**SYLLABUS – I & II Semesters B.Tech**

**I Semester**

**MA 101 MATHEMATICS – 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 nth 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 : F**actors 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, students 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 –Writing introduction and conclusion

**UNIT V**

**Writing Practices :** Comprehension - Précis Writing –Essay Writing

**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**

**EE104 BASIC 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-$\varphi$ I.M., Torque-Speed Characteristics of 3-$\varphi$ 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).



**Text books :**

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;

**UNIT III**

**Projections of planes :** Question Paper Modular – 4 questions from Units I to IV, 15 marks each.

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. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
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 104 PROBABILITY 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 & Glass Cutting.

Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

**Detailed Contents**

1. Manufacturing Methods-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 / Reference Books :**


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 Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 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. Rao P.N., "Manufacturing Technology", Vol. I & II, Tata McGraw Hill House, 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 201 MATHEMATICS 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 202 ENGINEERING 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 Moduli-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 Prakash Nath & 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 Kishner Reduction 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 mecha-nisms

**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: 3hr/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 node i) 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++, Yedidyah Langsam. Moshe J. 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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**SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502**

# Department of Computer Science and Engineering

**B.Tech (CSE) – Choice Based Credit System – 2020 Regulations**

**(With effect from the academic year 2021-22)**

**Scheme of Instruction and Examinations**

## III Semester

| Course Code | Course Title | Scheme of Instruction (Hours/Week) | | | | No. of Credits |
|---|---|---|---|---|---|---|
| | | L | T | P | Total | |
| MA301C | Mathematics III | 3 | | | 3 | 3 |
| CS302C | Database Management Systems | 3 | 1 | | 4 | 4 |
| CS303C | Discrete Mathematical Structures | 3 | | | 3 | 3 |
| CS304C | Basic Electrical Engineering | 3 | | | 3 | 3 |
| CS305C | Elements of Electronics and Communication Engineering | 3 | | | 3 | 3 |
| CS306L | Database Management Systems Laboratory | | | 3 | 3 | 1.5 |
| CS307L | Electronics and Communication Engineering Laboratory | | | 3 | 3 | 1.5 |
| CS309S | Skill Oriented Course - Basic Python Programming | 1 | | 2 | 3 | 2 |
| PA310A | Audit Course - Constitution of India | 2 | | | 2 | 0 |
| Total | | 18 | 1 | 8 | 27 | 21 |

- 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**

# Department of Computer Science and Engineering

**B.Tech (CSE) – Choice Based Credit System – 2020 Regulations**

**(With effect from the academic year 2021-22)**

**Scheme of Instruction and Examinations**

## IV Semester

| Course Code | Course Title | Scheme of Instruction (Hours/Week) | | | | No. of Credits |
|---|---|---|---|---|---|---|
| | | L | T | P | Total | |
| CS401C | Digital Electronics and Logic Design | 3 | | | 3 | 3 |
| CS402C | Simulation and Modeling | 3 | | | 3 | 3 |
| HS403C | Managerial Economics and Accountancy | 3 | | | 3 | 3 |
| CS404C | Computer Oriented Numerical Methods | 3 | | | 3 | 3 |
| CS405C | Computer Organization | 3 | | | 3 | 3 |
| CS406C | Design and Analysis of Algorithms | 3 | | | 3 | 3 |
| CS407L | Assembly Language Programming and VHDL Laboratory | | | 3 | 3 | 1.5 |
| CS408L | Algorithms Laboratory | | | 3 | 3 | 1.5 |
| CS409S | Skill Oriented Course - Basic Web Designing | 1 | | 2 | 3 | 2 |
| Total | | 19 | | 8 | 27 | 23 |
| Internship for 4 to 6 Weeks (Mandatory) during summer vacation. | | | | | | |

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

**SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502**

# Department of Computer Science and Engineering

**Choice Based Credit System – 2020 Regulations**

**Scheme of Instruction and Examinations**

## List of subjects for B.Tech (Honors) in Computer Science and Engineering**

| Course Code | Course Title | Scheme of Instruction (Hours/Week) | | | | No. of Credits |
|---|---|---|---|---|---|---|
| | | L | T | P | Total | |
| CSHN01 | Distributed Databases | 3 | 1 | | 4 | 4 |
| CSHN02 | Advanced Operating Systems | 3 | 1 | | 4 | 4 |
| CSHN03 | Multicore Computing | 3 | 1 | | 4 | 4 |
| CSHN04 | Natural Language Processing | 3 | 1 | | 4 | 4 |
| CSHN05 | Software Architecture and Design Patterns | 3 | 1 | | 4 | 4 |
| CSHN06 | Multi Agent Systems | 3 | 1 | | 4 | 4 |
| CSHN07 | Deep Learning | 3 | 1 | | 4 | 4 |

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

** Students shall register for any 4 subjects (4*4 = 16 credits) from the above listed subjects, choosing one subject each in IV, V, VI and VII semester. Further, they shall acquire 4 credits through two MOOCs (each of 2 credits), which shall be discipline-specific.

**SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING :: TIRUPATI – 517 502**

# Department of Computer Science and Engineering

**B.Tech (CSE) – Choice Based Credit System – 2020 Regulations**

**Scheme of Instruction and Examinations**

## List of subjects for B.Tech (Minor) in Computer Science and Engineering**

| Course Code | Course Title | Scheme of Instruction (Hours/Week) | | | | No. of Credits |
|---|---|---|---|---|---|---|
| | | L | T | P | Total | |
| CSMN01 | Data Structures | 3 | 1 | | 4 | 4 |
| CSMN02 | Computer Organization | 3 | 1 | | 4 | 4 |
| CSMN03 | Database Management Systems | 3 | 1 | | 4 | 4 |
| CSMN04 | Computer Networks | 3 | 1 | | 4 | 4 |
| CSMN05 | Software Engineering | 3 | 1 | | 4 | 4 |
| CSMN06 | Java and Web Technology | 3 | 1 | | 4 | 4 |

- All Courses - 40 marks (Internal) + 60 Marks (Univ. Semester End)

** Students shall register for any 4 subjects (4*4 = 16 credits) from the above listed subjects, choosing one subject each in IV, V, VI and VII semester. Further, they shall acquire 4 credits through two MOOCs (each of 2 credits), which shall be discipline-specific.

MA301C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## MATHEMATICS III

No.of Credits: 3 Instruction Hours/Week: 3

**Course Objectives:**

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables.
- To understand power series and expansion of analytic function.
- To understand Laurent Series, poles, singular points, Residue theorem and its applications.
- The aim is to analyze the solutions of partial differential equations.
- To discuss the boundary value problems, one dimensional wave equation, heat equation and Laplace Equation.

**UNIT I**

Complex analysis - I: Analytical functions - Cauchy- Reimann equations – Construction of Analytic functions- Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

**UNIT II**

Complex analysis - II**:** Taylor's and Laurents' series - Transformations - Conformal mapping - Bilinear transformations - Transformation of 1/z, $z^2$, sin z and cos z.

**UNIT III**

Complex analysis - III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals.

**UNIT IV**

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Legranges' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

**UNIT V**

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

**Course Outcomes:**

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

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Describe basic properties of complex integration and having the ability to compute such integrals.
- Describe conformal mappings between various plane regions.

- Apply the concepts of Complex Analysis in many branches of Engineering, including the branches of hydrodynamics, thermodynamics, and particularly quantum mechanics.
- Compute the residue of a function and use the Residue Theory to evaluate a contour integral or an integral over the real line.
- Formulate/solve/classify the solutions of Partial differential equations.
- Identify linear and nonlinear PDE and solve nonlinear PDE by Charpit's method.
- Apply Variables separable methods to solve boundary value problems.
- Find the solution of one dimensional wave equation, heat equation and Laplace equation.

**Text/Reference Books:**

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

CS302C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## DATABASE MANAGEMENT SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

**Course Objectives:**

- To learn data models, conceptualize and depict a database system using ER diagram
- To understand the internal storage structures in a physical DB design
- To demonstrate the fundamental concepts, operation and function of different components of database systems.
- To describe the roles of transaction processing and concurrency control in a modern DBMS.
- To demonstrate key issues in the operation of a DBMS including query processing, security and integrity.
- To design and implement a database application.

**UNIT-I**

Introduction: Managing Data, File Systems versus a DBMS, Advantages of a DBMS, Storing data in a DBMS, Queries in a DBMS, Transactions, Structure of a DBMS.

Introduction to Data base design: ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views Destroying/ altering Tables and Views.

**UNIT-II**

Relational Algebra and Calculus: Relational Algebra , Relational calculus, Expressive Power of Algebra and calculus.

SQL: Form of Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, NULL values , Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases

**UNIT-III**

Schema Refinement and Normal Forms: Introduction, Functional Dependencies, Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions, Normalization, Schema Refinement in Data base Design, Multi valued Dependencies , FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

Database Application Development: Accessing Databases from Applications, Introduction to JDBC, JDBC Classes and Interfaces, SQLJ, Stored Procedures.

**UNIT-IV**

Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash Recovery.
Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking

Crash Recovery: Introduction to ARIES, Log, Recovery related Structures, Write-Ahead Log Protocols, Checkpointing, Recovering from a System Crash, Media Recovery, Interaction with Concurrency Control

**UNIT-V**

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index data Structures, Comparison of File Organizations, Indexes and Performance Tuning.

Indexing and Hashing: Intuitions for tree indexes, Indexed Sequential Access Method, B+ Trees: A Dynamic Index Structure, Search, Insert, Delete, Duplicates, B+ Trees in Practice, Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

Parallel and Distributed Databases: Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in Distributed DBMS, Distributed Catalog Management, Distributed Query Processing

**Course Outcomes:**

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

- Use relational algebra and relational calculus, to express database queries.
- Use SQL to interact with database management systems.
- Design appropriate database tables, using functional dependencies and normal forms.
- Implement a disk-oriented database storage manager with heap table and indexes.
- Understand, compare, and implement the major concurrency control algorithms.
- Implement database recovery algorithms and verify their correctness.
- Identify trade-offs among database systems techniques and contrast distributed/parallel alternatives for both on-line transaction processing and on-line analytical workloads.

**Text Books**:

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill, 2014.
2. C. J. Date, A. Kannan and S. Swamynathan, An Introduction to Database Systems, 8th edition, Pearson Education, 2006.

**Reference Books:**

1. Silberschatz A, Korth H F, and Sudarshan S, Database System Concepts, 6th edition, McGraw-Hill, 2011.

2. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Fourth Edition, Pearson/Addision wesley, 2007.
3. J D Ullman, H. Garcia-Molina and J. Widom, Database Systems: The Complete Book, Prentice-Hall, 2009.
4. Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database Management, 12th edition, Pearson, 2015.

CS303C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## DISCRETE MATHEMATICAL STRUCTURES

No.of Credits: 3 Instruction Hours/Week: 3

**Course Objectives:**

This course is designed to

- Use mathematical reasoning in order to read, comprehend, and construct mathematical arguments and theorem proving techniques.
- Familiarize students with the basic concept of functions, basic set theory, countability and counting arguments.
- Present basic concepts of number theory and teach students how to apply the same to cryptography.
- Reinforce the method of recursion and use of structural induction.
- Introduce fundamental concepts of graph theory and present different graph models.
- Familiarize students with minimum spanning trees and shortest-path problems.

**UNIT I**

Logic, Prepositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Methods of Proof and Strategy.

**UNIT II**

Sets, Set Operations, Functions, Sequences and Summations, Introduction to Semigroups, Groups, Subgroups, Normal subgroups.
Relations and their properties, n-ary relations and their applications, Representing relations, Closures of relations, Equivalence relations, Partial orderings, Lattices.

**UNIT III**

Counting: Basics of Counting, Pigeonhole principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.
Advanced Counting Techniques: Recurrence Relations, Solving Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-and-Exclusion and its Applications.
Number Theory and its Applications.

**UNIT IV**

Introduction to graphs, Graph terminology, Applications of some special graphs, Representation of graphs, Graph isomorphism.
Connectivity: Connectedness in undirected and directed graphs, Paths and Isomorphism, Construction of reliable communication networks, Euler path, Hamilton path, Chinese postman problem, Shortest path problems, Traveling salesman problem.

**UNIT V**

Planar graphs, Kuratowski's theorem, Graph coloring and applications.

Introduction to trees, Application of trees, Spanning trees, Applications of backtracking, Minimum spanning trees, Flows, Cuts, Max-flow Min-cut problem.

**Course Outcomes**

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

- Verify the correctness of an argument using propositional and predicate logic
- Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases, and mathematical induction.
- Solve problems involving recurrence relations and generating functions.
- Construct and analyze graph models for problems in different areas.
- Design and develop real time application using graph theory

**Text Books:**

1. Kenneth H Rosen, Discrete Mathematics and its Applications, 6th edition, McGraw-Hill Companies.
2. Mott J L, Kandel A, and Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd edition, PHI, 2004.

**Reference Books:**

1. Malik D S, Sen M K, Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, 2004.
2. Mott J L, Kandel A, and Baker T P, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd edition, PHI, 2004.
3. Kolman B, Busby R C, Ross S C, and Rehman N, Discrete Mathematical Structures, 5th edition, Pearson Education, 2006.
4. Lipschutz S, Lipson M, Discrete Mathematics, 2nd edition, TMH, 2006.

CS304C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## BASIC ELECTRICAL ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

**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 wave forms – 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.

**Course Outcomes**

Having successfully completed this course the students will be able to:

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

**Text/Reference 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 McGraw-Hill.
3. Nagrath and Kothari, Basic Electrical Engineering, 4th Edition, Tata McGraw-Hill.
4. D.C.Kulshreshtha, Basic Electrical Engineering, McGraw-Hill.

CS305C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**

**(With effect from the academic year 2021-22)**

## ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

No.of Credits: 3 Instruction Hours/Week: 3

**UNIT I**

Basic Electronic Devices: Semiconductor fundamentals, Principle of operation and V-I Characteristics of Diodes (PN, Zener, Photo, LED, Laser Diode), Transistors (BJT, JFET, MOSFET).

Microelectronics: Concept of miniaturization of electronic systems, Basic principles of monolithic integrated circuit technology, IC fabrication of simple circuit elements.

**UNIT II**

Transistor Amplifiers: Concept of an amplifier -Gain, Input and Output impedance, Frequency response, Biasing of a transistor, CB, CE and CC Configurations and their characteristics, Multi stage Amplifiers.

Concept of feedback: Negative and Positive feedback, Advantages and limitations, Oscillator Operation, RC phase shift oscillator and Crystal oscillator.

**UNIT III**

Analog ICs: Concept of differential amplifier, Operational Amplifier (OPAMP), Characteristics of an OP AMP and its applications - Inverting and non-inverting amplifiers, Summer, Integrator, Differentiator.

555 timer, and its application as multi-vibrator, Phase Locked Loop (PLL), and its application as frequency multiplier.

**UNIT IV**

Basics of Communication Engineering: Introduction, Signal Spectrum, Bandwidth, Noise; Concept of Communication - Source, Channel, Sink; Types of channels; Concept of information and entropy, Shannon's law, Bit rate; Analog Modulation Schemes - AM, FM; Pulse Modulation Schemes - Sampling, PAM, PWM, PPM, PCM, DM; Multiplexing - FDM,TDM.

**UNIT V**

A/D and D/A Converters: D to A converters- Basic principle, Weighted resistor and ladder types; A to D Converters - Basic principle, Ramp, Successive approximation types.

Basic Electronics Instruments: Block diagram and principle of operation of - Digital Multi-meter, Function generator, Cathode Ray Oscilloscope (CRO).

**Text Books:**

1. Bogart Jr. T F, Beasley J S, and Rico G, Electronic Devices and Circuits, 6th edition, Pearson Education, 2006.

2. Malvino A, and Bates D J, Electronic Principles, 7th edition, Tata McGraw-Hill, 2007.

**Reference Books:**

1. Deshpande N P, Electronic Devices and Circuits - Principles and Applications, Tata McGraw-Hill, 2007.
2. Muthusubramanian R, Salivahanan S, and Muraleedharan K A, Basic Electrical, Electronics, and Computer Engineering, 2nd edition, Tata McGraw-Hill, 2001. (Part II - Electronics Engineering only)
3. Stanley W D, Hackworth J R, and Jones R L, Fundamentals of Electrical Engineering and Technology, Thomson Delmar Learning, 2007. (Part III - Electronic Devices and Linear Electronics only)
4. Gates E D, Introduction to Electronics, 5th edition, Thomson Delmar Learning, 2007. (Sections 3 and 4 only)
5. Storey N, Electronics - A Systems Approach, 2nd edition, Pearson Education Asia, 2001.

**CS306L**

## SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**

**(With effect from the academic year 2021-22)**

## DATABASE MANAGEMENT SYSTEMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the course, "Database Management Systems".

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**CS307L**

## SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**

**(With effect from the academic year 2021-22)**

## ELECTRONICS AND COMMUNICATION ENGINEERING LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the courses, "Elements of Electronics and Communication Engineering".

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CS309S

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## BASIC PYTHON PROGRAMMING

No.of Credits: 2 Instruction Hours/Week: 1T+2P

**Course Objectives:**

The course is designed to:

- Python syntax and semantics and be fluent in the use of Python flow control and functions.
- the concepts of Object-Oriented Programming as used in Python.
- various problems solving approaches of computer science in various Domains.
- various data structures like lists and dictionaries using python.
- introduce Python third- Party Tools for various domains.

**UNIT I**

**Introduction to Python Programming:** Features and History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion.

**Decision Control Statements:** Introduction to Decision Control Statements, Selection/ Conditional Branching Statements, Basic Loop Structures/Iterative Statements, Nested Loops, The break, continue and pass Statement, The else Statement used with Loops.

**UNIT II**

**Functions and Modules:** Introduction, Function Definition, Function Call, Variable Scope and Lifetime, The return statement, More on Defining Functions, Lambda Functions or Anonymous Functions, Documentation Strings, Good Programming Practices, Recursive Functions, Modules, Packages in Python, Standard Library modules, Globals(), Locals(), and Reload(), Function Redefinition.

**Python Strings Revisited:** Introduction, Concatenating, Appending, and Multiplying Strings, Strings are Immutable, String Formatting Operator, Built-in String Methods and Functions, Slice Operation, ord() and chr() Functions, in and not in operators, Comparing Strings, Iterating String, The String Module, Regular Expressions, Metacharacters in Regular Expression.

**UNIT III**

**File Handling:** Introduction, File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Directory Methods.

**Data Structures:** Sequence, Lists, Functional Programming, Tuple, Sets, Dictionaries.

**Classes and Objects:** Introduction, Defining Classes, Creating Objects, Data Abstraction, Class Method and self Argument, The _init_() Method, Class Variables and Object Variables, The _del_() Method, Other Special Methods, Public and Private Data Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Functions to Check, Get, Set, and Delete Class Attributes, Built-in Class Attributes, Garbage Collection, Class Methods, Static Methods.

**UNIT IV**

**Inheritance:** Introduction, Inheriting Classes in Python, Types of Inheritance, Composition or Containership or Complex Objects, Abstract Classes and Interfaces, Metaclass.

**Operator Overloading:** Introduction, Implementing Operator Overloading, Reverse Adding, Overriding _getitem_() and _setitem_() Methods, Overriding the in Operator, Overloading Miscellaneous Functions, Overriding the _call_() Method.

**Error and Exception Handling:** Introduction to Errors and Exceptions, Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, The else Clause, Raising Exceptions, Instantiating Exceptions, Handling Exceptions in Invoked Functions, Built-in and User-defined Exceptions, The finally Block, Pre-defined Clean–up Action, Re-raising Exception, Assertions in Python, Multi-threading.

**UNIT V**

**Survey of The Most Common 3rd Party Packages:** Requests, Numpy/Scipy, Matplotlib/ Pyplot, Pandas, Pillow, Flask/Django/Twisted, Pep8, Scikit-Learn/Nltk, Stanford-Corenlp, Bcrypt, Beautiful Soup, and More.

**GUI Design with Tkinter:** Button, Canvas, Check Button, Entry, Frame, Label, List Box, Menu, Menu Button, Message, Radio Button, Scale, Scrollbar, Text Graphics with Turtle: Motion Control, Pen, Colour, Fill, Multiple Turtles, Reset and Clear.

**Course Outcomes**

Having successfully completed this course the students will be able to:

- understand the structure, syntax, and semantics of the Python language.
- interpret the concepts of Object-Oriented Programming as used in Python.
- demonstrate proficiency in handling Strings and File Systems.
- implement desktop/Web-based applications using the Python programming language.

**Text Books:**

1. Reema Thareja, Python Programming using problem solving approach, First Edition, Oxford University Press, 2017.
2. Mark Lutz, Learning Python, Fifth Edition, O'Rielly, 2016.

**Reference Books:**

1. Mark Lutz, Programming Python, Fourth Edition, O'Reilly, 2010.
2. John V.Guttag, Introduction to Computation and Programming Using Python with Application to Understanding, PHI.
3. Allen Downey, Think Python: How to think like a Computer Scientist, Green Tea Press.
4. Paul Barry, Head First Python: A Brain-Friendly Guide, Second Edition, O'Reilly.
5. The Python Standard Library, Python 3.6.5 documentation (Web Resource) https://docs.python.org/3/library/.

PA310A

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**III Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## CONSTITUTION OF INDIA

No.of Credits: Nil Instruction Hours/Week: 2

**Course Objectives:**

The objective of the course is to impart to the students

- understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

**UNIT I**

**History and philosophy of the Indian Constitution:**
History -Drafting Committee, (Composition & Working) - Preamble - Salient Features

**UNIT II**

**Contours of Constitutional Rights & Duties:** Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

**UNIT III**

**Organs of Governance:** Parliament – Composition - Qualifications and Disqualifications - Powers and Functions, Executive President – Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

**UNIT IV**

**Local Administration:**
District's Administration Head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

**UNIT V**

**Election Commission:** Election Commission: Role and Functioning - Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning.
Institute and Bodies for the welfare of SC/ST/OBC and women.

**Course Outcomes**

Having successfully completed this course the students will be able to know:

- the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- the passage of the Hindu Code Bill of 1956.

**Text/Reference Books:**

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, Lexis Nexis, 7th Edition, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

CS401C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## DIGITAL ELECTRONICS AND LOGIC DESIGN

No.of Credits: 3 Instruction Hours/Week: 3

**Course Objectives**

- To understand the essential knowledge on the fundamental of digital circuits
- To understand the overview on the design principles of digital computing systems

**UNIT I**
Number Representation, Signed and Unsigned, Code Conversion, Review of Boolean Algebra and DeMorgan's Theorem, Sum-of-Product and Product-of-Sum forms, Canonical forms, Karnaugh maps up to 6 variables.

**UNIT II**
MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half andFull Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU

**UNIT III**
Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, PseudoRandom Binary Sequence generator, Clock generation

**UNIT IV**
Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Conceptof Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

**UNIT V**
VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data typesand objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

**Course outcomes:**

At the end of this course students will demonstrate the ability to

- Design and analyze combinational logic circuits
- Design and analyze synchronous sequential logic circuits
- Design and implement complicated digital systems using Verilog
- Design a VLSI circuit for an application

**Text/Reference Books:**

1. R.P. Jain, “Modern digital Electronics”, Tata McGraw Hill, 4th edition, 2010.
2. Douglas Perry, “VHDL: Programming by Example”, Tata McGraw Hill, 4th edition.
3. Brown S, and Vranesic Z, Fundamentals of Digital Logic with VHDL Design, 3rd edition, McGraw Hill, 2012.
4. Kinney L L, and Roth Jr. C H, Fundamentals of Logic Design, 7th edition, Cengage Learning, 2015.

CS402C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## SIMULATION AND MODELING

No.of Credits: 3 Instruction Hours/Week: 3

**Course Objectives**

- To introduce various system modeling and simulation techniques, and highlight their applications in different areas.
- To provide an overview of modeling, through the basic concepts of systems analysis.
- To provide the elements needed to understand how the models can be used in simulation, forecasting, planning and management, and how they can be integrated to support decision-making

**UNIT -I**

Introduction to Simulation, Definitions, Types of Simulation Models, Applications, System and Environment, Components of System, Scope, Advantages and Limitations of Simulation.

**UNIT- II**

Introduction to Sampling, Statistical Distributions – Discrete and Continuous, Generation of Random Numbers and Random Variates.

**UNIT- III**

Introduction to Mathematical Modeling and Types, Applications, Simulations of Queuing, Inventory and Manufacturing Systems.

**UNIT- IV**

Introduction to Input data and output Analysis for single Model, Comparing Alternative System Configurations.

**UNIT- V**

Simulation of computer system, Introduction, Simulation Tools – Process and Event Orientation, CPU and Memory simulation, Simulation of Complex Systems.

**Course Outcomes**

After successful completion of the course the students would be able to

- describe the components of continuous and discrete systems and simulate the same.
- model any system from different fields.
- discuss the simulation methods and select the suitable technique on the problems.
- implement the model on the computer and from the results, check for the validity of the model and correctness of the assumptions present in the model.
- understand the limitations of their model and nuances in computer modeling of systems.

**Text Books:**

1. Banks J, Carson II J S, Nelson B L, Nicole D M and Shahabudeen P, Discrete-Event System Simulation, Pearson Education, 2007.
2. Geoffrey Gordon, System Simulation, 2nd edition, Pearson Education, 2015.

**Reference Book:**

1. Seila A F, Ceric V, and Tadimalla P, Applied Simulation Modeling, Thomson Brooks/Cole, 2003.

HS403C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**

**(With effect from the academic year 2021-22)**

## MANAGERIAL ECONOMICS AND ACCOUNTANCY

No.of Credits: 3 Instruction Hours/Week: 3

**UNIT I**

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

**UNIT II**

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

**UNIT III**

**Inflation:** Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

**UNIT IV**

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

**UNIT V**

**Cost Accounting:** Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

**Course Outcomes:**

On successful completion of this course the students will be able to

- Understand Macro Economic environment of the business and its impact on enterprise.
- Identify various cost elements of the product and its effect on decision making.
- Understand the concepts of financial management and smart investment.
- Prepare the Accounting records and interpret the data for Managerial Decisions.

**Text/Reference Books:**


1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition, Vikas Publication, 2012.

CS404C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## COMPUTER ORIENTED NUMERICAL METHODS

No.of Credits: 3 Instruction Hours/Week: 3

**UNIT I**

Errors in Numerical Calculations: Truncation and Round-off errors, Effect of errors in data; Closed form solution versus Iterative methods.
Roots of Nonlinear Equations: Bisection, False position and, Newton-Raphson methods.

**UNIT II**

Iterative Solution of Liner Equations - Jacobi iteration, Gauss-Seidel and Relaxation methods; Convergence of iteration methods.

**UNIT III**

Interpolation - Lagrange polynomials, Newton's difference formula, Cubic splines, and Two dimensional interpolation.

**UNIT IV**

Numerical Differentiation - Differentiating continuous and tabulated functions, Difference tables and Richardson extrapolation. Numerical integration - Trapezoidal, Simpson's 1/3 and Simpson's 3/8 Rules.

**UNIT V**

Numerical Solution of Ordinary Differential Equations - Taylor's Series, Euler's, Runge-Kutta methods.

**Text Books:**

1. Schilling R J, and Harries S L, Applied Numerical Methods for Engineers Using MATLAB and C, Thomson Brooks/Cole, 2006.

**Reference Books:**

1. Chapra S C, Applied Numerical Methods with MATLAB for Engineers and Scientists, 2nd edition, Tata McGraw-Hill, 2007.
2. Gerald C F, and Wheatley P O, Applied Numerical Analysis, 6th edition, Pearson Education Asia, 2002.
3. Niyogi P, Numerical Analysis and Algorithms, Tata McGraw Hill, 2003.
4. Heath M T, Scientific Computing: An Introductory Survey, McGraw-Hill, 1997.

CS405C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## COMPUTER ORGANIZATION

No.of Credits: 3 Instruction Hours/Week: 3

**Course Objectives**

The course is designed to

- make the students understand the basic structure and operations of various functional units of a digital computer.
- familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- Make the stdents understand how to design processing unit using hardwired control and microprogrammed control approaches.
- familiarize the students with hierarchical memory system.
- expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

**UNIT I**

Structure of Computers: Introduction, Performance, Memory addressing and Operations, Instructions and Instruction sequencing, Addressing modes, Basic l/0 operations, Pushdown stacks, Subroutines, Encoding of machine instructions, Brief description and functional classification of IA-32 Pentium instruction set

**UNIT II**

Basic Processing Unit: Fundamental concepts, Single and Multiple bus organization, Hardwired control, Multiprogrammed control – Microinstructions, Microprogram sequencing, Wide-branch addressing, Microinstructions with next-address field, Prefetching microinstructions.

Arithmetic: Multiplication – Booth algorithm; Integer division, Floating-Point Addition and Subtraction.

**UNIT III**

The memory System: Basic concepts, RAM and ROM Memories and their internal organization, Cache Memories - Mapping functions, Replacement algorithms; Performance Considerations, Virtual Memories, Secondary Storage.

**UNIT IV**

Input/ Output Organization: Accessing l/O devices; Interrupts –Enabling and disabling, Handling multiple devices; Direct Memory Access - Bus Arbitration; Buses – Synchronous and Asynchronous; Interface circuits – Parallel port, Serial port

**UNIT V**

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Superscalar operation.

Processor Families: The ARM family, The Motorola 680x0 and Coldfire families, The IA-32 family.

**Course Outcomes:**

On successful completion of this course the students will be able to

- Identify the basic structure and functional units of a digital computer.
- Analyze the effect of addressing modes on the execution time of a program.
- Design processing unit using the concepts of hardwired control or microprogrammed control.
- Select appropriate interfacing standards for I/O devices.
- Identify the roles of various functional units of a computer in instruction execution.
- Understand memory hierarchy and its impact on computer cost/performance.
- Understand the advantage of instruction level parallelism and pipelining for high performance processor design.

**Text Books**

1. Hamacher C, Vranesic Z, and Zaky S, Computer Organization, 5th edition, McGraw-Hill.

**Reference Books**

1. Heuring V P, and Jordan H F, Computer systems Design and Architecture Addison-Wesley.
2. Carpinelli J D, Computer System Organization and Architecture. Addison-Wesley 2001.
3. Mano M M, Computer system Architecture, 4th edition, Pearson Education Asian 2002.

CS406C

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## DESIGN AND ANALYSIS OF ALGORITHMS

No.of Credits: 3 Instruction Hours/Week: 3

**Course Objectives:**

- To understand how to design an algorithm for the given problem.
- To analyze the complexity of an algorithm in terms of time and space.
- To get better insight on different strategies of algorithm design.

**UNIT-I**

Introduction: What is an Algorithm?, Algorithm Specification, Performance Analysis - Space Complexity, Time Complexity, Amortized Complexity, Asymptotic Notation ($O$, $\Omega$, $\Theta$), Practical Complexities, Performance Measurement, Randomized Algorithms: An Informal Description, Identifying the Repeated Element, Primality Testing, Advantages and Disadvantages.

Sets and Disjoint Set Union: Introduction, Union and Find Operations.

**UNIT-II**

Divide-and-Conquer: General Method, Defective Chess Board, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quicksort, Selection, Strassen's Matrix Multiplication, Convex Hull.

**UNIT-III**

The Greedy Method: The General Method, Container Loading, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Patterns, Single-Source Shortest Paths.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected Components and Spanning Trees, Biconnected Components and DFS.

**UNIT-IV**

Dynamic Programming: The General Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths: General Weights, Optimal Binary Search Trees, String Editing, 0/1-Knapsack, Reliability Design, The Traveling Salesperson Problem, Flow Shop Scheduling.

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.

**UNIT-V**

Branch-and-Bound: The Method, 0/1 Knapsack Problem, Traveling Salesperson, Efficiency Considerations.

$\mathcal{NP}$-Hard and $\mathcal{NP}$-Complete Problems: Basic Concepts, Cook's Theorem, NP-Hard Graph Problems, NP-Hard Scheduling Problems.

PRAM Algorithms: Introduction, Computational Model, Fundamental Techniques and Algorithms, Selection.

**Course Outcomes:**

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

- Develop systematically an algorithm for solving a problem
- Analyze the time and space complexity of the given algorithm
- Identify algorithm design methodology to solve problems.
- Distinguish between P and NP classes of problems

**Text Books**:

1. Ellis Horowitz, Sartaj Sahni, and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, 2nd edition, Universities Press, 2008.
2. Cormen T H, Leiserson C E, Rivest R L, and Stein C, Introduction to Algorithms, 3rd edition, Prentice-Hall of India, 2009.

**Reference Books:**

1. Levitin A, Introduction to the Design and Analysis of Algorithms, 3rd edition, Pearson Education, 2012.
2. Goodrich M T, Tamassia R, Algorithm Design, Wiley, 2008.
3. Skiena S S, The Algorithm Design Manual, 2nd edition, Springer, 2012.
4. Heineman G T, Pollice G, Selkow S, Algorithms in a Nutshell, 2nd edition, O'Reilly, 2016.
5. Dave P H, and Dave H B, Design and Analysis of Algorithms, 2nd edition, Pearson Education, 2008.

**CS407L**

## SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**

**(With effect from the academic year 2021-22)**

## ALP AND VHDL LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the course, "Assembly Language Programming and VHDL".

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**CS408L**

## SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**

**(With effect from the academic year 2021-22)**

## ALGORITHMS LABORATORY

No.of Credits: 1.5 Instruction Hours/Week: 3

At least 10 assignments are to be given covering the topics of the courses, "Design and Analysis of Algorithms".

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CS409S

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**IV Semester B.Tech (CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## BASIC WEB DESIGNING

No.of Credits: 2 Instruction Hours/Week: 1T+2P

**Course Objectives:**

The objectives of this course is to acquire knowledge on the

- Web related terminology and how does a website work.
- Web standards and W3C elements
- Responsive Web Designing
- Client-side Scripting Languages (Front End)
- Domains and Hosting

**UNIT I**

**Introduction to Web and Web Design Principles:**
Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Web pages, Website, Web browsers and Web servers and Web protocols. Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design concept.

**UNIT II**

**Introduction to HTML:**
What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags. Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

**UNIT III**

**Introduction to Cascading Style Sheets:**
Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

**UNIT IV**

**Introduction to Java Script:**
What is Java Script? Basics of Java Script: Variables, functions, and Operators, select HTML elements with Java Script, Java Script Events and Event Handlers, Regular expressions and pattern matching in Java Script. Form validation using Java Script.

**UNIT V**

**Introduction to Web Publishing or Hosting:**

Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites. Case study: Web publishing and hosting using Heroku cloud platform (https://www.heroku.com/).

**Course Outcomes**

Having successfully completed this course the students will be able to:

- describe and explain the relationship among HTML, XHTML, CSS, JavaScript, XML and other web technologies.
- create and publish advanced web pages with the help of HTML frames, scripting languages, and CSS.
- design forms for thick clients using JavaScript with interactive responsiveness and validations.
- design, host and publish websites in various domains.

**Text Books:**

1. Kogent Learning Solutions Inc., HTML 5 in simple steps, Dreamtech Press.
2. A beginner's guide to HTML, NCSA, 14th May 2003.
3. Murray, Tom/Lynchburg, Creating a Web Page and Web Site, College, 2002.

**Reference Books:**

1. Web Designing and Architecture-Educational Technology Centre, University of Buffalo.
2. Steven M Schafer, HTML, XHTML, CSS and JavaScript, Wiley India.
3. Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design, Wiley India.
4. Kogent Learning, Web Technologies: HTML, JavaScript, Wiley India.

CSHN 01

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**B.Tech (Honors in CSE) – CBCS Regulations-2020**

## DISTRIBUTED DATABASES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

**Course Objectives:**

- To expose the need for distributed database technology to confront with the deficiencies of the centralized database systems.
- To introduce basic principles and implementation techniques of distributed database systems.
- To familiarize students with the principles and knowledge of parallel databases.

**UNIT I**

**Introduction:** What Is a Distributed Database System?, History of Distributed DBMS, Data Delivery Alternatives, Promises of Distributed DBMSs, Design Issues, Distributed DBMS Architectures.

**Distributed and Parallel Database Design:** Data Fragmentation, Allocation, Combined Approaches, Adaptive Approaches, Data Directory.

**Distributed Data Control:** View Management, Access Control, Semantic Integrity Control.

**UNIT II**

**Distributed Query Processing:** Overview, Data Localization, Join Ordering in Distributed Queries, Distributed Cost Model, Distributed Query Optimization, Adaptive Query Processing.

**Distributed Transaction Processing:** Background and Terminology, Distributed Concurrency Control, Distributed Concurrency Control Using Snapshot Isolation, Distributed DBMS Reliability, Modern Approaches to Scaling Out Transaction Management.

**UNIT III**

**Data Replication:** Consistency of Replicated Databases, Update Management Strategies, Replication Protocols, Group Communication, Replication and Failures.

**Database Integration - Multidatabase Systems:** Database Integration, Multidatabase Query Processing.

**Parallel Database Systems:** Objectives, Parallel Architectures, Data Placement, Parallel Query Processing, Load Balancing, Fault-Tolerance, Database Clusters.

**UNIT IV**

**Peer-to-Peer Data Management:** Infrastructure, Schema Mapping in P2P Systems, Querying Over P2P Systems, Replica Consistency, Blockchain.

**Big Data Processing:** Distributed Storage Systems, Big Data Processing Frameworks, Stream Data Management, Graph Analytics Platforms, Data Lakes.

**UNIT V**

**NoSQL, NewSQL, and Polystores:** Motivations for NoSQL, Key-Value Stores, Document Stores, Wide Column Stores, Graph DBMSs, Hybrid Data Stores, Polystores.

**Web Data Management:** Web Graph Management, Web Search, Web Querying, Question Answering Systems, Searching and Querying the Hidden Web, Web Data Integration.

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

- Design and implement distributed databases.
- Handle query processing in a distributed database system.
- Comprehend transaction management and analyze various approaches to concurrency control in distributed databases.
- Design and implement various algorithms and techniques for deadlock and recovery in distributed databases.

**Text Books:**

1. M. Tamer Ozsu and Patrick Valduriez, “Principles of Distributed Database Systems”, Fourth Edition, Springer, 2020.

**Reference Books:**

1. Stefano Ceri and Giuseppe Pelagatti, Distributed Databases: Principles and Systems, McGraw Hill Education, 2017.
2. Saeed K. Rahimi and Frank S. Haug, Distributed Database Management Systems: A Practical Approach, Wiley.
3. Chhanda Ray, Distributed Database Systems, First Edition, Pearson Education India.
4. Sachin Deshpande, Distributed Databases, Dreamtech Press.
5. David Bell and Jane Grimson, Distributed Database Systems, First Edition, Addison-Wesley, 1992.
6. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: Database Systems: The Complete Book, Second Edition, Pearson Education.

CSMN 01

# SRI VENKATESWARA UNIVERSITY :: TIRUPATI

**B.Tech (Minor in CSE) – CBCS Regulations-2020**
**(With effect from the academic year 2021-22)**

## DATA STRUCTURES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

**Course Objectives:**

- Develop skills to design and analyze linear and nonlinear data structures.
- Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- Develop recursive algorithms as they apply to trees and graphs.
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- 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:** Single 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

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

**Text Books:**

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", Computer Science Press.
2. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Fundamentals of Data Structures in C++, Universities Press, Second Edition.
3. Debasis Samanta, Classic Data Structures, Second Edition, Prentice Hall of India.

**REFERENCES**:

1. Aaron M. Tenenbaum Yedidyah Langsam. Moshe J. Augenstein, "Data Structures using C and C++", PHI Learning Private Limited.
2. Jean Paul Tremblay and Paul G Sorenson, "An Introduction to Data Structures with Applications", McGraw Hill.
3. R. Kruse et.al, "Data Structures and Program Design in C", Pearson Education.