ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING

B.Tech - Four Year Degree Course

(Applicable for the Batches Admitted from 2019 - 2020)

R-19

(Choice Based Credit System)

NEC

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Kotappakonda Road, Yellamanda (P),
Narasaraopet - 522 601, Guntur Dist.,
Andhra Pradesh, INDIA.

Academic Regulations
Course Structure and Syllabus

B. Tech.
Computer Science and Engineering
(4 Year Program)

NARASARAOPETA
ENGINEERING COLLEGE
(Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.
Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada. Code: 47.
Accredited by NBA & NAAC with "A" Grade; ISO 9001:2008 Certified Institution.
Phone: 08647239905   Website: www.nrtec.ac.in

ACADEMIC REGULATIONS   R-19 FOR B.TECH
(Applicable for the students of B.Tech admitted from the academic year 2019-20)

1. PREAMBLE
The rapid transformation in every sphere of life is augmenting the need to prepare the present fast-paced generation to adapt to the changing knowledge & skill requirement on a life-long basis, in the fields of science, engineering, technology and humanities to influence society positively. The future looks up to multi-disciplinary, competent leaders who are Information and Communication Technology ready and driven by strong ethical values.

NEC envisions to nurture knowledge, skills, attitude and values of the aspiring youth to enable them to become global citizens and towards that process, the institution has evolved a flexible integrated academic curriculum.

NEC introduced Outcome Based Education (OBE) and Choice Based Credit System (CBCS), which emphasized on honing the skills and knowledge of the graduates.

NEC is ambitious to develop a new academic regulation, curricular framework and syllabi for its UG programmes. This effort is undertaken to address the present challenges in the educational system and also to be ahead of the curve with respect to innovative practices.

2. PROGRAMS OFFERED BY THE COLLEGE
Narasaraopeta Engineering College (NEC) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) for the following branches of Engineering.

S. No.	Name of the Program	Program Code
1.	Civil Engineering (CE)	01
2.	Electrical and Electronics Engineering (EEE)	02
3.	Mechanical Engineering (ME)	03
4.	Electronics and Communication Engineering (ECE)	04
5.	Computer Science and Engineering (CSE)	05
6.	Information Technology (IT)	12

3. ELIGIBILITY FOR ADMISSION
The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.
The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.
   a. Under Category A: 70% of the seats are filled through EAMCET counselling.
   b. Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE

Admission eligibility - Under Lateral Entry Scheme
Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral entry scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three-year B Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.
Academic Calendar
For all the eight semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with three weeks for theory examinations and evaluation. Dates for registration, sessional and end semester

examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

4. AWARD OF B.TECH. DEGREE

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

      i) Pursue a course of study for not less than four academic years and not more than eight academic years.

     ii) Registers for 160 credits and secures all 160 credits.

Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall **forfeit** their seat in B.Tech. course and their admission stands cancelled.

The medium of instruction for the entire undergraduate programme in Engineering and Technology will be in English only.

5. ABOUT PROGRAM RELATED TERMS

    i. **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

    ii. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

   iii. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses.

   iv. Each course is assigned certain number of credits based on following criterion:

	Semester	
	Periods / Week	Credits
Theory (Lecture/Tutorial)	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project	14	07

    v. Every B. Tech. Programme will have a curriculum consisting of theory, practical, project courses that shall be included in any of the following categories. The typical curriculum structure for UG degree programmes are based on AICTE and University norms and is given below.
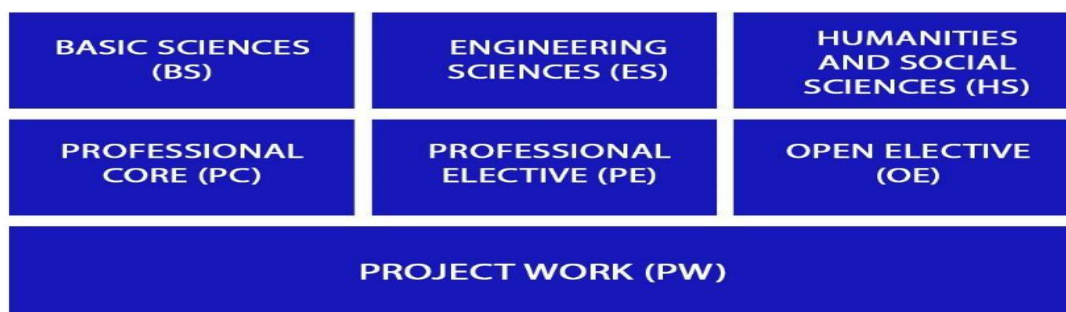
5.1 SUBJECT / COURSE CLASSIFICATION

All subjects/ courses offered for the under graduate programme in B.Tech. degree are broadly classified as follows. NEC has followed almost all the guidelines issued by JNTUK/AICTE/UGC

S.No.	Broad Course Classification	Course Group/Category	Course Description	No. of Credits
1	FOUNDATION COURSES	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry Subjects	25
2		ES – Engineering Sciences	Includes fundamental engineering subjects like Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering, etc.	24
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management Courses like English, Professional Ethics and Human Values, Communication skills and Environmental Science and Engineering	12
4	Core Courses	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.	48
5	Electives	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.	18
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering	18
7	Project Work	PR-Project Work	B.Tech. Project or UG Project or UG Major Project	15
8		Industrial training/ Internship	Industrial training/ Summer Internship	
9		Mini- project	Industrial Oriented Mini-project/ Mini-project	
10		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.	
11	Mandatory Courses (MC)	Mandatory Courses (non-credit)		0
			Total	160

5.2. Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

A two-week induction program for first year B.Tech students is to be held in zero semester. Regular classes will start after the induction program.

The objectives of the program are as follows:

1. Assimilation in the ethos and culture of the institution
2. Exposure to a larger vision of life
3. Bonding among students and teachers
4. Learning a creative skill in arts
5. Regular lifestyle and professional discipline
6. Special assistance for needy students for improving proficiency in English and Mathematics

The above objectives will be achieved through the following activities:

1. Physical activity: Yoga, Mild Exercise, Games and sports etc.
2. Creative arts: Painting, Photography, music, dance etc.
3. Literary activity: General reading, writing summaries, debating, enacting a play etc.
4. Human Values: Discussion/Lectures in small groups of students with a faculty member
5. Lectures by eminent people: From industry, entrepreneurs, public life, social activists, alumni
6. Exposure to department/branch, Innovation, Exploring Engineering.

6. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for Theory, 50 marks for Practical Subject / Mini Project and 50 marks for Practical Training / Internship. The Project Work shall be evaluated for 200 marks.

6.1. THEORY

For all theory subjects consisting of 5 units in each subject, the assessment shall be for 40 marks through internal evaluation and 60 marks through external end semester examination of 3 hours duration.

6. 1.a. INTERNAL EVALUATION

The internal evaluation will be based on two cycle tests conducted in each semester. The 40 internal marks will be awarded as sum of 75% of the best cycle and 25% of the least cycle examinations, where each cycle of examination contains

Descriptive test	- 20 Marks
Objective test	- 10 Marks
Assignment test	- 10 Marks

Syllabus is framed for 5 Units. **First descriptive** test question paper contains 3 questions from 50% of the syllabus i.e. 1st, 2nd and half of 3rd unit. **Second descriptive** test in remaining half of 3rd Unit, 4th Unit and 5th Units of each subject in a semester. The student has to answer all the 3 questions (10 marks questions from 1st and 2nd units and 5 marks question from half of the 3rd unit totalling to 25 marks). These 25 marks will be scaled down to 20 marks. The descriptive examination will be conducted in 1½ hour duration.

Each Objective type test 1 question paper (Online examination) contains 20 objective Multiple-choice questions for 10 marks covering the syllabus of 1st, 2nd and half of 3rd unit. The Objective Examination (online) will be conducted for a duration of the 20 minutes on the day of descriptive exam. Objective test 2 shall contains 20 Multiple choice questions for 10 marks covering the syllabus from the remaining half of the 3rd unit, 4th and 5th Units.

Two assignments will be conducted for each cycle. In first cycle first assignment will be from 1st unit for 10 marks. 5 or 6 questions will be given in the classroom at least one week

in advance. Student must answer two questions in classroom which are given at random as per the schedule given by exam cell. Second assignment test for 10 marks of first cycle will be conducted from 2nd unit. 5 or 6 questions will be declared in the class room at least one week in advance. Student has to answer two questions in class room which are given at random as per the schedule given by exam cell.

First cycle assignment marks (10 marks) is calculated from the two assignments (1&2) i.e. 75% of best assignment and 25% of the least assignment.

Similarly, for second cycle assignment test 3 for 10 marks will be conducted from remaining half of the 3rd unit (after first mid syllabus) and half of the 4th unit. 5 or 6 questions will be given in the classroom at least one week in advance. Student must answer two questions in classroom which are given at random as per the schedule given by exam cell.

Assignment test 4 will be from remaining half the fourth unit and half of the 5th unit for 10 marks. 5 or 6 questions will be declared in the classroom at least one week in advance. Student has to answer two questions in class room which are given at random as per the schedule given by exam.

Second cycle assignment marks (10 marks) is calculated from the two assignments (3 &4) i.e. 75% of best assignment and 25% of the least assignment

First cycle (Descriptive, objective and assignment) is conducted for 1st ,2nd and half of 3rd Unit and second cycle is remaining half of 3rd unit, 4th & 5 units of each subject in semester.

Final internal semester marks shall be arrived at by considering the marks secured by the student in both the cycle examinations with 75% weightage given to the best cycle exam and 25% to the other.

Final internal marks = 75% of best cycle and 25% of the least cycle.
=(0.75 x best cycle) + (0.25 x least cycle)

If the student is absent for any one internal examination, the final internal semester marks shall be arrived at by considering 75% weightage to the marks secured by the student in the appeared examination and zero to the other.

Final internal marks = 75% of best cycle and 25% of the least cycle.
= (0.75 x best cycle) + (0.25 x 0)

6.1.b. EXTERNAL EVALUATION
End semester examinations will be conducted for 60 marks. The Question paper consists of five questions and each question carries 12 marks from all the five units. Each of the question is from one unit and may contain sub-questions. There will be two questions from each unit and student should answer any one of the two questions. The examination duration is 3 hours

6.2. PRACTICALS

For practical subjects there shall be continuous evaluation during the semester.
6.2.a. INTERNAL EVALUATION

There shall be continuous evaluation during the semester for 20 internal marks.
The internal marks shall be awarded as follows:

    i) Day to day performance: Record (4M) +Experiment (4M) + Viva (2M) - 10Marks
    ii) Internal Lab Test　　　: 10 Marks

      Total =i +ii =10+10 = 20 Marks.

6.2.b. EXTERNAL EVALUATION

For practical subjects there shall be an external examination at the end of the semester
for 30 marks in the presence of an external examiner. The examination duration is
3 hours.

6.3. DRAWING SUBJECTS

For the subject having design and / or drawing, (such as Engineering Graphics, Engineering
Drawing, etc.,) and estimation, the distribution shall be 40 marks for Internal Evaluation
and 60 marks for End Examination.
The 40 internal marks will be evaluated as follows:

    Internal Tests　　　: 20 marks. (1½ hour duration)
    Day – to – day work: 20 marks (evaluation of charts)

In the internal test, 3 questions will be given to the student and he has to answer all the three
questions (2 x10 =20 marks from 1st and 2nd units and 5 marks from half of the 3rd unit
totalling 25 marks scaled down to 20 marks)

There shall be two internal tests in a semester. The sum of 75% of the best and 25% of the
least of two internal tests shall be considered for the award of internal marks.

The syllabus for the subject "**Machine drawing and CAD Lab**" consists of two major
portions:
    1. Unit 1, 2 –Conventional drawing pattern.
    2. Unit 3 and 4 - CAD lab using drafting packages

The distribution of internal and external marks is 40 and 60 marks respectively.

Internal Evaluation: Max Marks: 40

The total internal evaluation marks are distributed in the following two components:
    1. Day-to-day work　　: 20 Marks (Evaluation of Charts)
    2. Descriptive Test　　: 20 Marks

Cycle–I Examination – Conventional drawing pattern

In Cycle-I examination the 40 marks will be awarded as follows:
    Day-to-day evaluation　　- 20 Marks
    Internal Test　　　　　　- 20 Marks

In the Descriptive Test of duration 2 hours, one question for 20 marks will be given to the student.

Cycle–II Examination – Computer lab pattern using any drafting packages
for duration of 2 hours.

In Cycle-II examination the 40 marks will be awarded as follows:

Day-to-day evaluation   - 20 Marks
Internal Test   - 20 Marks

Of two cycle examinations conducted during the semester, sum of 75% of the best and 25% of the least of two cycle examinations shall be considered for the award of internal marks.

End Examination (Total Duration: 4 hours, Max, marks: 60) in the presence of external examiner

Conventional drawing pattern (Duration: 2 Hours, Marks: 30)

Computer lab pattern using any drafting packages (Duration: 2 Hours, Max:30)

(Note: Both Conventional drawing pattern and Computer lab pattern using any drafting packages are compulsory and are to be conducted in separate sessions)

6.4. MANDATORY NON-CREDIT COURSES

A student is required to take up Non-Credit / Mandatory courses (zero credit), viz. Environmental Science, Constitution of India, Community service, Advanced Communication Skills (ACS), Quantitative Aptitude and Reasoning (QAR), MOOCs (Massive Open Online Courses) etc., as and when the courses are offered. The B.Tech degree shall only be awarded only if a student gets satisfactory grade in each of the mandatory non-credit courses besides acquiring 160 credits.

A student has to repeat the course if he does not get satisfactory grade in each non- credit course for getting the degree awarded.

MOOCS:

Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with AICTE/ UGC guidelines, MOOC (Massive Open Online Course) have been introduced, Student has to complete an on-line course to fulfil the academic requirement of B.Tech course. He/she can start doing the course from II Year II semester and submit the MOOCs certificate before the commencement of the end examinations wherever the MOOCs course is offered. The student shall register on-line Course offered by any reputed organization like NPTEL, SWYAM, JNTUK MOOCS, COURSERA, edX, Udacity, etc., approved by Departmental Committee constituted by HOD. Student has to submit the progress of the MOOC's course (such as assignment submission etc.,) to the mentor or departmental committee. B.Tech. degree shall be awarded only upon submission of MOOC's certificate. If a student fails to submit in that semester, he/she has to submit the certificate in the subsequent semesters for getting the degree awarded.

Advanced Communication Skills (ACS) & Quantitative Aptitude & Reasoning (QAR) :

There will be two online internal examinations of 40 marks of each and another 20 marks will be awarded based on day to day evaluation. The student has to secure a minimum of 40 marks out of the above mentioned 100 marks to secure satisfactory report.

Community Service:

Community service gives an opportunity to explore the leadership skills, Team work and

develop empathy in real world. Students have to spend time in hospitals, temples, at traffic signals, old age homes, orphanage homes at least 24 hours during that semester.

Old age homes: The students will go to old age homes and fulfil the special needs and requirements that are unique to senior citizens. They help the old people by taking them to hospitals.

Hospitals: in hospitals the students help them to maintain hygiene, help the people who cannot understand the medical terms, give directions to the old people who are unable to read the signs, serve them by distributing food.

Traffic clearance: Help the people understand the traffic rules, help the disabled persons, Children and old people to cross the roads.

Temple services: During the festivals the students give the directions to pilgrims, distribute the food and help the old and disabled people to get their darshan in the temple.

6.5 PRACTICAL TRAINING / INTERNSHIP

As a part of curriculum in all branches of Engineering, it is mandatory for all students to undergo summer internship Programme at industries (core or allied) / R & D organization to get practical insight of their subject domain during summer break after the 6th semester. This internship Programme shall be availed by the students in a duration of minimum 2 weeks or maximum of 4 weeks and the assessment shall be carried out by internal experts.

After the completion of internship, the student shall submit a certificate, a technical report and presentation to the concerned departmental committee constituted by the HOD for evaluation. 50 marks shall be awarded for the submission of certificate, technical report, presentation and Viva-Voce examination.

Students are advised to take up Industrial Internship. In case, the student is unable to obtain the internship, they can opt for Practical Training at College.

Assessment for Practical Training:

The practical training gained by student shall be assessed for 50 marks. The time duration for Practical Training shall be 2 to 4 weeks during the inter-semester break. The training shall be evaluated through continuous assessment. After the completion of Practical Training the student shall submit a report and presentation to the Departmental Committee constituted by HOD for evaluation. A total of 50 marks shall be awarded for day to day performance, submission of report, presentation and Viva-Voce examination.

6.6. MINI PROJECT

Mini Project shall be evaluated for a total of 50 marks. Out of a total of 50 marks, 20 marks shall be awarded for internal evaluation consisting of day-to-day work, reviews, the assessment of the project report and 30 marks will be awarded for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of mini project work shall be conducted as and when offered.

Mini Project:
Continuous Assessment (Internal Evaluation): 20 Marks
Distribution

Literature Survey	: 04 Marks
Innovativeness of the Project	: 04 Marks
Review 1	: 04 Marks
Review 2	: 04 Marks
Marks Final Presentation	: 04 Marks

6.7. PROJECT WORK

Out of a total of 200 marks for the project work, 80 marks shall be awarded for Internal Evaluation consisting of day-to-day work, reviews, the assessment of the project report and 120 marks are for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year II semester.

Continuous Assessment (Internal Evaluation): 80 Marks

Distribution	
Innovativeness of the Project	: 05 Marks
Literature Survey	: 05 Marks
Experimentation / Simulation	: 10 Marks
Result Analysis	: 05 Marks
Review 1	: 15 Marks
Review II	: 20 Marks
Final Presentation	: 10 Marks
Project Report	: 10 Marks

6.8. Technical Seminar:

For the Technical Seminar the student shall collect information on an advanced topic, prepare a technical report and submit it to the department. It shall be evaluated by the departmental committee consisting of HOD, supervisor and senior faculty. The seminar report and his/her presentation shall be evaluated for 50 internal marks.

Student has to secure a minimum of 40% of marks to pass the Technical Seminar.

If he/she fails, he/she has to repeat the Technical Seminar and get the pass grade for the award of the degree.

7. PASS MARK CRITERIA

A student shall be deemed to have satisfied the pass mark, if he secures not less than 35% of marks in the end examinations and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together as detailed below.
On passing a course of a program, the student shall earn the credits as assigned to that course.

S.No	Category of Subject	Max. Marks	Internal Marks	External Marks	External pass %	External pass mark	Over all pass %	Over all pass mark
1	Theory/ Drawing	100	40	60	35	21	40	40
2	Practical	50	20	30	35	11	40	20
3	Mini Project	50	20	30	35	11	40	20
4	Project work	200	80	120	35	42	40	80
5	Practical Training/ Internship	50	50	-	-	-	40	20

8. PROMOTION POLICY

8.1. ATTENDANCE REQUIREMENTS

(1) A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

(2) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester for genuine medical reasons shall be approved by a committee duly appointed by the college. A fee stipulated by the college shall be payable towards condonation of shortage of attendance. However, the number of condonations is restricted to **four** for the entire course.

(3) A student who is short of attendance in a semester may seek re-admission into that semester when offered next time within 4 weeks from the date of commencement of class work.

(4) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.

8.2. CREDIT REQUIREMENTS

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned above.

(1) A student shall be promoted from I to II year, if he puts up the minimum attendance requirement in I year II semester, irrespective of credits earned.

(2) A student shall be promoted from II year to III year, only if he fulfils the academic requirement of 40% of the credits up to II year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(3) A student shall be promoted from III to IV year, only if he fulfils the academic requirements of 40% of the credits up to III year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(4) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated above.

(5) A student registers for all 160 credits and earns all 160 credits. Marks obtained in the all the courses shall be considered for the calculation of grade points/division.

(6) The registrations in mandatory courses i.e. CI, ES, MOOCS, CS is compulsory and student should get a satisfactory report.

8.3. COURSE PATTERN

(1) The entire course of study is of FOUR academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(2) A student is eligible to appear for the end examination in a subject, but absent for it or has failed in the end examinations may appear for that subject in supplementary examinations, when conducted next.

(3) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted in to the same semester / year in which he has been detained.

Re-admission Criteria:

i) A candidate, who is detained in a semester due to lack of attendance has to obtain written permission from the Principal for readmission into the same semester after duly fulfilling the required norms stipulated by the college and by paying the required tuition fee .

ii) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated in regulation by paying the required tuition fee.

9. METHOD FOR AWARDING OF GRADE POINTS FOR A SUBJECT:

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

Theory/ Drawing / Laboratory / Practical Training / Internship / Mini Project / Project (% of marks in a subject)	Corresponding Grade Points	Letter Grade
91 - 100	10	O (Outstanding)
81 - 90	9	A (Excellent)
71 - 80	8	B (Very Good)
61 - 70	7	C (Good)
51 - 60	6	D (Satisfactory)
40 - 50	5	E (Pass)
<40	0	F (Fail)

A student who has obtained an 'F' grade in any subject shall be deemed to have 'Failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

To a student who has not appeared for an examination in any subject, 'AB' grade will be allocated in that subject, and he is deemed to have 'Failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained

earlier. A Student who involved in malpractice during the examination will be marked as MP in that subject grade.

For mandatory courses, "**Satisfactory**" or "**Unsatisfactory**" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

10. CRITERIA FOR AWARD OF GRADES/DIVISION

10.1.Calculation of Semester Grade Point Average (SGPA)* for semester

The performance of each student at the end of each semester is indicated in terms of SGPA. The SGPA is calculated by dividing the sum of credit points secured from all subjects registered in a semester by the total no.of credits of that semester.

The SGPA is calculated as given below:

$$\text{SGPA} = \frac{\sum(CR \times GP)}{\sum CR}$$

Where CR = Credits of a subject
GP = Grade Points awarded for a subject
*SGPA is calculated for a candidate who passed all the subjects in that semester.

10.2. Calculation of Cumulative Grade Point Average (CGPA) for Entire Program:

The CGPA is a measure of the overall cumulative performance of a student in all semesters considered for a registration. CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters and the total no.of credits in all semesters.

The CGPA is calculated as given below:

$$\text{CGPA} = \frac{\sum(CR \times GP)}{\sum CR}$$

Where CR= Credits of a subject
GP = Grade Points awarded for a subject

- The SGPA and CGPA shall be rounded off to 2 decimal point and reported in the transcripts.
- Equivalent percentage = (CGPA – 0.75) x 10

CGPA is calculated for a candidate who passed all the subjects of all previous and current semester.

10.3 Award of Division:

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech Degree and shall be placed in one of the following classes:

CGPA	Class	
≥ 7.75	First Class with Distinction *(with no subject failures)	From the CGPA
≥ 6.75	First Class (with subject failures)	
≥ 5.75 & < 6.75	Second Class	secured from 160 credits
≥ 4.75 to < 5.75	Pass Class	

***First Class with Distinction:** A candidate who qualifies for the award of the Degree having passed all the courses of study of all the eight semesters (six semesters for lateral entry candidates) at the first attempt, within eight consecutive semesters (six consecutive semesters for lateral entry candidates) after the commencement of his /her study and securing a CGPA of 7.75 and above shall be declared to have passed in First Class with Distinction.

10.4. CONSOLIDATED GRADE MEMO

A Consolidated Grade Memo containing credits and grades obtained by the candidate will be issued after the completion of the four year B.Tech program.

11. REVALUATION/CHALLENGE EVALUATION

1. Student can submit the application for revaluation, along with the prescribed fee for revaluation of his answer script(s) of theory subject(s) as per the notification issued by the Controller of Examinations.

2. The Controller of Examinations shall arrange for revaluation of such answer script(s).

3. An External evaluator, other than the first evaluator shall revaluate the answer script(s).

12. MINIMUM INSTRUCTION DAYS

The minimum instruction days for each semester shall be **90 working days.**

13. There shall be **no branch transfer** after the completion of admission process.

14. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the college or if any case of indiscipline/malpractice is pending against him, the result of such student will be kept withheld. His degree will be withheld in such cases.

15. TRANSITORY REGULATIONS

Discontinued or detained candidates are eligible for readmission as and when next offered.
A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the subjects in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such subjects in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

15.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

15.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The

student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.3 Transfer candidates (from non-autonomous college affiliated to JNTUK)

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.4 Transfer candidates (from an autonomous college affiliated to JNTUK)

A student who has secured the required credits up to previous semester as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.

A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.

However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of studies.

The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he has transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

16. Scope

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

2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

3. The college may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the College Authorities.

ACADEMIC REGULATIONS (R-19) FOR B. TECH. (LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year from the
Academic Year 2020- 21 and onwards)

1. AWARD OF B. TECH. DEGREE

A student will be declared eligible for the award of the B. Tech. Degree if he fulfils the following academic regulations.

(a) Pursue a course of study for not less than three academic years and not more than six academic years counted from the academic year of admission.

(b) The candidate registers for 120 credits and secures all the 120 credits.

CGPA	Class	
≥ 7.75	First Class with Distinction *(with no subject failures)	From the CGPA secured from 120 credits from 2nd year to 4th year
≥ 6.75	First Class (with subject failures)	
≥ 5.75 & < 6.75	Second Class	
≥ 4.75 to < 5.75	Pass Class	

2. The attendance regulations of B.Tech (Regular) shall be applicable to B.Tech (LES), whereas the number of condonations are restricted to 3.

3. **PROMOTION RULE:**

    (a) Attendance requirement is same as regular course.

    (b) A lateral entry student will be promoted from II to III year if he puts up the minimum required attendance in II year II semester irrespective of credits earned.

    (c) A student shall be promoted from III to IV year only if he fulfils the academic requirements of 40% of the credits up to III Year II semester from all the examinations, whether the candidate takes the examinations or not.

4. TRANSITORY REGULATIONS:

4.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of second year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

4.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch of them as decided by the Board of Studies.

The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT INEXAMINATIONS

➢ The Principal shall refer the cases of Malpractices in Internal Assessment Test and Semester end examinations to a malpractice prevention committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the students based on the recommendations of the committee.

➢ Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder:

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the candidate:	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book,	Expulsion from the examination hall and cancellation of the performance in that subject and

	programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the college.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and to be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent /any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s)has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against

		them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the college for further action to award suitable punishment.	

OTHER MATTERS:

1. Physically challenged candidates who have availed additional examination time and a scribe during their intermediate / EAMCET examinations will be given similar concessions on production of relevant proof / documents.

2. The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the departments shall be reported to the Academic Council for ratification.

GENERAL:

1. The academic council may, from time to time, revise, amend or change the regulations, schemes of examinations and / or syllabi.

2. Where ever the words ''he'' ''him'' ''his'', occur in the regulations, they include ''she'', ''her'', ''hers''.

3. The academic regulation should be read as a whole for the purpose of any interpretation.

4. In the case of any doubt or ambiguity in the interpretation of the above rules, the

decision of the Principal is final.

R19 B.Tech Four Year Course Structure
&
SYLLABUS (First and Second year)

R19 COURSE STRUCTURE

I B.TECH - I SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Communicative English -I	HS	40	60	100	2	-	-	2
2	Linear Algebra & Calculus	BS	40	60	100	3	-	-	3
3	Electronic Devices and Logic Design	ES	40	60	100	3	-	-	3
4	Engineering Chemistry	BS	40	60	100	3	-	-	3
5	C Programming	ES	40	60	100	2	1	-	3
6	English Communication Skills Lab - I	HS	20	30	50	-	-	3	1.5
7	Engineering Chemistry Lab	BS	20	30	50	-	-	3	1.5
8	C Programming Lab	ES	20	30	50	-	-	3	1.5
9	Constitution of INDIA	MC	-	-	-	3	-	-	0
	Total		**260**	**390**	**650**	**16**	**1**	**9**	**18.5**

I B.TECH. – II SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Communicative English -II	HS	40	60	100	2	-	-	2
2	Engineering Physics	BS	40	60	100	2	1	-	3
3	Probability & Statistics	BS	40	60	100	2	1	-	3
4	Engineering Graphics	ES	40	60	100	1	-	4	3
5	Numerical Methods And Vector Calculus	BS	40	60	100	2	1	-	3
6	Python Programming	ES	40	60	100	3	-	-	3
7	Engineering Physics Lab	BS	20	30	50	-	-	3	1.5
8	IT Workshop	ES	20	30	50	-	-	3	1.5
9	Python Programming Lab	ES	20	30	50			3	1.5
10	Environmental Studies	MC	-	-	-	3	-	-	0
Total			**300**	**450**	**750**	**15**	**3**	**13**	**21.5**

II B.TECH. – I SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Business Management Concept for Engineers	HS	40	60	100	3	-	-	3
2	Front End Web Technologies	ES	40	60	100	3	-	-	3
3	OOPs Through Java	PC	40	60	100	2	1	-	3
4	Mathematical Foundations of Computer Science	BS	40	60	100	3	-	-	3
5	Data Structures	PC	40	60	100	3	-	-	3
6	Computer Organization	PC	40	60	100	3	-	-	3
7	Data Structures Lab	PC	20	30	50	-	-	3	1.5
8	Front End Web Technologies Lab	ES	20	30	50	-	-	3	1.5
9	Java Programming Lab	PC	20	30	50	-	-	3	1.5
10	Community Service	MC	-	-	-	-	-		0
Total			**300**	**450**	**750**	**17**	**1**	**9**	**22.5**

II B.TECH. – II SEMESTER

S.No	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Database Management Systems	PC	40	60	100	2	1	-	3
2	Formal Languages and Automata Theory	PC	40	60	100	3	-	-	3
3	Design and Analysis of Algorithms	PC	40	60	100	3	-	-	3
4	Software Engineering	PC	40	60	100	3	-	-	3
5	Open Elective -I	OE	40	60	100	3	-	-	3
6	Mobile Applications Development Lab	PC	20	30	50	-	-	3	1.5
7	English Communication Skills Lab - II	HS	20	30	50	-	-	3	1.5
8	Data Base Management Systems Lab	PC	20	30	50	-	-	3	1.5
9	QAR	MC	-	-	-	3	-	-	0
Total			**260**	**390**	**650**	**17**	**1**	**9**	**19.5**

III B.TECH. – I SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Operating Systems	PC	40	60	100	3	-	-	3
2	Computer Networks	PC	40	60	100	3	-	-	3
3	Compiler Design	PC	40	60	100	3	-	-	3
4	OOAD through UML	PC	40	60	100	2	-	2	3
5	Advanced Java and Web Technologies	PC	40	60	100	3	-	-	3
6	**Professional Elective – I** a. Data warehousing and Data Mining. b. Web Services c. Software Requirements & Estimation d. Microprocessors and Multicore systems	PE	40	60	100	3	-	-	3
7	OS and OOAD Lab	PC	20	30	50	-	-	3	1.5
8	Advanced Java and Web Technologies Lab	PC	20	30	50	-	-	3	1.5
9	Employability Skills - I	HS	20	30	50	-	-	3	1.5
10	Mini Project	PR	20	30	50	-	-	-	1
11	Advanced Communication Skills	MC	-	-	-	3	-	-	0
Total			**320**	**480**	**800**	**20**	**0**	**11**	**23.5**

III B.TECH. – II SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Artificial Intelligence	PC	40	60	100	3	-	-	3
2	Cryptography and Network Security	PC	40	60	100	3	-	-	3
3	Entrepreneurship and Innovation	HS	40	60	100	2	-	-	2
4	**Open Elective – II**	OE	40	60	100	3	-	-	3
5	**Professional Elective – II** a. Big Data Analytics b. Network Programming c. Agile with SCRUM d. High Performance Computing	PE	40	60	100	3	-	-	3
6	Artificial Intelligence Lab	PC	20	30	50	-	-	3	1.5
7	Software Lab-1*	PC	20	30	50	-	-	2	1.5
8	R PROGRAMMING LAB	ES	20	30	50	0	1	2	1.5
9	Employability Skills Lab -2	HS	20	30	50	-	-	3	1.5
10	MOOCS	MC	-	-	-	-	-	-	0
	Total		**280**	**420**	**700**	**14**	**1**	**10**	**20**

* This lab covers experiments related to CNS and of the chosen PE-II

IV B.TECH. – I SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Machine Learning	PC	40	60	100	3	-	-	3
2	**Professional Elective – III** a. Data Science b. Mobile Computing c. Cyber Security d. DevOps	PE	40	60	100	3	-	-	3
3	Open Elective – III	OE	40	60	100	3	-	-	3
4	Open Elective – IV	OE	40	60	100	3	-	-	3
5	**Professional Elective – IV** a. Deep Learning b. Internet of Things c. Database Security d. Software Testing	PE	40	60	100	3	-	-	3
6	Machine Learning Lab	PC	20	30	50	-	-	3	1.5
7	Software Lab-II	PC	20	30	50	-	-	3	1.5
8	Internship/ Practical Training	PR	50	-	50	-	-	-	1
9	TSEM	PR	50	-	50	-	-	2	1
10	Skill Lab	PR	20	30	50	-	-	3	1.5
	Total		**360**	**390**	**750**	**15**		**11**	**21.5**

Software Lab-II contains experiments related to PE-III, PE-IV

IV B.TECH. – II SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	**Professional Elective – V** a. Distributed Systems b. Wireless and Sensor Networks c. Design Patterns d. Human Computer Interaction	PE	40	60	100	3	-	-	3
2	**Professional Elective – VI** a. Block Chain Technologies b. SoA c. Functional Programming d. E-Commerce	PE	40	60	100	3	-	-	3
3	Project	PR	60	140	200	-	-	-	7
	Total		**140**	**260**	**400**	**6**	**-**	**-**	**13**

Open Elective Course: At any semester, student can choose an open elective course offered by any department provided that he/she has not studied it.

LIST OF OPEN ELECTIVES OFFERED BY ALL DEPARTMENTS

OPEN ELECTIVE-I

S.No.	Open Elective-I Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	MEMS	EEE	19BEE4OE11	3	-	3
2	Energy Audit, Conservation & Management	EEE	19BEE4OE12	3	-	3
3	RPT &3D Printing (Other than ME)	ME	19BME4OE11	3	-	3
4	Operations Research	ME	19BME4OE12	3	-	3
5	Smart Materials	ME	19BME4OE13	3	-	3
6	Product Engineering	ME	19BME4OE14	3	-	3
7	DBMS (Other Than CSE)	CSE	19BCS4OE11	3	-	3
8	Web Development Using Mean Stack Tech	CSE	19BCS4OE12	3	-	3
9	Principles of Signals, Systems & Communications(Other than ECE)	ECE	19BEC4OE11	3	-	3
10	Medical Electronics	ECE	19BEC4OE12	3	-	3
11	GIS	CE	19BCE4OE11	3	-	3
12	Public Health Engineering	CE	19BCE4OE12	3	-	3
13	Front End UI and Frame Work	IT	19BIT4OE11	3	-	3
14	Front End Web Technologies	IT	19BIT4OE12	3	-	3

OPEN ELECTIVE-II

S.No.	Open Elective-II Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	Non-Conventional Energy Resources	EEE	19BEE5OE11	3	-	3
2	Electrical Machine Design	EEE	19BEE5OE12	3	-	3
3	Work study	ME	19BME5OE11	3	-	3
4	Lean Manufacturing	ME	19BME5OE12	3	-	3
5	Condition Monitoring	ME	19BME5OE13	3	-	3
6	Mechatronics	ME	19BME5OE14	3	-	3
7	AI	CSE	19BCS5OE11	3	-	3
8	OOPS through JAVA	CSE	19BCS5OE12	3	-	3
9	Fundamentals of Image Processing (Other than ECE)	ECE	19BEC5OE11	3	-	3
10	Consumer Electronics	ECE	19BEC5OE12	3	-	3
11	Disaster Management	CE	19BCE5OE11	3	-	3
12	Urban Transportation & Planning	CE	19BCE5OE12	3	-	3
13	Object Oriented Programming through C++	IT	19BIT5OE11	3	-	3
14	Cloud Computing	IT	19BIT5OE12	3	-	3

OPEN ELECTIVE-III

S.No.	Open Elective-III Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	Soft Computing	EEE	19BEE6OE11	3	-	3
2	Industrial Electronics	EEE	19BEE6OE12	3	-	3
3	Smart Materials	ME	19BME6OE11	3	-	3
4	Nano Technology	ME	19BME6OE12	3	-	3
5	Total Quality Management	ME	19BME6OE13	3	-	3
6	Basic Manufacturing Processes	ME	19BME6OE14	3	-	3
7	Cloud Computing	CSE	19BCS6OE11	3	-	3
8	Block Chain Technologies	CSE	19BCS6OE12	3	-	3
9	Introduction to Embedded Systems (Other than ECE)	ECE	19BEC6OE11	3	-	3
10	Global Positioning System(GPS)	ECE	19BEC6OE12	3	-	3
11	Environmental Impact Assessment	CE	19BCE6OE11	3	-	3
12	Smart Cities Development	CE	19BCE6OE12	3	-	3
13	Digital Marketing	IT	19BIT6OE11	3	-	3
14	DevOps	IT	19BIT6OE12	3	-	3
15	Augmented Reality	IT	19BIT6OE13	3	-	3

OPEN ELECTIVE-IV

S.No.	Open Elective-IV Subject Title	Department Offering the Subject	Sub Code	No.of periods per week		No.of Credits
				L	T	C
1	Control System	EEE	19BEE7OE11	3	-	3
2	Embedded Control of Electric Drives	EEE	19BEE7OE12	3	-	3
3	Pneumatics & Hydraulic Automation	ME	19BME7OE11	3	-	3
4	Heat Ventilation & Air conditioning	ME	19BME7OE12	3	-	3
5	Supply Chain Management	ME	19BME7OE13	3	-	3
6	Industrial Robotics	ME	19BME7OE14	3	-	3
7	Cyber Security	CSE	19BCS7OE11	3	-	3
8	Ethical Hacking	CSE	19BCS7OE12	3	-	3
9	Introduction to Micro Processors & Micro Controllers(Other than ECE)	ECE	19BEC7OE11	3	-	3
10	Automotive Electronics	ECE	19BEC7OE12	3	-	3
11	Computer Aided Project Management	CE	19BCE7OE11	3	-	3
12	Solid waste hazardous management	CE	19BCE7OE12	3	-	3
13	Human Computer Interaction	IT	19BIT7OE11	3	-	3
14	E-Commerce	IT	19BIT7OE12	3	-	3

DISTRIBUTION OF CREDITS

S.No.	Year/Sem	HS	BS	ES	PC	PE	OE	PRC	TOTAL
1	I-I	3.5	7.5	7.5					**18.5**
2	I-II	2	10.5	9					**21.5**
3	II-I	3	3	4.5	12				**22.5**
4	II-II	1.5			15		3		**19.5**
5	III-I	1.5			18	3		1	**23.5**
6	III-II	3.5		2	8.5	3	3		**20**
7	IV-I				6	6	6	3.5	**21.5**
8	IV-II					6		7	**13**
9	TOTAL(Actual) CREDITS	15	21	22.5	60	18	12	11.5	**160**

S.No.	Course Work-Subject areas	Credits (as per AICTE)	Credits (as per NEC-CSE)
1	Humanities and Social Sciences (HS)	12	15
2	Basic Sciences (BS)	25	21
3	Engineering Sciences (ES)	24	22.5
4	Professional Core (PC)	48	60
5	Professional Elective (PE)	18	18
6	Open Elective (OE)	18	12
7	Project/Practical Training/Internship (PR)	15	11.5
	Total Credits	**160**	**160**

I B.TECH - I SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Communicative English -I	HS	40	60	100	2	-	-	2
2	Linear Algebra & Calculus	BS	40	60	100	3	-	-	3
3	Electronic Devices and Logic Design	ES	40	60	100	3	-	-	3
4	Engineering Chemistry	BS	40	60	100	3	-	-	3
5	C Programming	ES	40	60	100	2	1	-	3
6	English Communication Skills Lab - I	HS	20	30	50	-	-	3	1.5
7	Engineering Chemistry Lab	BS	20	30	50	-	-	3	1.5
8	C Programming Lab	ES	20	30	50	-	-	3	1.5
9	Constitution of INDIA	MC	-	-	-	3	-	-	0
Total			**260**	**390**	**650**	**16**	**1**	**9**	**18.5**

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	40	60	100	2
SUBCODE: 19BCC1TH01	**COMMUNICATIVE ENGLISH - I** (Common to All Branches)						

COURSE OBJECTIVES:
- To equip the students with appropriate oral and written communication skills.
- To inculcate the skills of listening, reading and critical thinking.
- To enhance the students' proficiency in reading skills enabling them meet the academic needs of their course.
- To enable the engineering students develop their basic communication skills in English for academic and social purposes.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO 1: Infer explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it. [K2]
CO 2: Compose paragraphs, essays as creative writing.[K5]
CO 3: Build grammatically correct sentences using a variety of sentence structures.[K3]
CO 4: Enhance word power and usage of lexicons. [K3]
CO 5: Compile emails, letters, reports, resume and information transfer.[K5]

SYLLABUS
UNIT– I
Akio Morita
  a) **Speaking**: Introducing self and others.
  b) **Reading**: Skimming for main idea, scanning for specific piece of information.
  c) **Writing**: Note – making flowed by paragraph writing, effective opening sentences, introducing the topic, key words, main idea, summarize the main idea.
  d) **Grammar and Vocabulary**: Content words and function words, verbs, nouns, adjectives and adverbs. Basic sentence structure and simple question form, framing jargon, technical vocabulary (15 words)

UNIT–II
Dhirubhai Ambani
  a) **Speaking**: Discussions on specific topic
  b) **Reading**: Identifying the sequence of ideas and recognizing verbal techniques to link the ideas in a paragraph.
  c) **Writing**: Paragraph writing, using key words/phrases and organizing points in a coherent manner.
  d) **Grammar and Vocabulary**: Linkers, articles and prepositions.

UNIT–III
Louis Braille
  a) **Speaking**: Discussions on specific topic
  b) **Reading**: Sequencing of ideas and recognizing verbal techniques to link the ideas in a paragraph.
  c) **Writing**: Paragraph writing, using key words/phrases and organizing points in a coherent manner.
  d) **Grammar and Vocabulary**: Cohesive devices, articles and prepositions

UNIT-IV
Mallika Srinivasan
     a) **Speaking:** Role plays, asking for and giving information/directions/instructions
     b) **Reading**: Understand and interpret graphic elements used in texts.
     c) **Writing**: Information transfer.
     d) **Grammar and Vocabulary**: Adjectives, adverbs and antonyms.

UNIT-V
Muhammad Yunus
     a) **Speaking**: Oral presentations
     b) **Reading:** Reading for comprehension.
     c) **Writing**: Essay writing
     d) **Grammar and Vocabulary**: Articles, prepositions, tenses, subject verb agreement and technical jargon (15 words)

TEXT BOOKS:
1. "Modern Trail Blazers", Orient Black Swan Pvt.Ltd.Publisher, 1ST edition. 2013
2. English All Round -I (Communication skills for Under Graduate Learners)– Orient Black Swan Pvt.Ltd.Publisher, 1st edition,2019

REFERENCE BOOKS:
1. Raymond Murphy, *Murphy's English Grammar,* Cambridge University Press 2004
2. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
3. Michael Swan, *Practical English Usage,* Oxford University Press, 1996

WEB REFERENCES:
1. https://app.grammarly.com/
2. https://www.grammarly.com/blog
3. https://www.englishclub.com/
4. https://www.nonstopenglish.com/
5. https://www.fluentu.com/blog/english/
6. https://www.fluentu.com/blog/english/
7. http://freerice.com soon migrating to https://beta.freerice.com/

I B.TECH	L	T	P	INTERNAL	EXTERNAL	TOTAL	CREDITS

I-SEMESTER				MARKS	MARKS	MARKS	
	3	-	-	40	60	100	3
SUBCODE: 19BCC1TH03	**LINEAR ALGEBRA AND CALCULUS** (Common to All Branches)						

COURSE OBJECTIVES:
- Understanding basic concepts of linear algebra (systems of linear equations, matrix calculus).
- To become proficiency in solving computational problems of linear algebra.
- To acquire knowledge on mean value theorems in calculus.
- Familiarization about the techniques in calculus and multivariate analysis.

COURSE OUTCOMES:
Upon successful completion of the course, the students should be able to
CO 1: Solve the system of linear equations.[K3]
CO 2: Analyze the applications of matrices in various fields and obtain Eigen values and Eigenvectors.[K4]
CO 3: Relate the results of mean value theorems in calculus to Engineering problems.[K1]
CO 4: Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.[K3]
CO 5: Compute the area and volume by interlinking them to appropriate double and triple integrals.

SYLLABUS
UNIT I: Linear systems of equations: (10 hours)
Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordon and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.
Application: Finding the current in a electrical circuit

UNIT II: EIGENVALUES AND EIGENVECTORS   (12 hours)
Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem, Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive definite, negative definite, semi definite, index, signature.
Application: Finding powers and inverse of a square matrix using Cayley Hamilton's Theorem.

UNIT III: MEAN VALUE THEOREMS   (6 hours)
Review on limits and continuity, Mean Value theorems (without proofs): Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's (Generalized mean value) theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

UNIT IV: PARTIAL DIFFERENTION: (8 hours)
Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor's theorem for Two variables. Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT V: APPLICATION OF INTEGRATION and MULTIPLE INTEGRALS:
                                                                         (12 hours)
Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple Integrals- double and triple integrals, Change of Variables, Change of order of Integration.

TEXT BOOK :

1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, 2012.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
3. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
4. Peter V. O'Neil, *"Advanced Engineering Mathematics"*, 7th Edition, Cengage Learning, 2011.
5. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.

I B.TECH	L	T	P	INTERNAL	EXTERNAL	TOTAL	CREDITS

I-SEMESTER				MARKS	MARKS	MARKS	
	3	-	-	40	60	100	3
SUBCODE: 19BCI1TH06	**ELECTRONIC DEVICES AND LOGIC DESIGN**						

COURSE OBJECTIVES:

- To discuss the characteristics of semiconductor diodes.
- To illustrate the different types of Transistors and their applications.
- To demonstrate the basics of Boolean algebra and reduction techniques.
- To design of combinational circuits.
- To design sequential circuits like registers and counters.

COURSE OUTCOMES:

After completion of this course, the students will be able to

CO1: Apply P-N diodes and Special diodes in electronic circuits.[K3]
CO2: Compare different types of transistors (BJT, FET and MOSFET) with their working principles.[K2]
CO3: Make use of Boolean algebra and K-map and to minimize combinational functions.[K3]
CO4: Develop combinational circuits and sequential circuits.[K3]
CO5: Construct different types of registers and counters.[K3]

SYLLABUS:

UNIT I: Junction Diode Characteristics

Open circuited PN Junction, Forward and Reverse bias, V-I characteristics, Applications of Diode – Switch, Rectifiers (without and with filters), Zener Diode characteristics, Zener as voltage regulator, LED.

UNIT II: Transistors

BJT, Configuration of BJT, Input and Output Characteristics of CB, CE and CC Configuration, JFET, MOSFETs – Construction, Characteristics and Applications, Comparison between BJT and JFET, Comparison between JFET and MOSFET.

UNIT III: Number Systems, Logic Gates and Boolean algebra

Binary, Octal, Decimal and Hexadecimal Number Systems, Conversion of Numbers from one Radix to another Radix, 1's Complement and 2's Complement.
Basic Gates- AND, OR and NOT, Universal Gates- NAND and NOR, EX-OR and EX-NOR Gates, De-Morgan's Laws, Minimization of Logic Functions using Boolean Theorems and Karnaugh map method.

UNIT IV: Combinational and Sequential Logic Circuits

Combinational: Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Design of Decoders, Encoders, Multiplexers, Demultiplexers. Sequential:Basic sequential logic circuits: Latch and Flip-Flop, Truth tables and excitation tables of RS, JK, T and D Flip-Flops.

UNIT V: Registers and Counters

Buffer Register, Control Buffer Register, Bidirectional Shift Registers, Universal Shift Registers. Synchronous Counter, Ripple Counter, Ring Counter, Modulus Counter.

TEXT BOOKS:

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, TMGH, 2nd Edition 1998.
2. Digital Design – M. Morris Mano, Pearson, 3rd Edition, 2009.

REFERENCES:

1. Electronic Devices and Circuits Theory- Robert L. Boylestad and Louis Nashelsky, Pearson Education, 9th Edition, 2008.
2. Fundamentals of Logic Design- Charles H. Roth, Jr, Thomson Learning, 5th Edition, 2005.

I B.TECH I SEMESTERS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCC1TH07	**ENGINEERING CHEMISTRY** (COMMON TO ALL BRANCHES)						

COURSE OBJECTIVES:

- To analyze water for its various parameters and its significance in industrial and domestic allocations.
- To acquire the knowledge on types of polymers, fuels and their applications.
- To provide information on exciting advanced materials available in engineering.
- To apply the electrochemical principles, understand the fundamentals of corrosion and development of different techniques in corrosion control.
- To learn the importance of engineering materials used in daily life and industry.

COURSE OUTCOMES:

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

CO 1: Analyze the suitable method of water treatment depending on the quality treatment. [K4]

CO 2: Compare different types of polymers, fuels and their importance. [K4]

CO 3: Utilize the advanced materials as engineering materials and apply them in domestic and industrial life. [K3]

CO 4: Distinguish electrical energy sources and importance of corrosion science. [K4]

CO 5: Identify different types of engineering materials and applications in engineering. [K3]

SYLLABUS
UNIT-I: WATER CHEMISTRY

Characteristics of water: Sources, Impurities–Hardness & its units–Industrial water characteristics– Softening of water by external treatment methods (Lime soda process, Zeolite and Ion exchange process)–Numerical problems on lime soda process–Desalination of brackish water (Reverse osmosis and Electrodialysis).

Water analysis techniques: Alkalinity–hardness (Complexo-metric)–Break point chlorination–Free chlorine–DO–BOD and COD.

UNIT-II: POLYMERS AND FUEL CHEMISTRY

Polymers: Introduction to polymers–Chain growth (free radical, ionic)–Step growth polymerization–Coordination polymerization–Copolymerization with specific examples–Thermoplastics and thermosets–Plastic moulding methods (Compression & Injection moulding)–Rubbers–Natural rubber–Processing–Vulcanization.

Fuels-Types of fuels–Calorific value–Numerical problems based on calorific value–Analysis of coal–Liquid fuels–Refining of petroleum–Cracking of heavy oil–Knocking and anti knocking agents–Octane and cetane values.

UNIT-III: CHEMISTRY OF ADVANCED MATERIALS

Nano materials: Introduction–Sol-gel method & Chemical reduction method of preparation – Characterization by BET method and TEM methods–Carbon nano tubes and fullerenes: Types–Preparation–Properties and Applications.

Liquid crystals: Introduction–Types–Applications.

Composite materials: Introduction–Definition–Types–Applications–Cermets.

UNIT-IV: ELECTROCHEMISTRY AND CORROSION

Electrochemistry: Galvanic cells–Single electrode potential–Reference electrodes–Electrochemical series–Batteries (primary, secondary and fuel cells)–Applications of secondary batteries in E-vehicles.

Corrosion: Causes and effects of corrosion–Theories of corrosion (chemical and electrochemical corrosion)–Factors effecting corrosion–Corrosion control methods–Cathode protection–Sacrificial anodic, Impressed current methods–Surface coatings–Methods of application on metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electroless plating)–Organic surface coatings–Paints–Constituents and their functions–Pigment Volume Concentration.

UNIT-V: CHEMISTRY OF ENGINEERING MATERIALS

Lubricants: Introduction–Mechanism of lubrication–Classification of lubricants–Properties and testing of lubricating oils.

Cement & Refractories: Manufacture–Setting and hardening of cement–Failures of cement–Slag cement–Refractory: Introduction–Classification and properties of refractories.

TEXT BOOKS:

1. Shikha Agarwal, "**Engineering Chemistry**", ISBN 1107476410, 2nd Edition, Cambridge University Press, New Delhi, (2019).
2. O.G. Palana, "**Engineering Chemistry**", ISBN 0070146101, Tata McGraw Hill Education Private Limited, New Delhi, (2009).
3. B. Rama Devi, Ch. Venkata Ramana Reddy, Prashantharath, "**Text Book of Engineering Chemistry**", ISBN 9789353500511, Cenage Learning India Pvt. Ltd, (2016).

REFERENCE BOOKS:

1. P.C. Jain and M. Jain "**Engineering Chemistry**", ISBN 8187433175, 15/e, Dhanpat Rai & Sons, Delhi, (2015).
2. B.S Murthy and P. Shankar, "**A Text Book of NanoScience and NanoTechnology**", University Press (2013).
3. K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry**", Pearson India Edn services, (2016).
4. S.S. Dara, "**A Textbook of Engineering Chemistry**", ISBN 8121932645, S.Chand Publisher, (2010)

WEB REFERENCES:

1. URL: https://www.youtube.com/watch?v=CWOJW4357Bg
2. URL: https://www.youtube.com/watch?v=H1Y1oxQ5eUA&t=627s
3. URL: https://www.youtube.com/watch?v=1xWBPZnEJk8
4. URL: https://www.youtube.com/watch?v=p9yPXdT0k48&t=225s
5. URL: https://www.youtube.com/watch?v=xb_xndPe4n0&t=390s

E-BOOKS:

1. "**Engineering Chemistry**" (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCC1TH10	**C PROGRAMMING** **(Common to CSE & IT)**						

COURSE OBJECTIVE:

- To know the basic problem solving process using Flow Charts and algorithms.
- To understand the basic concepts of control structures in C.
- To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
- To use the concepts of structures, unions, files and command line arguments in C.

COURSE OUTCOMES:

After completion of this course, the students would be able to:

CO1. Develop algorithms and flow charts for simple problems [K3].
CO2. Utilize suitable control structures for developing code in C [K3].
CO3. Make use of functions and arrays in developing modular programs [K3].
CO4. Make use of structures and pointers to write well-structured programs [K3].
CO5. Make use of file Operations in C programming for a given application [K3].

SYLLABUS

UNIT I

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms – Some more Algorithms – Flow Charts – Pseudo code – Programming Languages – Generation of Programming Languages – Structured Programming Language.

Introduction to C: Introduction – Structure of C Program – Writing the first C Program - Compiling and Executing C Programs - Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C - Operators in C -Programming Examples – Type Conversion and Type Casting.

UNIT II

Decision Control and Looping Statements: Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement.

Functions: Introduction – using functions – Function declaration/ prototype – Function Definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions – Recursion vs Iteration.

UNIT III

Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – Calculating the length of the Array – Operations on Array — Two Dimensional Arrays –Operations on Two Dimensional Arrays.

Strings: Introduction – Reading Strings – Writing Strings – String Manipulation functions - Array of Strings.

UNIT IV

Pointers: Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Passing Arguments to Functions using Pointer, Dynamic Memory Allocation.

Structure, Union, and Enumerated Data Types: Introduction – Nested Structures –Arrays of Structures – Structures and Functions – Self-referential Structures – Union –Enumerated Data Types.

UNIT V

Files: Introduction to Files – Using Files in C – Reading Data from Files – Writing Data To Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments – Functions for Selecting a Record Randomly - Remove – Renaming a File – Creating a Temporary File

TEXT BOOKS:

1. Reema Thareja, **"**Programming in C**"**, First **edition,** OXFORD University Press 2018.

REFERENCE BOOKS

1. REEMA THAREJA, "Introduction to C programming" OXFORD UNIVERSITY PRESS
2. Rachhpal Singh, "Programming in C", kalyani publishers
3. E Balagurusamy, "computing fundamentals & c programming", isbn 978-0-07- 066909-3, Tata McGraw-Hill, Second Reprint, 2008,
4. Ashok N Kamthane, "Programming with ANSI and Turbo C", Pearson Edition Publications, 2002.
5. Dennis Richie and Brian Kernighan, "The C programming Language", 2nd edition.

WEB REFERENCES:

1. http://cprogramminglanguage.net/
2. http://lectures-c.blogspot.com/
3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
4. http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC1LB01	**ENGLISH COMMUNICATION SKILLS LAB-I** **(Common to All Branches)**						

COURSE OBJECTIVES:
- To build confidence in the students to communicate effectively in English.
- To strengthen the oral communication skills to enable them to interact with the people in various social situations.
- To enable the learners improve pronunciation through emphasis on word accent, intonation and rhythm

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO 1: Improve their basic communication skills to interact with peers and others in various social situations.

CO 2: Speak English with good pronunciation, overcoming mother tongue influence.

CO 3: Take part in various conversations/discourses using formal and informal expressions.

CO 4: Listen and comprehend several accents of English Language.

SYLLABUS
UNIT– I
   a. Greeting, Introducing and Taking leave
   b. Pure Vowels
   c. Listening - TEDx Talks (https://www.ted.com/talks/ashweetha_shetty_how-education-helped-me-rewrite-my-life?language-en#t-623369)
   d. Self-Introduction

UNIT–II
   a. Giving information and Asking for information
   b. Diphthongs
   c. Listening -TEDx Talks(https://www.youtube.com/watch?v=Dk20-E0yx_s)
   d. Role Play

UNIT–III
   a. Inviting, Accepting and Declining Invitations
   b. Consonants
   c. Listening - TEDx Talks (https://www.youtube.com/watch?v=IgAnj6r1O48)
   d. JAM

UNIT-IV
   a. Commands, Instructions and Requests
   b. Accent and Rhythm
   c. Listening -TEDx Talks(https://youtu.be/SKvMxZ284AA)
   d. Tables Turned

UNIT-V
   a. Suggestions and Opinions
   b. Intonation
   c. Listening -TEDx Talks(https://youtu.be/ov6pEGXRYZo)
   d. Impromptu

TEXT BOOKS:
"Strengthen Your Communication Skills", Maruthi Publications, 2013.

REFERENCE BOOKS:
1. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: Principles and Practice*, Oxford University Press, 2015
2. J.D.O Conner, *Better English Pronunciation,* Cambridge University Press 1980.
3. T.Balasubramanian, "*A Text Book of English Phonetics for Indian Students",* Macmillan,1981
4. Penny ur *Grammar Practice Activities,* Cambridge University Press, 2010.
5. Mark Hancock, *Pronunciation in Use,* Oxford University Press 2007.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC1LB05	**ENGINEERING CHEMISTRY LAB** **(COMMON TO ALL BRANCHES)**						

COURSE OBJECTIVES:
- To provide the students with a solid foundation in chemistry laboratory required to solve the engineering problems.
- To expose the students in practical aspects of the theoretical concepts.
- To train the students on how to handle the instruments.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO 1: Develop and perform analytical chemistry techniques to address the water related problems (hardness, alkalinity, Chlorine, DO). [K3]
CO 2: Explain the functioning of different analytical instruments.[K2]
CO 3: Compare viscosity and surface tension of different oils.[K2]

LIST OF EXPERIMENTS
Introduction to chemistry laboratory–Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.
1. Estimation of NaOH using standard HCl solution
2. Determination of hardness of water sample by EDTA method
3. Determination of alkalinity of water sample
4. Determination of Dissolved Oxygen content of water sample by Winkler's method
5. Determination of Dissolved Chlorine by Mohr's method
6. Estimation of Fe^{+2} by using $KMnO_4$
7. Preparation of phenol formaldehyde resin/Urea formaldehyde
8. Conductometric titration between strong acid and strong base
9. Determination of viscosity of a liquid by Ostwald's viscometer
10. Determination of surface tension of a liquid by Stalagnometer
11. Determination of moisture content present in given coal sample
12. Determination of acid value of an oil

TEXT BOOKS:
1. N.K Bhasin and Sudha Rani "**Laboratory Manual on Engineering Chemistry**" 3/e, Dhanpat Rai Publishing Company (2007).
2. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B "**Vogel's Quantitative Chemical Analysis**" 6/e, Pearson publishers (2000).
3. Sudharani, "**Lab manual on Engineering Chemistry**" Dhanpat Rai Publications, Co., New Delhi. (2009).

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC1LB07				**C PROGRAMMING LAB (Common to CSE & IT)**			

COURSE OBJECTIVE:

- The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

COURSE OUTCOMES:

After completion of this C Programming Lab, students would be able to:

CO1: Study, analyze and understand logical structure of computer programming and different constructs to develop programs in C Language [K4].

CO2: Compare and contrast various data types and operator precedence [K2].

CO3: Analyze the use of conditional and looping statements to solve problems associated with conditions and repetitions [K4].

CO4: Analyze simple data structures, use of pointers and dynamic memory allocation techniques [K4].

CO5: Make use of functions and file I/O operations in developing C Programs [K3].

EXERCISE 1

Construct Flowcharts for the following through Raptor:

  i) Develop a calculator to convert time, distance, area, volume and temperature from one unit to another.

  ii) Calculate simple and compound interest for various parameters specified by the user.

  iii) Calculate the average of n numbers.

EXERCISE 2

a) Write a C Program to calculate the area of triangle using the formula
Area $=(s*(s-a)*(s-b)*(s-c))^{1/2}$ where s$= (a+b+c)/2$.

b) Write a C Program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

EXERCISE 3

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program, which takes two integer operands and one operator form the user, performs

the operation and then prints the result. Consider the operators +,-,*, /, % and use Switch

Statement

EXERCISE 4

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) Draw a flow chart using Raptor and write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

EXERCISE 5

a) Draw a flow chart using Raptor and write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

EXERCISE 6

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

EXERCISE 7

a) Draw a flow chart using Raptor and write a C Program to find both the largest and smallest number
of an array of integers

b) Write a C Program to find transpose of a matrix.

EXERCISE 8

Draw a flow chart using Raptor and write C programs that use both recursive and non-recursive
Functions for the following

i) To find the factorial of a given integer.

ii) To find the GCD greatest common divisor of two given integers.

EXERCISE 9

a) Draw a flow chart using Raptor and write a C Program for the following To find Fibonacci sequence

b) Write C programs illustrating call by value and call by reference concepts.

EXERCISE 10

Write C Programs for the following string operations without using the built in functions - to concatenate two strings

a) To append a string to another string

b) To compare two strings

EXERCISE 11

Write C Programs for the following string operations without using the built in functions

a) To find whether a given string is palindrome or not

EXERCISE 12

Write a C program that uses functions to perform the following operations:

i. To insert a sub-string in to given main string from a given position.

ii. To delete n Characters from a given position in a given string.

iii. To replace a character of string either from beginning or ending or at a specified location

EXERCISE 13

a) Write a C Program to Implement Taylor series method

b) Write a C Program to Implement Euler's method

c) Write a C Program to Implement Runge Kutta method

EXERCISE 14

a) Draw a flow chart using Raptor and write a C program to implement a linear search.

b) Draw a flow chart using Raptor and write a C program to implement binary search

c) Write a C program to implement sorting of an array of elements.

EXERCISE 15

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

EXERCISE 16

Examples which explores the use of structures, union and other user defined variables

EXERCISE 17

a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

EXERCISE 18

Virtual Lab: http://cse02-iiith.vlabs.ac.in/ /

Any three programs must be submitted with result from the above link.

* At the end of the semester the student has to submit a Mini-Project on Computer Programming. The list of Mini-Projects is available in the department.

TEXT BOOKS:

1. Reema Thareja, " Programming in C", OXFORD .
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:

1. Dr.E.Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education.
2. Hanly, "Problem Solving and Program Design in C", Koffman, 7th ed, PEARSON.
3. Forouzan, Gilberg, Prasad ,"C Programming, A Problem Solving Approach", CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	-	-	-	MC
SUBCODE: 19BCC1MC02	CONSTITUTION OF INDIA (MC)						

COURSE OBJECTIVES:
* To train students in understanding the basic structure of Indian Constitution
* To aware the students about the role of constitution in a democratic society
* To prepare students to live better and happily with other fellow beings through the application of Fundamental Rights in their lives.
* To know about the powers of Union Government and State Government

COURSE OUTCOMES:
CO1: Examine salient features of Indian Constitution and live accordingly in society & interpret the meaning of Fundamental Rights of State Policy. [K

CO2: Discover various aspects of Union Government legislation and live up to the expectations of the rules.

CO3: Critically examine State Government legislation and improve your living standards by following the rules strictly

CO4: Examine powers and functions of local bodies such as Municipalities and Panchayats and, take advantage of available resources for better living

CO5: Analyze the powers and functions of Election Commission and The Union Public Service Commission and decide upon it for safe and secured life.

UNIT-I:
INTRODUCTION TO INDIAN CONSTITUTION & FUNDAMENTAL RIGHTS :
Meaning of the term Indian Constitution –Preamble- Constituent Assembly- Salient Features of Indian Constitution. Fundamental Rights -Fundamental Duties -The Directive Principles of State Policy.

UNIT-II:
UNION GOVERNMENT : Union Government -Union Legislature (Parliament) -Lok Sabha and Rajya Sabha (with Powers and Functions) -Union Executive -President of India (with Powers and Functions) -Prime Minister of India (with Powers and Functions) -Union Judiciary (Supreme Court) - Jurisdiction of the Supreme Court

UNIT-III:
STATE GOVERNMENT : State Government -State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) -Powers and Functions of the State Legislature -State Executive-Governor of the State (with Powers and Functions) -The Chief Minister of the State (with Powers and Functions) -State Judiciary (High Courts)

UNIT-IV:
LOCAL SELF GOVERNANCE : Powers and functions of Municipalities, Panchyats, ZP's and Co – Operative Societies

UNIT-V:
SOVEREIGN BODIES : Election Commission of India (with Powers and Functions) -The Union Public Service Commission (with Powers and Functions)

TEXT BOOKS:
1. Introduction to constitution of India, Durga Das Basu, Lexis Nexis Publications
2. Constitution of India by PRFESSIONAL BOOK PUBLISHERS
3. The Constitution of India by Arun K Tiru vengadam, Blooms bury publishers.
4. The constitution of India by PM Bakshi, Universal law publishing co
5. The Constitution of India by S.R. Bhansali, Universal law publishing co

I B.TECH. – II SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Communicative English -II	HS	40	60	100	2	-	-	2
2	Engineering Physics	BS	40	60	100	2	1	-	3
3	Probability & Statistics	BS	40	60	100	2	1	-	3
4	Engineering Graphics	ES	40	60	100	1	-	4	3
5	Numerical Methods And Vector Calculus	BS	40	60	100	2	1	-	3
6	Python Programming	ES	40	60	100	3	-	-	3
7	Engineering Physics Lab	BS	20	30	50	-	-	3	1.5
8	IT Workshop	ES	20	30	50	-	-	3	1.5
9	Python Programming Lab	ES	20	30	50			3	1.5
10	Environmental Studies	MC	-	-	-	3	-	-	0
Total			**300**	**450**	**750**	**15**	**3**	**13**	**21.5**

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	40	60	100	2
SUBCODE: 19BCC2TH01	**COMMUNICATIVE ENGLISH - II** **(Common to All Branches)**						

COURSE OBJECTIVES:
- To enable the engineering students develop their basic communication skills in English for academic and social purposes.
- To equip the students with appropriate oral and written communication skills.
- To enhance the skills of listening, reading and critical thinking.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO 1: Read and comprehend complex texts and summarize.

CO 2: Compose paragraphs, essays as creative writing.

CO 3: Learn grammatical structures and write grammatically correct sentences

CO 4: Enhance word power and usage of lexicons.

CO 5: Compile emails, letters, reports, resume and information transfer.

UNIT– I
    a. **Reading**: Rahul Bajaj
    b. **Communication Skills -**Role and significance of communication, Features of Human Communication-
    c. **Writing:** Emails and Letters
    d. **Vocabulary**: Homonyms, Homophone and Homographs.

UNIT–II
    a. **Reading:** Ratan Tata
    b. **Communication Skills -**Process of Communication & types of Communication, barriers to communication
    c. **Writing:** General Essay
    d. **Vocabulary:** Words often confused, Suffixes & Prefixes

UNIT–III
    a. **Reading:** Sabeer Bhatia
    b. **Communication Skills -**Importance of Listening for effective communication, Interpersonal communication-
    c. **Writing:** Note making
    d. **Vocabulary:** Synonyms and Antonyms (100)

UNIT-IV
    a) **Reading:** Steve Jobs
    b) **Communication Skills -**Persuasion techniques
    c) **Writing:** Resume
    d) **Vocabulary:** One word substitutes (100)

UNIT-V
a. **Reading:** Sudha Murthy
b. **Communication Skills -**Telephone and Cell phone etiquette-
c. **Writing:** Report writing; types, format, style, sample reports
d. **Vocabulary:** Frequently used Idioms (100)

TEXT BOOKS:
1. "Modern Trail Blazers" , Orient Black Swan Pvt.Ltd.Publisher, 1ST edition. 2013
2. E Suresh Kumar," *Engineering English",* Orient Black Swan Pvt. Ltd. Publishers.

REFERENCE BOOKS:
1. Raman, Meenakshi and Sangeetha Sharma, *"Technical Communication: Principles and Practice",* Oxford University Press, New Delhi. 2015.
2. Rutherford, Andrea. J *Basic Communication Skills for Technology*. Pearson, New Delhi. 2001
3. Raymong Murphy, *"Murphy's English Grammar",* Cambridge University Press 2004.
4. Sanjay Kumar, Pushpa Latha, *"Language and Communication Skills for Engineerers",* Oxford University Press, 2018.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCC2TH07	**ENGINEERING PHYSICS (Common to All branches)**						

COURSE OBJECTIVES:

- To impart knowledge in basic concepts of wave optics, fiber optics, properties of solid crystal materials and magnetic materials, acoustics, superconductors.
- To familiarize the applications of materials relevant to engineering field.

COURSE OUTCOMES:

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

CO 1: Find the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polarisation in various fields. [K1]

CO 2: Analyse various types of lasers & optical fibers. [K4]

CO 3: Explain the crystal structures and XRD techniques. [K2]

CO 4: Develop the strategies to apply the concepts of magnetiism in engineering field. [K3]

CO5: Examine the various applications of semiconductors in engineering field. [K4]

SYLLABUS

UNIT– I

Interference & Diffraction: Introduction -Interference in thin films by reflection – Newton's rings, introduction to diffraction – difference between Fresnel's and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

Polarization: Introduction – Types of Polarization – Double refraction – Nicol's prism-Quarter wave plate and Half Wave plate

UNIT–II

Lasers: Introduction – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Population inversion – Ruby laser – Helium Neon laser-Applications.

Fiber Optics: Introduction- Principle of optical fiber - Acceptance angle – cone - Numerical Aperture-Applications.

UNIT–III

Crystallography : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC.

X-Ray Diffraction: Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law.

UNIT-IV

Electromagnetic Fields: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations.

Magnetic materials: Magnetic Susceptibility- Magnetic permeability –Classification of Magnetic materials – Dia, Para, Ferro – Soft and Hard magnetic materials - Applications

UNIT-V

Quantum Mechanics: Introduction –de-Broglie's concept of Matter waves – Physical significance of wave function - Schrodinger Time Independent wave equations – Particle in a one dimensional potential box.

Semiconductor Physics: Origin of energy band formation in solids- classification of materials into conductors, semiconductors and insulators, Intrinsic and Extrinsic semiconductor- Hall Effect.

TEXT BOOKS:
1. A.J. Dekker, "Solid state Physics", ISBN 10: 0333918339 / ISBN 13: 9780333918333, Mc Millan India Ltd, First edition, 2000.
2. M.N. Avadhanulu & P.G. Kshirasagar, "A text book of Engineering Physics", ISBN 81-219-0817-5, S. Chand publications, First Edition, 2011.
3. P. K. Palanisamy, "Engineering Physics", ISBN: 9788183714464, Scitech Publishers, 4th Edition, 2014
4. M.R. Srinivasan, "Engineering Physics", ISBN978-81-224-3636-5, New Age international publishers, 2nd Edition,2014

REFERENCE BOOKS:
1. Charles Kittle, "Introduction to solid state physics" ISBN: 9788126578436, Willey India Pvt.Ltd, 5TH edition, 2012.
2. M.Arumugam, "Applied Physics", ISBN: 81-89638-01-7, Anuradha Agencies, 4th edition, 2013.
3. D.K.Bhattacharya, "Engineering Physics", ISBN: 0198065426, 9780198065425, Oxford University press, 2nd edition, 2010.
4. Sanjay D Jain and Girish G Sahasrabudhe "Engineering Physics", University Press ISBN: 8173716781,1^{st} edition, 2010.
5. B.K.Pandey & S. Chaturvedi "Engineering Physics" ISBN: 8131517616, Cengage Learning, 1st edition, 2012.

WEB REFERENCES:
1. http://link.springer.com/physics
2. http://www.thphys.physics.ox.ac.uk
3. http://www.sciencedirect.com/science
4. http://www.e-booksdirectory.com

E-BOOKS:
1. http://www.peaceone.net/basic/Feynman
2. http://physicsdatabase.com/free-physics-books
3. http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf
4. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html

I B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCI2TH08				**PROBABILITY AND STATISTICS (CSE & IT)**			

COURSE OBJECTIVES:

- To extend and formalize knowledge of the theory of probability and random variables
- To introduce techniques for carrying out probability calculations and identifying probability distributions.
- To explain students with the fundamental concepts of probability and statistics and to develop an understanding of the role of statistics in engineering.

COURSE OUTCOMES:

Upon Successful completion of the course, the students are able to

CO 1: Make use of the knowledge of theory of probability and random variables.
CO 2: Apply discrete and continuous probability distributions to solve various engineering problems.
CO 3: Identify the estimation errors in sampling distributions.
CO 4: Apply the proper test statistics to test the hypothetical data by Tests of Hypothesis.
CO 5: Apply Statistical Quality controlling methods to given data.

UNIT I: PROBABILITY AND DISCRETE DISTRIBUTIONS: (10 hours)

Probability, Conditional Probability, Baye's theorem -Random variables- Discrete Random variable-Distribution function- Expectation. Discrete distributions: Binomial, Poisson distributions and their fitting to data.

UNIT-II: CONTINUOUS RANDOM VARIABLES & DISTRIBUTIONS:
                                                                        (10 hours)

Continuous Random variable-Distribution function- Expectation.
Continuous distributions: Normal distributions-data fitting-Normal approximation to Binomial distribution, Uniform, Exponential, Weibull, and Gamma distributions.

UNIT-III: SAMPLING THEORY: (10 hours)

Introduction - Population and samples- Sampling distribution of means (σ known)-Central limit theorem- Sampling distribution of means (σ unknown) - Sampling distribution of variances. Point estimation- Maximum error of estimate - Interval estimation.

UNIT-IV: TESTS OF HYPOTHESIS FOR SMALL SAMPLES: (12 hours)

Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- t-test (single mean and differences of means), chi-square test (good ness of fit, Independence of attributes and population variance), F-test, ANOVA for one-way and two-way classified data.

UNIT-V: STATISTICAL QUALITY CONTROL METHODS & INTRODUCTION   TO DATA SCIENCE USING PYTHON: (6 hours)

Quality Control, control charts for measurements, control charts for attributes, tolerance limits.

TEXT BOOK:

1. **T. K. V. Iyenger**, Krishna Gandhi, Ranganadhan and M.V.S.S. Prasad Probability and Statistics, S. Chand & Company Ltd, 2015.
2. **S. C. Gupta and V. K. Kapoor,** Fundamentals of Mathematical Statistics, 11/e (Reprint) 2019, Sultan Chand & Sons Publications.

REFERENCES:

1. **Miller and Freund's,** Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. **Jay I. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross,** Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	-	4	40	60	100	3
SUBCODE: 19BCC2TH09	**ENGINEERING GRAPHICS** (COMMON TO CSE & ECE & EEE & IT)						

COURCE OBJECTIVES:

- The students to use drawing instruments and to draw polygons, engineering Curves & engineering scales.
- The students use to make orthographic projections, projections of points, simple lines & projections of the lines inclined to both the lines.
- The students use to draw the projections of the plane inclined to both the plane.
- The students use to draw the projections of solids & development of surfaces.
- The students use to draw conversion of isometric views to orthographic views vice versa and to learn basic drawing commands in auto cad.

COURSE OUTCOMES:

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

CO 1: **Construct** the geometrical shapes of regular polygons, Engineering Curves.

CO 2: **Develop** the orthographic projections, projections of points, and lines inclined to both the planes.

CO 3: **Construct** the projection of planes inclined to both the planes.

CO 4: **Develop** the projection of regular solids and surfaces.

CO 5: **Interpret** the conversion of isometric views to orthographic views vice versa.
.

UNIT– I

THE BASIC CONCEPTS IN ENGINEERING DRAWING: introduction to engineering drawing instruments, lettering and dimensioning practice. Geometrical constructions**-** Constructing regular polygons by general methods.

CURVES USED IN ENGINEERING PRACTICE: Introduction to **conic** sections, construction of ellipse, parabola, hyperbola by eccentricity method. Construction of ellipse by - Arcs of circles Method, Concentric Circles Method and Oblong Method, & parallelogram methods.

UNIT–II

ORTHOGRAPHIC PROJECTIONS: introduction to type of projections, first angle and third angle projections.

Projection of points: Principles of orthographic projection – Convention – First angle projections, projections of points.

PROJECTIONS OF STRAIGHT LINES:

Projections of straight lines parallel to both the planes, parallel to one plane and inclined to the other plane. Lines inclined to both the planes - Projections of straight lines inclined to both the planes- determination of true lengths, angle of inclination and traces.

UNIT–III

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

UNIT-IV

PROJECTIONS OF SOLIDS: introduction to projections of solids, types of solids: prisms, pyramids, cones and cylinders –simple positions and the axis inclined to one of the plane.

UNIT-V

Introduction of isometric views, isometric projections & orthographic projections. Conversion of isometric views to orthographic views and orthographic views to isometric views.
INTRODUCTION TO AUTO CAD: practice on draw, edit & modify commands using auto CAD.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Drawing & Graphics by K.Venu gopal, New age international Publishers.

REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers.
2. Engineering Drawing by Basant Agarwal & CM. Agarwal, Tata McGraw Hill Publishers.

WEB REFERENCES:

1. https://nptel.ac.in/courses/112103019/17

E-BOOKS:

1. https://www.pdfdrive.com/textbook-of-engineering-drawing-e28918244.html

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCI2TH10	NUMERICAL METHODS AND VECTOR CALCULUS (CSE & IT)						

COURSE OBJECTIVES:
- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To propagate the use of different numerical techniques for carrying out numerical integration.

COURSE OUTCOMES:
Upon successful completion of the course, the students should be able to

CO 1: Evaluate approximating roots of polynomials and transcendental equations by different algorithms.

CO 2: Apply Newton's forward backward and Lagrange's interpolation for equal and unequal intervals.

CO 3: Apply different algorithms for approximating solutions of ordinary differential equation to its analytical computations.

CO 4: Interpret the physical meaning of different operators as gradient, curl and divergence.

CO 5: Estimate the work done against a field, circulation and flux using vector calculus.

UNIT –I: ITERATION METHODS: (8 hours)
Solution of Algebraic and Transcendental Equations: Introduction- Bisection method, Method of false position, Iteration method, Newton-Raphson method (One variable and simultaneous Equations).

UNIT –II: INTERPOLATION: (10 hours)
Interpolation: Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals – Newton's Divided difference formula, Lagrange's interpolation formula.

UNIT –III: NUMERICAL DIFFERENTIATION AND INTEGRATION:
(10 hours)
Numerical Differentiation, Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Numerical integration- trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

UNIT- IV: VECTOR DIFFERENTIATION: (10 hours)
Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT- V: VECTOR INTEGRATION: (10 hours)
Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

TEXT BOOK :
1. Dr. B.S. Grewal, "*Higher Engineering Mathematics*", 43nd Edition, Khanna Publishers, 2012.

REFERENCES:
1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
3. Bhavanari Satyanarayana, Pradeep Kumar T.V. & Srinivasulu D, "Linear Algebra and Vector Calculus", Studera Press, New Delhi, 2017.
4. Curtis F. Gerald, Patrick O. Wheatley, "Applied Numerical Analysis", 7 th edition, Pearson.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCI2TH12	**PYTHON PROGRAMMING** (Common to CSE & IT)						

COURSE OBJECTIVE:

- To teach problem solving through flow charting tool-Raptor.
- To elucidate problem solving through python programming language.
- To introduce function oriented programming paradigm through python.
- To train in development of solutions using modular concepts.

COURSE OUTCOMES:

After successful completion of this course, the students would be able to:

CO 1: Summarize the fundamental concepts of python programming.[K2].

CO 2: Apply the suitable data structures to solve the real time problems.[K3].

CO 3: Interpret object oriented and event driven programming in python.[K2].

CO 4: Apply regular expressions for many different situations.[K3].

SYLLABUS:

UNIT-I

Introduction to python: Python-numbers, strings, variables, operators, expressions, statements, string operations, math function calls, Input/output statements, conditional if, while and for loops, **Functions**: user defined functions, parameters to functions, recursive functions, lambda function and turtle graphics.

UNIT-II

Data structures: Lists- basic list operators, replacing, inserting, removing an element; searching and sorting lists; tuples. Dictionaries- dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Sets, Strings, files and their libraries.

UNIT-III

Event driven programming: Turtle bar chart, event driven programming, key press events, mouse events, timer events.

UNIT-IV

OOP: Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects ,inheritance, polymorphism, operator overloading _eq_, _str_, etc); abstract classes; exception handling, try block.

UNIT-V:

Regular expressions: Powerful pattern matching and searching, Power of pattern searching using regex in python, Real time parsing of networking or system data using regex Password, email, url validation using regular expression, Pattern finding programs using regular expression.

TEXT BOOKS:
1. Kenneth Lambert, "Fundamentals of Python: First Programs" , ISBN-13: 978-1337560092,cengage learning publishers, first edition,2012.
2. Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2nd edition, 2016.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

REFERENCE BOOKS:
1. Vamsi kurama, "Python programming : A modern approach", ISBN-978-93-325-8752-6,pearson,2018.
2. Mark Lutz , "Learning python", ISBN: 1-56592-464-9,Orielly, 4th edition, 1999 .
3. W.Chun, "Core python programming", ISBN-13: 978-0132269933, pearson, 2nd edition, 2016.

WEB RESOURCES:
1. https://raptor.martincarlisle.com/
2. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
3. https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf
4. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
5. https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
6. https://nostarch.com/scratchplayground
7. http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC2LB06	**ENGINEERING PHYSICS LAB** (Common to All branches)						

COURSE OBJECTIVES:
- To impart physical measurement skills and make the students understand coherence between theoretical and practical knowledge.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Understand the principle of physics and interpret them in engineering field and compares the results with theoretical calculations.

CO2: Ability to use modern engineering physics techniques and tools in real time applications in engineering studies.

CO3: The student will be enabled to know about the characteristics and the behavior of materials in a practical manner and gain knowledge and its usage.

LIST OF EXPERIMENTS:
1. Rigidity modulus of material by wire-dynamic method (torsional pendulum)
2. Determination of wavelength of a source-Diffraction Grating-Normal incidence
3. Newton's rings –Radius of Curvature of Plano Convex Lens.
4. Determination of thickness of thin wire- Air wedge method
5. Determination of wavelength of Laser Source-single slit diffraction.
6. Determine the Numerical aperture of an optical fiber.
7. Melde's experiment – Transverse and Longitudinal modes.
8. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
9. Verification of laws of stretched string by using Sonometer.
10. Calculate the energy loss in a given ferromagnetic material by plotting B-H Curve.
11. Energy Band gap of a Semiconductor p - n junction.
12. Characteristics of Thermistor – temperature coefficient

TEXT BOOKS:
1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics Practical Manual, Lorven Publications
3. S. Balasubramanian , M.N. Srinivasan " A Text book of Practical Physics"- S Chand Publishers, 2017.

WEB REFERENCES:
1. https://www.youtube.com/watch?v=NDsSPtL9dyQ
2. https://www.youtube.com/watch?v=9agoJRCnu4w
3. https://www.youtube.com/watch?v=bv-lLJreyCU
4. http://vlab.amrita.edu/index.php

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC2LB07	**IT WORKSHOP** (Common to CSE & IT)						

COURSE OBJECTIVES:

- Enabling the student to understand basic hardware and software tools through practical exposure.

COURSE OUTCOME:

After completion of this course, the student should be able to

CO1: Demonstrate the need of PC hardware components, applications and software [K2].

CO2: Explain the knowledge of networks, internet and World Wide Web, Search engines, Netiquette [K2].

CO3: Experiment with the installation and use of different software like Windows XP, Linux [K3]

CO4: Identify and fix the defective PC and software related issues [K3].

CO5: Make use of various options in Microsoft word, Excel and Power point [K3].

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers, Trouble shooting Hardware and Software, some tips and tricks.

Internet & World Wide Web:

Different ways of hooking the PC on to the internet from home and workplace and effectively use the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.

Productivity tools: Crafting professional word documents; excel spread sheets, power point presentations and personal websites using the Microsoft suite of office tools.

PC Hardware

Task 1: Identification of the peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

Task 2: A Practice on disassembling the components of a PC and assembling them to back to working condition.

Task 3: Examples of Operating Systems- DOS, MS Windows, and Installation of MS windows on a PC

Task 4: Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

Task 5: Hardware Troubleshooting Demonstration: Identification of a problem and fixing a defective PC(improper assembly) or defective peripherals.

Software Troubleshooting Demonstration: Identification of problem and fixing the PC for any software issues.

Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices-Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Orientation & Connectivity Boot Camp and Web Browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc).Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

Task 8: Cyber Hygiene (Demonstration) : Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced

WORD

Task 9: MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

Task 10 : Creating Project : Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Task 10A: Create a document using Google Docs, Create a Survey Form using Google Forms, Create a document using Google Docs with voice typing, Translate Document from one language to another language.

EXCEL

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

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

LOOKUP/VLOOKUP

Task 12: Performance Analysis: Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

POWER POINT

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

Task 14: Focusing on the power and potential of Microsoft power point Help them learn best practices in designing and preparing power point presentation. Topic covered during this week includes:- Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background , textures, Design Templates, Hidden slides, OLE in PPT.

Task 14A: Create a Power point Presentation with audio recording and video recording, Create an animation video using Plotogon Tool.

TEXT BOOKS:
Faculty to consolidate the workshop manuals using the following references.
1. Anita Goel , Computer Fundamentals, Pearson
2. Scott. Mueller QUE , Scott Mueller's Upgrading and Repairing PCs, 18/e, Pearson, 2008

REFERENCE BOOKS:
1. Dr.N.B.Venkateswarlu, Essential Computer and IT Fundamentals for Engineering and Science Students.
2. G Praveen Babu, M V Narayana, "Information Technology Workshop", BS Publications, 3e Vikas Gupta, "Comdex Information Technology", Dreamtech.

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5

SUBCODE: 19BCI2LB09	**PYTHON PROGRAMMING LAB** (Common to CSE & IT)

COURSE OBJECTIVE:

- To introduce programming through Visual programming tool - Scratch
- To teach problem solving through Flow charting tool - Raptor
- To elucidate problem solving through python programming language
- To introduce function-oriented programming paradigm through python
- To train in development of solutions using modular concepts
- To teach practical Pythonic solution patterns

COURSE OUTCOMES:

After successful completion of this course, the students would be able to:

CO1: Develop interactive visual programs using Scratch.[K3].

CO2: Develop Python programs for numerical and text based problems. [K3].

CO3: Develop graphics and event based programming using Python. [K3].

CO4: Develop Python programs on object oriented programming and regular expressions. [K3].

LABORATORY EXPERIMENTS

Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, Pentagon.

1. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
2. Design a Memory Game in Scratch which allows the user to identify positions of similar objects in a 3 x 3 matrix.
3. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
4. Design a Python script to determine if a given string is a Palindrome using recursion
5. Design a Python script to sort numbers specified in a text file using lists.
6. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format $0 <= YYYY <= 9999$, $1 <= MM <= 12$, $1 <= DD <= 31$ following the leap year rules.
7. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
8. Design a Python Script to determine the time difference between two given times in HH:MM:SS format. $0 <= HH <= 23$, $0 <= MM <= 59$, $0 <= SS <= 59$
9. Design a Python Script to find the value of Sine, Cosine, Log, PI, e*g* of a given number using infinite series of the function.
10. Design a Python Script to convert a given number to words
11. Design a Python Script to convert a given number to roman number.
12. Design a Python Script to generate the frequency count of words in a text file.
13. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
14. Design a Python Script to implement Gaussian Elimination method.

15. Design a Python script to generate statistical reportsMinimum, Maximum, Count, Average, Sum etc) on public datasets.
16. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.
17. Write a Python program to match a string that contains only upper and lowercase letters, numbers, and underscores.
18. Write a Python program to convert a date of yyyy-mm-dd format to dd-mm-yyyy format.
19. Write a Python program to replace all occurrences of space, comma, or dot with a colon.
20. Write a Python program to check that a string contains only a certain set of characters in this case a-z, A-Z and 0-9
21. Write a Python program to find the occurrence and position of the substrings within a string.
22. Design a Python script on oop's concepts: Class variables and instance variable
        i)   Robot   ii) ATM Machine

23. Virtual Lab: http://ps-iiith.vlabs.ac.in/, www.w3schools.com, www.learnpython.org

 Any three programs must be submitted with result from the above link.

TEXT BOOKS:

1. Kenneth Lambert, "Fundamentals of Python: First Programs" , ISBN-13: 978-1337560092,cengage learning publishers, first edition,2012.
2. Allen B. Downey, "think python: how to think like a computer scientist", ISBN-13: 978-1491939369, O'reilly, 2nd edition, 2016.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19-948017-3, Oxford University Press, 2017.

REFERENCE BOOKS:

1. Vamsi kurama, "Python programming : A modern approach", ISBN-978-93-325-8752-6,pearson,2018.
2. Mark Lutz , "Learning python", ISBN: 1-56592-464-9,Orielly, 4th edition, 1999 .
3. W.Chun, "Core python programming", ISBN-13: 978-0132269933, pearson, 2nd edition, 2016.

WEB RESOURCES:

1. https://raptor.martincarlisle.com/
2. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
3. https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf
4. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
5. https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
6. https://nostarch.com/scratchplayground
7. http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	-	40+40+20		100	MC(0)
SUBCODE: 19BCC2MC02	**ENVIRONMENTAL STUDIES** **(Common to all Branches)**						

COURSE OBJECTIVES:

- To make the students aware about the environment and it's inter–disciplinary, to familiarize the concept of ecosystem and their importance, basic understanding of the ecosystem and its diversity.
- Overall understanding of the natural resources.
- To bring the awareness among students about the importance of biodiversity and the need for its conservation.
- To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities. Awareness on the social issues, environmental legislation and global treaties understanding the environmental policies and regulations.

COURSE OUTCOMES:

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

CO 1: Explain the concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.

CO 2: Analyze the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.

CO 3: Explain the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.

CO 4: Distinguish various attributes of the pollution, their impacts and measures to reduce or control the pollution along with waste management practices.

CO 5: Define Environmental policy, legislation, environmental assessment and the stages involved in EIA Environmental audit.

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness. Institutions and people in Environment.

Ecosystems:

Definitions and concepts – Characteristics of ecosystem – Structural and functional features – Producers, consumers and decomposers and food webs – Types of ecosystems – Forests, grassland, desert, crop land, pond, lake, river and marine ecosystems – Energy flow in the ecosystem – Ecological pyramids – Ecological successions.

UNIT – II

Natural Resources: Water resources–Use and over utilization of surface and natural resourced ground water–Floods, drought, conflicts over water, dams–benefits and problems on tribal population & Environment.

Forest resources: Use and over–exploitation, deforestation.

Mineral resources: Use and exploitation, tribal & environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer–pesticide problems, water logging, salinity–concept of sustainable agricultural methods.

Energy Resources: Renewable (wind energy, tidal energy) and non renewable energy resources (Fossil fuels, coal).

UNIT – III

Biodiversity: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity

Conservation of biodiversity: Threats to biodiversity: habitat loss, man wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: In-Situ conservation and Ex- situ conservation.

UNIT – IV

Environmental Pollution and Control Technologies: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, and nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Good Agricultural Practices – Drip irrigation, soil erosion and desertification

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

Environmental Policy, Legislation and Environmental Management: Environmental ethics: Issues and possible solutions. Environmental Protection Act, Legal aspects -Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. Impact Assessment and its significance - various stages of EIA, preparation of EMP and EIS, Environmental audit, Ecotourism.

Visit to some local Polluted Site: Study of an industrially Polluted area.

TEXT BOOKS:

1. AnubhaKaushik& C. P. Kaushik, Environmental Studies, New Age   International (P) Ltd., New Delhi. Fourth edition, 2014
2. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani,Environmental Studies, Pearson Education, Chennai.ISBN 978-93-325-2052-3,Second edition-2014.

REFERENCE BOOKS:

1. Deekshita Dave & P. Udaya Bhaskar, Text Book of Environmental Studies Cengage Learning.
2. Shaashi Chawla, a Textbook of Environmental Studies, TMH, New Delhi.
3. Benny Joseph Environmental Studies, Tata McGraw Hill Co, New Delhi.
4. Dr.K.V.S.G. Murali Krishna, Environmental Studies VGS Publishers, Vijayawada, First Edition 2016.
5. Bharucha, E. Text book of Environmental Studies, First edition, Universities Press (India) Pvt., Ltd., Hyderabad, 2005.

WEB REFERENCES:

1. URL:https://www.youtube.com/watch?v=7G3eXI_DPn8
2. URL: https://www.eolss.net/sample-chapters/C09/E6-70-05-01.pdf
3. URL: https://www.youtube.com/watch?v=QuRL6NbyvEQ
4. URL: https://google/ Introduction to Environmental Studies 5JM1G2
5. URL:http://www.teacherspayteachers.com/Product/Food-Chains-Trophic-Levels-and-Ecological- Pyramids-PowerPoint Click the above
6. URL:http://iadc-dredging.com/en/371/environment/ecosystem-services/ this webinar will focus on the concept of ecosystem services
7. URL: http://mocomi.com/ presents: What is Air Pollution? Air pollution is the introduction of foreign products into the atmosphere.
8. URL: https://en.wikipedia.org/wiki/green_impact_assessment

E-BOOKS:

1. https://faculty.psau.edu.sa/.../doc-5-pdf-d78456fce3bebc84d9320fa2f9cf9e2a-original
2. https://www.researchgate.net/.../273775623_Introduction_to_Environmental_Sciences

II B.TECH. – I SEMESTER

S.No.	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Business Management Concept for Engineers	HS	40	60	100	3	-	-	3
2	Front End Web Technologies	ES	40	60	100	3	-	-	3
3	OOPs Through Java	PC	40	60	100	2	1	-	3
4	Mathematical Foundations of Computer Science	BS	40	60	100	3	-	-	3
5	Data Structures	PC	40	60	100	3	-	-	3
6	Computer Organization	PC	40	60	100	3	-	-	3
7	Data Structures Lab	PC	20	30	50	-	-	3	1.5
8	Front End Web Technologies Lab	ES	20	30	50	-	-	3	1.5
9	Java Programming Lab	PC	20	30	50	-	-	3	1.5
10	Community Service	MC	-	-	-	-	-		0
Total			**300**	**450**	**750**	**17**	**1**	**9**	**22.5**

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
SUBCODE: 19BCC3TH01	**BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS**						

COURSE OUTCOMES:

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

CO1: Summarize fundamentals of Managerial economics for decision making. [K2)]

CO2: Apply concepts of Financial Accounting and BEP for business decisions. [K3].

CO3: Evaluate fundamental concepts and principles of management [K5].

CO4: Discuss functional areas of management like HR, marketing and finance [K6].

CO5: Apply project management techniques for project planning and evaluation [K3].

UNIT-I: INTRODUCTION TO MANAGERIAL ECONOMICS

Definitions, - Nature And Scope- Relation With Other Subjects- Demand Definition- Determinants- Law of Demand and Its Exceptions- Concept of Elasticity of Demand- Cost Concepts- CVP Analysis (With Simple Problems), Significance- Limitations.

UNIT-II: MARKET STRUCTURES AND FINANCIAL ACCOUNTING

Introduction to Markets – Features of various markets-Perfect competition, Monopoly and Oligopoly. Definition – Importance, limitations and basic books of financial accounting, Preparation of basic books of accounting: journal, ledger and trail balance.

UNIT-III: INTRODUCTION TO MANAGEMENT

Concept, Nature, Importance- Functions of Management- Henry Fayols Principles of Management- F.W.Taylors Scientific Management- Douglas Mc Gregors Theory X and Y.

UNIT-IV: FUNCTIONAL AREAS OF MANAGEMENT

Concept of HRM, Functions of HR Manager- Marketing Management- Functions of Marketing Manager- Production Management-Functions of Production Management – Financial Management and functions of Financial Management.

UNIT-V: PROJECT MANAGEMENT: (PERT/CPM)

Development of Network – Difference between PERT and CPM- Problems on Critical Path- Problems on PERT Analysis.

TEXT BOOKS

1. Dr. N. APPARAO Dr. P. Vijay Kumar: "Managerial economics and financial analysis" Cengage publication's, New Delhi-2011.
2. Dr. A. R. Aryasri- Managerial Economics and Financial Analysis, TMH2011.
3. V. Maheswari: Managerial Economies, Sultan Chand.
4. Suma Damodaran: Managerial Economics, Oxford 2011.
5. Koontz & Weihrich: Essentials of Management" TMH 2011.

REFERENCES:

1. Managerial economics theory & applications, DM Mithani, Himalaya Publishing House, 2013.   **Unit-1, 2**
2. Accounting For Managers, G. Prasad, Jaibharath Publishers, 2016. -   **Unit-3**
3. Dr. P. Vijaya Kumar & Dr. N. Appa Rao," Management Science" cengage. Delhi, 2012.   **Unit-4, 5**
4. Project Planning & Control with PERT & CPM, BC Punmia & KK Khandelwal, Lakshmi Publications, New Delhi, 4th Edition – 2016. -**Unit-6**

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCI3TH02	**FRONT END WEB TECHNOLOGIES** (Common to CSE & IT)						

COURSE OBJECTIVE:

- This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1: Interpret a webpage and identify its elements and attributes.[K2].

CO2: Build webpages using HTML5 [K3].

CO3: Make use of Cascading Style Sheets on webpages [K3].

CO4: Make use of Java Script to write Interactive webpages [K3].

CO5: Build dynamic webpages with JQuery [K3].

CO6: Make use of JQuery UI to develop dynamic webpages [K3].

SYLLABUS:

UNIT I:

HTML5: Fundamentals of HTML, working with text, organizing text in HTML, working with Links and URLs, creating tables, working with Images, Colors and Canvas, working with Forms, interactive elements, working with Multimedia.

UNIT II:

Cascading Style Sheets: Overview of CSS3, backgrounds and color gradients in CSS, fonts and text styles, creating boxes and columns using CSS. Displaying, positioning and floating an element, list styles, table layouts, pseudo-classes and pseudo-elements. Effects, frames and controls in CSS, Implementing the advanced features of HTML5.

UNIT - III

Introduction to JavaScript: General syntactic characteristics, primitives, operations, expressions and Control Statements. **Objects in JavaScript**: Object creation and modification, Arrays, Functions. **Dynamic HTML with JavaScript**: Positioning elements, moving elements, element visibility, changing colors and fonts, dynamic content. **Regular Expressions in JavaScript**: Pattern matching using regular expressions. **Working with Events**: onload, onclick, onsubmit, onmouseover, onmouseout, onkeydown, onkeyup and onkeypress.

UNIT - IV

JQuery API:

Introduction: What jQuery can Do, Who Develops jQuery? Obtaining jQuery, Installing jQuery, programming conventions, markup and CSS conventions, JavaScript conventions. **Selecting and Filtering Elements**: Using the selectors API, filtering a selection, working within the context of a selection, working with an element's relatives, slicing a selection, adding to a selection. **Events**: The various event wrapper methods, attaching other events, attaching persistent event handlers, removing event Handlers, creating custom events.

UNIT - V

JQuery UI: HTML5 Drag and Drop: Implementing Drag and Drop, Implementing Drag-and-Drop File Uploads, **Sortable**: Making a List Sortable, Customizing Sortable, Saving the State of Sorted Lists, **Selectable, Accordion**: Building an Accordion UI, Changing the Default Pane, Changing the Accordion Event, Setting the Header Elements, **Date picker**: Implementing a Date picker, Localizing the Date picker, **Dialogue**: Implementing a Dialog, Styling a Dialog, Making a Modal Dialog, Auto-Opening the Dialog, Controlling Dynamic Interaction, Animating the Dialog, Working with Dialog Events.

TEXT BOOKS:

1. Kogent Learning solutions Inc., "HTML 5 Black book", Dreamtech.,2011, (Unit I,II,III).
2. Uttam K Roy, "Web Technologies",Oxford,2010 (Unit IV).
3. Richard York , Web Development with JQuery, Wiley publications, 2/e ,2015(Unit V)

REFERENCE BOOKS:

1. Robert W Sebesta, "Programming the World Wide Web", 7ed, Pearson, 2012
2. Paul S Wang, Sanda S Katila, "An Introduction to Web Design, Programming", Cengage, 2003.

ADDITIONAL RESOURCES:

1. https://www.w3schools.com/
2. nptel.ac.in/courses/106105084/13
3. https://www.coursera.org
4. Learning Management System.

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCI3TH03	**OOPS THROUGH JAVA** (Common to CSE & IT)						

COURSE OBJECTIVE:

- The course provides fundamentals of object-oriented programming in Java and development of user interface.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1: Interpret the syntax and semantics of java programming language and OOPs concepts [K2].

CO2: Make use of different predefined classes and packages to develop programmes using OOPs concepts [K3].

CO3: Apply exception handling and multithreading on java programs [K3].

CO4: Develop Java Programmes using collection frame work & I/O [K3].

CO5: Make use of Applets, AWT and event-handling to develop GUI [K3].

SYLLABUS
UNIT-I

Oriented Languages (Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism), Procedural languages Vs. OOP. The History and Evolution of Java, Java Buzzwords, java program structure.

Data Types, Variables, and Arrays: The primitive types, variables, type conversion and casting, Automatic Type Promotion in Expressions, Arrays, Operators, Control statements.

Introducing Classes : Class fundamentals, Declaring the objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this keyword, Garbage Collection, the finalize() Method.

UNIT-II

A Closer Look at Methods and Classes: Overloading Methods, Using objects as Parameters, Returning Objects, Understanding static , Nested and Inner Classes.

Inheritance: Inheritance Basics and types of inheritance, Using super, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, using final with Inheritance, The Object class.

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

UNIT-III

String Handling: String class, StringBuffer class, StringBuilder Class,

Exception Handling: Fundamentals, Exception types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

Multithreaded Programming : The Java Threaded Model, The Main Thread , Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter Thread Communication, Suspending, Resuming, Stopping Threads.

UNIT-IV

Collections Framework in Java- Introduction to Java collections, Overview of Java collection frame work, Commonly used Collection classes- ArrayList,LinkedList, HashSet, Hash table, HashMap, TreeSet,TreeMap , StringTokenizer.

Input/Output: reading and writing data - Byte Stream, Console, Character Stream, Buffered Byte Stream, Buffered Character Stream; java.io package.

UNIT-V

The Applet Class: Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repainting, The HTML APPLET Tag, Passing Parameters to Applets.

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, The KeyEvent Class, Sources of Events, Event Listener Interfaces, Using The Delegation Event Model, Adapter Classes , Inner Classes.

Introducing the AWT: java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar.

TEXT BOOKS:

1. Herbert Schildt, "The Complete Reference Java", 8/e, , TMH, 2011 (UNITS : I, IV, V)
2. Sachin Malhotra, Saurabh Choudhary, "Programming in JAVA", 2/e, , Oxford, 2014, (UNITS: I, II & III)

REFERENCE BOOKS:

1. JAVA Programming, K. Rajkumar,1/e, Pearson,2013.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, 1/e, Dream Tech, 2012.

ADDITIONAL RESOURCES:

https://www.tutorialspoint.com/java/index.html

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	40	60	100	3
SUBCODE: 19BCI3TH04	**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE** (CSE & IT)						

COURSE OBJECTIVE:

* The course provides with the basic mathematical implication for computer science, applications of mathematics in computer science.

COURSE OUTCOMES:

After completion of this course, the students would be able to

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO 1: Apply the logical statements, connectivity among the statements and forms different types of normal forms. [K3]

CO 2: Analyze the theory of Inference for statement calculus. [K4]

CO 3: Classify the types of graphs and trees to formulate computational problems.[K4]

CO 4: Apply DNF and CNF on Boolean algebraic functions to simplify the digital (logic) circuits. [K3]

CO 5: Solve mathematical problems with recurrence relations using different methods. [K3]

SYLLABUS

UNIT – I: Mathematical Logic: (10 hours)

Statements and Notations, Connectives - Negation, Conjunction, Disjunction, Statement Formulas and Truth tables, Conditional Statements, Bi Conditional Statements, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Functionally Complete Sets of Connectives, Other Connectives; Normal Forms - Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms, Principal Conjunctive Normal Forms, Ordering and Uniqueness of Normal Forms.

UNIT – II: THE THEORY OF INFERENCE FOR THE STATEMENT CALCULUS:

(10 hours)

Validity Using Truth Tables, Consistency of Premises and Indirect method of proof.
Predicate calculus: Predicates, Statement Function, Variables and Quantifiers, Free and Bound Variables, Inference Theory of Predicate Calculus, Exercises.
Mathematical Induction: Principle of Mathematical Induction, Exercises.

UNIT – III: GRAPH THEORY: (12 hours)

Definitions, finite and infinite graphs, incidence and degree, isolated pendant vertices, isomorphism, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Euler graphs, Euler graph theorem, operations on graphs, decomposition of Euler graphs into circuits, arbitrarily traceable Euler graphs, Hamiltonian paths and circuits, number of edge disjoint Hamiltonian circuits in complete graph with odd number of vertices, travelling salesman problem.
Trees: Some properties of trees, pendant vertices, distance and centers, rooted and binary trees, spanning trees, fundamental circuit, shortest spanning trees, Kruskal's algorithm

UNIT – IV: RECURRENCE RELATION: (8 hours)

Recurrence Relations, Formation of Recurrence Relations, Solving linear homogeneous recurrence Relations by substitution method, generating functions and The Method of Characteristic Roots. Solving Inhomogeneous Recurrence Relations.

UNIT – V: BOOLEAN ALGEBRAS & COMBINATORICS: (8 hours)
Boolean Algebras: Boolean Algebras, Boolean Polynomials, Disjunctive and Conjunctive Normal forms, Switching Circuits and Applications.
Combinatorics: Basic Counting Principles, Permutations and Combinations: Permutations, Combinations, Restricted Combinations, Pigeonhole Principle and its Application.

TEXT BOOKS:

1. Tremblay & Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH.
2. Bhavanari Satyanarayana and Kunchan Syam Prasad "Discrete Mathematics", PHI, India, ISBN: 978-81-203-4948-3.
3. Bhavanari Satyanarayana, T. V. Pradeep, Sk. Mohiddin Shaw, "Mathematical Foundation for Computer Science", B.S Publications, Hyd: 2016, ISBN: 978-93-83635-81-8.

REFERENCE BOOKS:

1. Rosen, "Discrete Mathematics and its Applications with combinatorics and graph theory", 7th ed, , TMH
2. Purna Chandra Biswal, "Discrete Mathematics and Graph theory", 3rd rd, PHI.
3. Joe L. Mott, Abraham Kandel, Theodore P. Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", 2nd Edition, PHI.

ADDITIONAL RESOURCES:

1. nptel.ac.in/courses/106106094
2. nptel.ac.in/courses/106108054 (Graph Theory)

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCI3TH05	DATA STRUCTURES (Common to CSE & IT)						

COURSE OBJECTIVE:

- Comprehensive knowledge of data structures and exposure to algorithmic complexities, recursive algorithms, searching, sorting and hashing techniques
- Applying Stack and Queue techniques for logical operations
- Understand Linked-list representation models in various types of applications
- Implementation of tree in various forms, orientation on graphs, representation of graphs, graph traversals, spanning trees Graphs

COURSE OUTCOMES:

After the completion of this course the student should be able to:

CO1 : Apply Searching, Sorting and Hashing techniques to solve problems [K3].

CO2 : Analyze basic data structures such as Stacks, Queues and Linked List [K4].

CO3 : Solve problems involving Advanced concepts of Trees [K3].

CO4 : Analyze variety of Graph data structures that are used in various applications [K4].

SYLLABUS:

UNIT – I

Introduction to Data Structures and Algorithms: Basic Terminology – Variables, Data Types, Data Structures, Abstract Data Types (ADTs)(p.g.no.20-21). Algorithms, Time and Space Complexity (worst-case, average-case, best-case). (p.g.no 21-27).

UNIT-II

Searching and Sorting : Introduction to Searching, Linear Search, Binary Search.(p.g.no:318-319).Introduction to Sorting, Bubble sort, Selection sort, Insertion sort ,Merge sort, Heap sort, Quick sort. (p.g.no:292-301).

UNIT – III

Hashing: Introduction, Hash Tables, Hash Functions, Different Hash Functions, Collisions. (pg.no.:356-361). **Linked Lists:** Introduction, Singly linked list, Doubly linked list, Circular linked list (p.g.no. 52-65).

UNIT - IV

Stacks: Definition, Stack ADT, Applications, Implementation (p.g.no 100-105).**Queues:** Definition, Queue ADT, Exceptions, Applications, Implementation. (p.g.no 123-124). **Trees:** Introduction, Binary Trees, Traversing a Binary Tree. (pg.no.:139-143). Binary Search Trees, operations on Binary Search Trees (insertions and deletions), AVL Trees (pg.no.:178-193).

UNIT - V

Priority Queues and Heaps: Introduction ,ADT, Applications ,Implementations, Binary Heaps-Inserting a new element in a Binary Heap, Deleting an element from a Binary Heap.(pg.no.:216-223)

Graphs: Introduction, Graph Terminology, Directed Graphs, Representations of Graphs, Adjacency Matrix Representation, (Adjacency List Representation), Graph Traversal algorithms.(pg.no:247-255).

TEXT BOOKS:

1. Data Structures and Algorithmic Thinking with Python Narasimha Karumanchi ,IIT Bombay, CareerMonk Publications, First Edition, 2018.
2. Data Structures and Algorithms in Python, Michael T. Goodrich,Second Edition,2013.

REFERENCE BOOKS:

1. Python Data Structures and Algorithms, Benjamin Baka , Kindle Edition.
2. Hands-On Data Structures and Algorithms with Python, Dr. Basant Agarwal and Benjamin Baa, 2nd Edition.

ADDITIONAL RESOURCES:

1. https://www.youtube.com/watch?v=YWnBbNj_G-U
2. https://www.youtube.com/watch?v=RBxS6niE6q4

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCI3TH06	**COMPUTER ORGANIZATION (Common to CSE & IT)**						

COURSE OBJECTIVE:

- Comprehensive knowledge of computer system including the analysis and design of components of the system.
- Describes different parameters of a memory system, organization and mapping of various types of memories.
- Illustrates algorithms for basic arithmetic operations using binary representation.
- Describes the means of interaction of devices with CPU, their characteristics and operating modes.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO 1: Interpret the computer system from user's perspective and can explain how Arithmetic Logic Unit works [K2].

CO 2: Explain of basic components of the system and illustrate data paths and control flow for sequencing in CPUs [K2].

CO 3: Interpret the Micro operations and Microprogramming for design of control unit of CPU. [K2]

CO 4: Develop Main Memory Interfacing Circuit and can apply various cache memory mapping techniques.

CO 5: Apply algorithms to perform arithmetic operations on binary representation of fixed point data [K3].

CO 6: Interpret various I/O interface devices [K2].

SYLLABUS:

UNIT - I

Introduction: Types of Computers, Functional units of Basic Computer (Block diagram of Micro Computer).

Register Transfer and Micro-operations: Register Transfer language, Register Transfer, Bus and memory transfers - Three-State Bus Buffers, Memory Transfer; Arithmetic micro operations, Binary Adder, Binary Adder _Subtractor, Binary Incrementer, Arithmetic Circuit; Logical micro operations- List of Logic Microoperations, Hardware Implementation, Some Applications; Shift micro operations-Hardware Implementation, Arithmetic logic shift unit.

UNIT - II

Basic Computer Organization and Design: Instruction codes – Stored Program Organization, Indirect Address, Computer Registers – Common Bus Systems, Computer instructions – Instruction Set Completeness, Timing and control, Instruction cycle – Fetch and Decode, Determine the Type of Instruction, Register Reference Instructions, Memory – Reference Instructions – AND to AC, ADD to AC, LDA :Load to AC,STA: Store AC, BUN: Branch Unconditionally, BSA: Branch and Save Return Address, ISZ: Increment and Skip if Zero, Control Flow Chart, Input – Output Instructions and Interrupt – Input – Output Configuration, Input-Output Instructions.

UNIT - III

Central Processing Unit: Instruction formats – Three Address Instructions, Two Address Instructions, One Address Instructions, Zero Address Instructions, RISC Instructions, Addressing modes – Numerical Example, Data Transfer and manipulation – Data Transfer Instructions, Data Manipulation Instructions, Arithmetic Instructions, Logical and Bit Manipulation Instructions, Shift Instructions, Program control – Status Bit Conditions, Conditional Branch Instructions, Subroutine Call and Return, Program Interrupt, Types of Interrupts, Reduced Instruction Set Computer – CISC Characteristics, RISC Characteristics.

Micro Programmed Control Unit: Control memory, Address sequencing – Conditional Branching, Mapping of Instructions, Subroutines, Micro program example – Computer Configuration, Microinstruction Format, Symbolic Microinstructions, The Fetch Routine, Symbolic Microprogram, Design of control unit – Microprogram Sequencer.

UNIT - IV

The Memory System: Memory Hierarchy, Main memory - RAM and ROM Chips, Memory Address Maps, Memory Connection to CPU, Auxiliary memory – Magnetic Disks, Magnetic Tape, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative Mapping, Direct Mapping, Set- Associative Mapping, Writing into Cache.

Computer Arithmetic: Addition and subtraction – Addition and Subtraction with Signed Magnitude Data, Hardware Implementation, Hardware Algorithm, Addition and Subtraction with Signed 2's Complement Data, Multiplication Algorithms –Booth Multiplication Algorithm

UNIT – V

Input-Output Organization: Peripheral Devices – ASCII Alphanumeric Characters, Input Output Interface – I/O Bus and Interface Modules, I/O vs Memory Bus, Isolated vs Memory Mapped I/O, Example of I/O Interface, Asynchronous data transfer – Strobe Control, Handshaking, Asynchronous Serial Transfer, Modes of Transfer – Example of Programmed I/O, Interrupt Initiated I/O, Priority Interrupts – Daisy Chaining Priority, Parallel Priority Interrupt, Priority Encoder, Interrupt Cycle, Direct memory Access – DMA Controller, DMA Transfer.

TEXT BOOKS:

1. M. Morris Mano, "Computer System Architecture", Third Edition, Pearson.2008

REFERENCE BOOKS:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", McGraw Hill, 5/e, 2002.
2. William Stallings, "Computer Organization and Architecture", Pearson 6/e, 2006.
3. Structured Computer Organization, Andrew S. Tanenbaum, Pearson, 4/e, 2005.
4. Sivarama P. Dandamudi, "Fundamentals of Computer Organization and Design", Springer, 2006

ADDITIONAL RESOURCES:

1. nptel.ac.in/courses/106106092
2. nptel.ac.in/courses/106103068

NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCI3LB01	**DATA STRUCTURES LAB (Common to CSE & IT)**						

COURSE OBJECTIVES:

- To teach efficient storage mechanisms of data for an easy access
- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

COURSE OUTCOMES:

After the completion of this course the student should be able to

CO 1: Analyze algorithms, Searching, Sorting and hashing Techniques [K4].

CO 2: Make use of elementary data structures such as stacks, Queues and linked list to develop their applications.

CO 3: Examine different tree traversal techniqes.

CO 4: Experiment with different graph traversal techniques.

LABORATORY EXPERIMENTS

WEEK - 1

a) Write a recursive Python program which computes the nth Fibonacci number, for appropriate values of n.

b) Write recursive Python programs for the following
    i)   Factorial of a given number
    ii) GCD Computation
    iii) Towers of Hanoi

WEEK - 2

a) Write a Python program that use both recursive and non-recursive functions to perform linear search.

b) Write a Python program that use both recursive and non-recursive functions to perform binary search.

WEEK - 3

a) Write a Python program to implement Bubble sort.

b) Write a Python program to implement Insertion sort.

c) Write a Python program to implement Selection sort.

WEEK - 4

a) Write a Python program to implement Quick sort.

b) Write a Python program to implement Merge sort.

c) Write a Python program to implement Heap sort.

WEEK - 5

a) Write a Python program to implement Stack operations using arrays

b) Write a Python program to implement Queue operation using arrays.

WEEK – 6
a)   Write a Python program to convert infix expression into postfix expression using Stack.
WEEK - 7
a)   Write a Python program to implement Stack operation using Linked list.
b)   Write a Python program to implement Queue operations using Linked lists.

WEEK - 8

Write a Python program to implement the following operations on a singly linked using functions
i)   Insertion
ii)   Deletion
iii)   Displaying
iv)   Reversing
WEEK - 9
a)   Write a Python program to store a polynomial expression in memory using linked list
b)   Write a Python program to representation the given sparse matrix using arrays.
WEEK - 10
a)   Write a Python program to implement following Operations on a Binary Tree
i)   Create
ii)   In-order traversal
iii)   Pre-order traversal
iv)   Post-order traversal
b)   Write a Python program to implement following Operations a Binary Search Tree
i)   Create
ii)   Insert
iii)   Delete
WEEK - 11
a)   Write a Python program to compute the shortest path of a graph using Dijkstra's algorithm
b)   Write a Python program to find the minimum spanning tree using Warshall's Algorithm.

WEEK - 12
    Virtual Lab: http://cse01-iiith.vlabs.ac.in/
    Any three programs must be submitted with result from the above link.

II B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCI3LB02	**FRONT END WEB TECHNOLOGIES LAB** **(Common to CSE & IT)**						

COURSE OBJECTIVES:

- This course provide students with theoretical and practical skills in the design and development of web pages using HTML5,CSS, JS and jQery.

COURSE OUTCOMES:

After Completion of this course, students would be able to:

CO 1: Develop static html pages [K3].

CO 2: Develop Interactive Web Pages with different styles and client side validations[K3].

CO 3: Make use of JQuery programming to develop Web pages [K3].

CO 4: Apply JQuery UI to HTML pages [K3].

LIST OF PROGRAMS:

Lab 1: Create the following web

1. Welcome.html

   It explain about website

   (Hint: Heading the website (Preferable H1, Describe website) it includes minimum two paragraphs)

2. Aboutus.html

   (Hint: About owner of website)

3. Contactus.html
4. List.html
   (Hint: Mention List of courses)

Lab 2:

a. Create web pages for each course. Example cse.html (Hint: It contains Heading and List of subjects in tabular form)
   Example

SNo	Title Book	Author	Publisher	Price	Image
--	--	--	--	--	--

b. Create Registration and Login forms

   Registration Form: It contains Student Name, Roll Number, Password, Gender, Email ID,
   Phone
   Number, opted course and languages known.
   Login Form: It contains roll number as User ID, password, submit button and cancel button.

Lab 3: Apply CSS 3 on web-pages created on Lab 1 and Lab2.
   Make use of the selectors like class, id, html elements, pseudo classes and elements

Lab 4:

a. Apply validation on Registration and Login forms.
b. In contactus.html web-page add Google maps.

Lab 5:

a. Design HTML5 web page by embedding Audio, Video elements.
b. Write HTML5 and JavaScript code to draw Arc, Circle, Rectangle and Triangle using Canvas.

Lab 6: Bootstrap Concepts on Grid System, Menus

Lab 7: Create index.html page and design it as shown in above screen (Hint: Use Bootstrap Grid
   System, Horizontal and vertical menus, footer, table etc.)

Lab 8: Write a jQuery code to make draggable Rectangle

Lab 9: Write jQuery code to demonstrate the usage of important options disabled, delay, distance
   and clone in the drag function of jQuery UI.

Lab 10: Write jQuery code to demonstrate three options addClass, disable and tolerance in the drop
   function of jQuery UI.

Lab 11: Write jQuery code to demonstrates the use of two options delay and distance of
   selectable() method.

Lab 12: Write jQuery code to demonstrate Accordion and Date Picker.

Lab 13: Virtual Lab : www.w3schools.com

II B.TECH ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCI3LB03	JAVA PROGRAMMING LAB						

COURSE OBJECTIVE:

- The course provides user interface and application development program implementation using core java principles.

COURSE OUTCOMES:

After completion of this course, the students will be able to

CO1 : Develop java programs by using OOP concepts [K3].

CO2 : Make use of interfaces, threads, applets in developinging JAVA programmes [K3].

CO3 : Make use of exception handling and collections in Java Programming[K3].

CO4 : Develop java components [K3].

LIST OF PROGRAMS:

1. Write a JAVA program to display default value of all primitive data types of JAVA.
2. Write a JAVA program to display the Fibonacci sequence
3. Write a JAVA program give example for command line arguments.
4. Write a JAVA program to sort given list of numbers.
5. Write a JAVA program to search for an element in a given list of elements (linear search).
6. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
7. Write a JAVA program to determine multiplication of two matrices.
8. Write a JAVA program to sort an array of strings
9. Write a JAVA program to check whether given string is palindrome or not.
10. Write a JAVA program to give the example for 'this' operator. And also use the 'this' keyword as return statement.
11. Write a JAVA program to demonstrate static variables, methods, and blocks.
12. Write a JAVA program using StringTokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
13. Write a JAVA program to give the example for 'super' keyword.
14. Write a JAVA program that illustrates simple inheritance.
15. Write a JAVA program to maintain Student Grading Database using multilevel inheritance. Student is Super class, which contains roll no, name, address. Marks derived from Student class, which contains subject names and respective marks. Result is derived from Marks class, which contains total, grade.
16. Write a JAVA program demonstrating the difference between method overloading and method overriding.
17. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.
18. Write a JAVA program that describes exception handling mechanism.
19. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
20. Write a JAVA program for creation of user defined exception.
21. Write a JAVA program to illustrate creation of threads using runnable interface (start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).

22. Write a JAVA program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.
23. Write a JAVA program illustrating multiple inheritance using interfaces.
24. Write a JAVA program to create a package named pl, and implement this package in Ex class.
25. Write a JAVA program to create a package named mypack and import it in Circle class.
26. Write a JAVA program to create an abstract class named Shape, that contains an empty method named numberOfSides ().Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method numberOfSides (), that contains the number of sides in the given geometrical figure.
27. Write a JAVA program that describes the life cycle of an applet.
28. Write a JAVA program to create a border layout control.
29. Write a JAVA program to create a grid layout control.
30. Write a JAVA program to create a simple calculator.
31. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
32. Write a JAVA program that displays number of characters, lines and words in a text file.
33. Write a JAVA program that allows user to draw lines, rectangles and ovals.
34. Write a Java Program to Implement HashMap API.
35. Write a Java Program to Implement HashSet API.
36. Write a Java Program to Implement ArrayList API.
37. Write a Java Program to Implement TreeSet API.
38. Write a Java Program to Implement TreeMap API.
39. Virtual Lab: http://ps-iiith.vlabs.ac.in/, www.w3schools.com

Any three programs must be submitted with result from the above link.

II B.TECH. – II SEMESTER

S.No	SUBJECT	Cat. Code	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	L	T	P	CREDITS
1	Database Management Systems	PC	40	60	100	2	1	-	3
2	Formal Languages and Automata Theory	PC	40	60	100	3	-	-	3
3	Design and Analysis of Algorithms	PC	40	60	100	3	-	-	3
4	Software Engineering	PC	40	60	100	3	-	-	3
5	Open Elective -I	OE	40	60	100	3	-	-	3
6	Mobile Applications Development Lab	PC	20	30	50	-	-	3	1.5
7	English Communication Skills Lab - II	HS	20	30	50	-	-	3	1.5
8	Data Base Management Systems Lab	PC	20	30	50	-	-	3	1.5
9	QAR	MC	-	-	-	3	-	-	0
Total			**260**	**390**	**650**	**17**	**1**	**9**	**19.5**

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	1	-	40	60	100	3
SUBCODE: 19BCI4TH01	DATABASE MANAGEMENT SYSTEMS (Common to CSE & IT)						

COURSE OBJECTIVE:

- Provides students with theoretical knowledge and practical skills in the design, use of databases and database management systems in information technology applications

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1 : Interpret the fundamentals of DBMS [K2].

CO2 : Analyze DB design methodology and normalization process [K4].

CO3 : Develop Queries in RDBMS [K3].

CO4 : Compare and Contrast various transaction and concurrency management techniques [K2].

CO5 : Analyze various file organizations and indexing techniques [K4].

SYLLABUS:

UNIT - I

Introduction: Database system, Characteristics - Database vs. File System; Database Users - Actors on Scene, Workers behind the scene; Advantages of Data base systems, and Database applications. Brief introduction of different Data Models Hierarchical, Network and Relational; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system Environment, Centralized and Client Server architecture for the database.

UNIT - II

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, Key constraints - Key constraints for Ternary Relationships, participation constraints, class hierarchies, Aggregation; sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values - Comparisons Using Null Values, Logical Connectives AND, OR, and NOT, Impact on SQL Constructs, Disallowing Null Values; Integrity constraints in SQL - Domain constraints, Entity constraints, Referential integrity constraints, Assertions.

UNIT - III

Basic SQL: Form of a basic SQL Query, Examples of Basic SQL Queries, Expressions and Strings in the SELECT Command, Simple Database schema, data types, table definitions, different DML operations, basic SQL querying using where clause, arithmetic & logical operations, SQL functions - Date and Time, Numeric, String conversion.

SQL : Creating tables with relationship, implementation of key and integrity constraints, nested queries, correlated Nested Queries, set-Comparison Operators, sub queries, grouping, aggregate operators, ordering, implementation of different types of joins, view - updatable and non-updatable; relational set operations, SQL constructs that grant access or revoke access from user or user groups.

UNIT - IV

Schema Refinement (Normalization): Problems Caused by Redundancy, Decompositions, Problems Related to Decomposition, Functional dependency, Properties of Functional dependency, Normal forms based on functional dependency - 1NF, 2NF and 3NF, concept of surrogate key, Boyce-Codd normal formBCNF, 4NF; Properties of Decompositions - Lossless join decomposition and dependency preserving decomposition.

UNIT - V

Transaction Management and Concurrency Control: Transaction - Single-User versus Multiuser Systems; Transactions, Database Items, Read and Write Operations, Transaction States and Additional Operations, The System Log, Commit Point of a Transaction, properties of transactions, Characterizing Schedules Based on Serializability ; Lock based Concurrency Control ; Concurrency Control Based on Timestamp Ordering .

Indexing Files:, Files of Unordered Records (Heap Files), Files of Ordered Records (Sorted Files), Types of Single-Level Ordered Indexes - Primary Indexes, Clustering Indexes, Secondary Indexes; Multilevel Indexes, Dynamic Multilevel Indexes Using B+Trees.

TEXT BOOKS:

1. Raghuram Krishnan, Johannes Gehrke , "Database Management Systems", TMH, 3/e, , 2003.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", PEA, 6/e, 2010,

REFERENCE BOOKS:

1. Silberschatz, Korth, "Database System Concepts". TMH, 5/e, 2006.
2. C J Date, "Introduction to Database Systems", PEA, 8/e, 2006.
3. NarainGehani, "The Database book principles & practice using Oracle/MySql", University Press, 2006.

ADDITIONAL RESOURCES:

1. nptel.ac.in/courses/106106093
2. nptel.ac.in/courses/106104135

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCI4TH02	**FORMAL LANGUAGES AND AUTOMATA THEORY (Common to CSE & IT)**						

COURSE OBJECTIVE:
- Introduce concepts in automata theory and theory of computation.
- Identify different formal language classes and their relationships.
- Design grammars and recognizers for different formal languages.
- Prove or disprove theorems in automata theory using its properties.
- Determine the decidability and intractability of computational problems.

COURSE OUTCOMES:
After completion of this course, the students would be able to
CO1: Interpret the core concepts relating to the theory of computation, formal languages, Regular Expressions[K2].
CO2: Analyze the functioning of Finite-State Machines, Pushdown Automata and Turing Machines to solve problems [K4].
CO3: Build grammars and Normal forms for given grammars for different language classes and able to prove and disprove theorems establishing key properties of formal languages and automata[K3].
CO4: Identify formal language classes and their membership properties[K2].

SYLLABUS:
UNIT - I
Fundamentals of Automata: Computation, Finite State Machine, Examples Finite State Automata, Components of Finite State Automata, Elements of Finite State System, Mathematical representation of Finite State Machine, Automata in Real World - Advantages of FSM, Disadvantages of FSM, Applications of FSM.
Formal Language Theory: Symbols, Alphabets and Strings, Operations on Strings, Formal Languages, Operations on Languages.
Formal Languages / Grammar Hierarchy: Formal Grammar, Generative Grammars, Types of Generative Grammar, Formal Languages, Regular Language, Context-Free Language, Context- Sensitive Language, Recursive Language, Recursively Enumerable Language, Relationship between Grammars and Languages.

UNIT – II
Finite Automata: Introduction, Deterministic Finite Automata, Design of DFAs, Non Deterministic Finite Automata, Design of NFAs, Non-Deterministic Automata with ϵ-moves, Design of NFA- ϵ s, Advantages of Non-Deterministic Finite automata, NFA Versus DFA. **Equivalent Automata:** Equivalent Finite-State Automata, Equivalence of NFA/NFA- ϵ and DFA, Equivalence of NFA - ϵ to NFA.
Transducers: Introduction, Moore Machine, Design of a Moore Machine, Mealy Machine Design of a Mealy Machine; Difference between Moore and Mealy Machines, Properties / Equivalence of Moore and Mealy Machines.

UNIT - III

Minimization/ Optimization of DFA: Optimum DFA, Minimal DFA, 2DFA, DFA vs. 2DFA. **Regular Expressions and Languages:** Regular Languages, Regular Expressions, Components of Regular Expression, Languages Associated with Regular Expression, Properties of Regular Expressions, Uses of Regular Expressions.

Finite Automata and Regular Expressions: Properties of Regular Sets or Regular Languages, Arden's Theorem, Equivalence of Finite Automata and Regular Expressions, Cycle of Constructions, Equivalence of DFA and Regular Expressions, Equivalence of NFA And Regular Expressions.

UNIT – IV

Context-Free Grammars and Context-Free Languages: Types of Grammar, Ambiguous and Unambiguous Grammars, Relation between Regular Grammar and Finite Automata**.**
Simplification of Context - Free Grammar: Simplification of Context-Free Grammars, Elimination of ϵ - Productions, Elimination of Unit Productions, Normal Forms for Context Free Grammars, Chomsky Normal Form, Greibach Normal Form, Chomsky Vs. Greibach Normal Form, Application of Context-Free Grammars.
Push Down Automata: Definition, Model, Graphical notation, and Instantaneous descriptions, Acceptance of context free languages, Acceptance by final state and acceptance by empty Stack.

UNIT - V

Turing Machine: Introduction, Components of Turing Machine, Description of a Turing Machine, Observations on TM, Elements of TM, Instantaneous description of TM, Moves of a TM, Language accepted by a TM, Role of TM's, Design of TM's, Undecidable Problem, P and NP Classes of Languages.

TEXT BOOKS:

1. Nasir S.F.B, P.K. Srimani, "A Text Book on Automata Theory", 1/e, Foundation Publications Cambridge University Press, 2014. (UNITS: I, II, III, IV,V).

2. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and computation", 3/e, PEA, 2009. (UNIT-IV)

REFERENCE BOOKS:
1. Shamalendu Kandar, "Introduction to Automata Theory, Formal Languages and Computation", 1/e, Pearson, 2013.
2. Michel Sipser, "Introduction to Theory of Computation", 2/e, , CENGAGE, 2007.

ADDITIONAL RESOURCES:
1. nptel.ac.in/courses/106104028
2. nptel.ac.in/courses/106104148

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCS4TH03				**DESIGN AND ANALYSIS OF ALGORITHMS** (Common to CSE & IT)			

COURSE OBJECTIVES:

- To analyze the asymptotic performance of algorithms.
- To write rigorous correctness proofs for algorithms.
- To demonstrate a familiarity with major algorithms and data structures.
- To apply important algorithmic design paradigms and methods of analysis.
- To synthesize efficient algorithms in common engineering design situations.

COURSE OUTCOMES:

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

CO 1: Apply asymptotic notations to measure the performance of algorithms [K3]

CO 2: Apply divide-and-conquer paradigm when an algorithmic design situation calls for it [K3].

CO 3: Identify all feasible solutions to get optimal solutions using greedy method [K3].

CO 4: Apply dynamic-programming approach, to solve real world problems [K3].

CO 5: Apply fundamental graph traversal techniques to solve various applications using Backtracking [K3].

CO 6: Analyse least cost and FIFO branch and bound paradigms [K4].

SYLLABUS:

UNIT-I

Introduction: Algorithm Specification, Performance Analysis -Space complexity, Time complexity, Asymptotic Notations (Big-oh notation, Omega notation, Theta notation).

UNIT-II

Divide and Conquer: General method, Binary search, Merge sort, Quick sort, Strassen's matrix multiplication.

UNIT-III

Greedy method: General method, Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Single source shortest paths.

UNIT-IV

Dynamic Programming: The General method, All pairs shortest path problem, Optimal binary search trees, 0/1 knapsack, Reliability design, The Travelling sales person problem, Matrix-chain multiplication.

UNIT-V

Backtracking: The General method, N-Queen problem, Sum of subsets, Graph coloring, Hamiltonian cycles.

Branch and Bound: The method, 0/1 knapsack problem, Travelling sales person problem.

TEXT BOOK:

1. Fundamentals of Computer Algorithms, Second Edition – Ellis Horowitz, Sartaj Sahni and rdSanguthevar Rajasekaran, Universities Press.

REFERENCE BOOKS:

1. S. Sridhar, Oxford,   Design and Analysis of Algorithms, First Edition –.

2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein , Introduction to Algorithms, second edition, ,   PHI Pvt.Ltd.

3. Parag Himanshu Dave, Himanshu Bhalchandra Dave , Design and Analysis of Algorithms, Second Edition –, Pearson Education.

4. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman , Design and Analysis of Computer Algorithms –, Pearson Education.

5. Anany Levitin , Introduction to the Design and Analysis of Algorithms, Third Edition –, Pearson Education.

ONLINE REFERENCES:

1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html

2. https://www.coursera.org/learn/algorithms-divide-conquer

3. http://nptel.ac.in/courses/106101060/

4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/index.html

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	40	60	100	3
SUBCODE: 19BCS4TH04	**SOFTWARE ENGINEERING**						

COURSE OBJECTIVE:

- The student will have a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

COURSE OUTCOMES:

After completion of this course, the students will be able to

CO1 : Compare and contrast basic software engineering methods and practices. [K2].

CO2 : Analyze the project management essentials [K4].

CO3 : Analyze the software process models. [K4].

CO4 : Outline the importance of software testing and quality control approaches [K2].

SYLLABUS:

UNIT - I

Introduction to Software Engineering: Software-Software classification, Engineering Discipline; Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies - exploratory, structured, data structure, object oriented, component based development; Software Engineering Challenges- problem understanding, quality and product, cycle time and cost, reliability, change and maintenance, usability and reusability, repeatability and process maturity, estimation and planning.

Software Processes: Software Process- software process model, elements of software process, characteristics of software process; Phased development life cycle- phased life cycle activity; Software Development Process Models- classical waterfall model, iterative waterfall, prototyping, incremental, spiral, agile process, RUP process model.

UNIT - II

Requirements Engineering: Software Requirements- business, user, system, functional and nonfunctional; Requirements engineering Process, Requirements elicitation-fact finding techniques; Requirements Analysis, Structured Analysis - data flow diagram, data dictionary, Structured analysis, pros and cons of structured analysis; Prototyping Analysis- throwaway, evolutionary; Requirements Specification- characteristics, components, structure, requirement specification methods; Requirements Validation- review, inspection, test case generation, reading, prototyping; Requirements Management.

UNIT - III

Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles- abstraction, information hiding, functional decomposition, design strategies, modularity; Modular Design- coupling, cohesion; Design Methodologies- function oriented design, object oriented design; Structured Design- structure chart, structure vs flow chart; Structured Design Methodology- review and refine data flow diagram, identify boundaries between input process and output segments, apply design principles modularization criteria.

UNIT - IV

Implementation: Coding Principles- information hiding, structure programming, max cohesion and min coupling, code reusability, kiss, simplicity extensibility , code verification, code documentation; Coding Process- traditional coding process, test driven development.

Software Testing: Testing Fundamentals- errors, faults, failures, cost of defects, testing process, role of software testers; Test Planning- create a test plan, design test cases, test stubs and test drivers, test case execution, test summary report, defect tracking and statistics; Black Box Testing- equivalence class partitioning, boundary value analysis, cause effect graphing, error guessing; White Box Testing- control flow based, path, data flow based, mutation; Levels of Testing- unit, integration, system, acceptance.

UNIT - V

Project Planning and Estimation: Project Planning activities, Software Metrics and measurements, Project Size Estimation - lines of code, functional point analysis; Effort Estimation Techniques- COCOMO cost models, analytical estimation.

Software Quality: software quality concept, Software Quality Factors, Verification & Validation, Software Quality Assurance- SQA activities, SQA plan; Capability Maturity Model (CMM) - SEI-CMM vs ISO standard.

TEXT BOOKS:

1. Ugrasen Suman, "Software Engineering, concepts and practices", Cengage learning, 1/e, 2015.

REFERENCE BOOKS:

1. W S Jawadekar, "Software Engineering principles and practice", TMH, 2006
2. Sommerville, "Software Engineering", 8/e, , Pearson.
3. Roger S. Pressman, "Software Engineering", 7/e, TMH

ADDITIONAL RESOURCES:

1.   nptel.ac.in/courses/106101061

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCS4LB03	**MOBLILE APPLICATION DEVELOPMET LAB**						

COURSE OBJECTIVES:

- To enlighten the student with knowledge base in Android Applications Development.

COURSE OUTCOMES:

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

CO1 : Demonstrate various components of Android Framework.[K2].

CO2 : Develop user Interfaces for the Android Application.[K3].

CO3 : Develop Android Applications using Android API and Services.[K3].

CO4 : Develop Android Applications which access data from Internet.[K3].

LIST OF EXPERIMENTS

1. Create Hello World Android App using **Android Studio** and explain each step in detail.
2. Create an Activity that receive name form the user and displays **Hello Name** to the user using Android Studio.
3. Create an Activity that demonstrates the Life Cycle of an Activity.
4. Create an Android Application which receives URL form the user and open appropriate page in the system browser with the help of Implicit Intents using Android Studio.
5. Create an Android App which receives name form the user and displays welcome name in Second Activity.
6. Create Login Screen Application which shows Home screen if Login success otherwise displays error message using Android Studio.
7. Write an Android application program that demonstrate the use of
   a. RelativeLayout.
   b. LinearLayout.
   c. GridLayout.
   d. TableLayout.
8. Write an Android application program that demonstrates the use ImageView.
9. Write an Android application program that demonstrates the use of ListView and ArrayAdapter.
10. Write an Android application program that demonstrates how to create Custom ListView and Custom Adapters.
11. Write an Android application program that demonstrates the use of SQLite Database and Cursor.
12. Write an Android application program that demonstrates the use AsyncTask.
13. Write an Android application program that demonstrates Notifications.
14. Write an Android application program that demonstrates Shared Preferences.
15. Write an Android application program that connect to the internet, gets JSON data and displays the result in UI by parsing JSON data.

ONLINE REFERENCES:

1. https://developer.android.com/index.html
2. http://nptel.ac.in/courses/106106147/10
3. https://www.edx.org/course/introduction-mobile-application-hkustx-comp107x-2
4. https://www.coursera.org/specializations/android-app-development

II B.TECH IV SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC4LB01			**ENGLISH COMMUNICATION SKILLS LAB-II** (Common to All Branches)				

II B.TECH IV SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCC4LB01	**ENGLISH COMMUNICATION SKILLS LAB-II** (Common to All Branches)						

COURSE OBJECTIVES:

- To train the students to use language effectively in various professional interactions like Group Discussions, Public Speaking, Presentations and Interviews.
- To make the students understand the importance of body language.
- To provide exposure to students to soft skills like Goal Setting, Assertiveness, Time Management, Positive Attitude and Stress Management
- To expose the students to variety of a self-instructional, learner friendly, electronic media and stimulate intellectual faculties/resources

COURSE OUTCOMES:

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

CO 1: Know the importance of Non-verbal communication and interpret nonverbal symbols.

CO 2: Make formal presentations using strategies.

CO 3: Participate in Group Discussions using analytical and problem solving skills effectively.

CO 4: Face job interviews confidently for employability.

UNIT– I

Body Language

UNIT–II

Presentation Skills

UNIT–III

Group Discussions

UNIT-IV

Interviews and Telephonic Interviews

UNIT-V

Debates

TEXT BOOKS:

1. *"Strengthen Your Communication Skills",* Maruthi Publications, 2013.

REFERENCE BOOKS:

1. *"Personality Development and Soft Skills"*, Oxford University Press, New Delhi.
2. M Ashraf Rizvi, *"Effective Technical Communication skills"*, McGraw-Hill, 2005.
3. Barun K Mitra, *"Personality Development and Soft Skills",* Oxford University Press, 2011.
4. Konar N, *"Communication Skills for Professionals",* PHI Learning Private Limited, 2011.

*****

II B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	20	30	50	1.5
SUBCODE: 19BCI4LB02			**DATABASE MANAGEMENT SYSTEMS LAB (Common to CSE & IT)**				

COURSE OUTCOMES:

After Completion of this course student must be able to

CO1 : Apply SQL commands like DDL,DML,DCL to perform different Database operations [K3].

CO2 : Develop PL/SQL block statements, control statements and cursors [K3].

CO3 : Develop PL/SQL programs using functions and procedures [K3].

CO4 : Develop PL/SQL programs using packages and Triggers [K3].

PROGRAMS LIST:

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date).

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
   Example:- Select the roll number and name of the student who secured fourth rank in the class.

5. i)Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
   ii)Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

TEXT BOOKS:

1. SCOTT URMAN, "ORACLE DATA BASE LOG PL/SQL Programming", Tata Mc-Graw Hill.

REFERENCES:

1. Benjamin Rosenzweig, Elena Silvestrova "ORACLE PL/SQL by example", Pearson Education 3/e
2. Dr.P.S. Deshpande, "SQL & PL/SQL for Oracle 10g", Black Book
3. Pranab kumar Das Gupta, P Radha Krishna, "Data Base Management System, Oracle SQL and PL/SQL" , PHI

II B.Tech II -SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	--	--	--	0
SUBCODE: 19BCC4MC02	**QUANTITATIVE APTITUDE AND REASONING**

COURSE OBJECTIVES:
- To train students in analyzing real life scenarios considering all factors
- To educate the students on principles of mathematical problems and problem solving methods
- To train students for campus placements
- To make students adept in applying appropriate logic and shortcuts to solve the problems in the least possible time.

COURSE OUTCOMES:
After thorough learning of Quantitative Aptitude and Reasoning, a student:

CO 1: Will be able to prepare well for clearing Quantitative Aptitude and Reasoning tests for campus placements

CO 2: Will be able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.

CO 3: Will be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

SYLLABUS FOR QUANTITATIVE APTITUDE
UNIT I: Simple equations, Ratio, Proportion, and Variation
1. **Simple equations**
   a. Definition of Linear Equations
   b. Formation of simple equations
   c. Problems on Ages, Fractions and Digits
   d. Indeterminate system of equations
   e. Special cases in indeterminate system of equations
2. **Ratio and proportion**
   a) Definition of Ratio
   b) Properties of Ratios
   c) Comparison of Ratios
   d) Problems on Ratios
   e) Compound Ratio
   f) Problems on Proportion, Mean proportional and Continued Proportion

3. **Variation**
   a) Direct variation
   b) Inverse variation
   c) Joint variation
   d) Problems on Variations

UNIT II: Percentages, Partnership.
 1. **Percentages**
   a) Introduction
   b) Converting a percentage into decimals
   c) Converting a Decimal into a percentage

    d) Percentage equivalent of fractions
    e) Problems on percentages
2. Partnership
    a) Introduction
    b) Relation between capitals, Period of investments and Shares

Unit III: Profit And Loss
    a) Problems on Profit and Loss percentage
    b) Relation between Cost Price and Selling price
    c) Discount and Marked Price
    d) Two different articles sold at same Cost Price
    e) Two different articles sold at same Selling Price
    f) Gain% / Loss% on Selling Price

SYLLABUS FOR REASONING

UNIT III: Deductions & Connectives
1. Deductions
    a) Finding the conclusions using Venn diagram method
    b) Finding the conclusions using syllogism method
2. Connectives
    a) Definition of a simple statement
    b) Definition of compound statement
    c) Finding the Implications for compound statements
    d) Finding the Negations for compound statements

UNIT IV: Analytical Reasoning puzzles
    a) Problems on Linear arrangement
    b) Problems on Circular arrangement
    c) Problems on Double line-up
    d) Problems on Selections
    e) Problems on Comparisons

UNIT IV: Clocks, Calendars & Blood relations
1. Clocks
    a) Finding the angle when the time is given
    b) Finding the time when the angle is known
    c) Relation between Angle, Minutes and Hours
    d) Exceptional cases in clocks
2. Calendars
    a) Definition of a Leap Year
    b) Finding the number of Odd days
    c) Framing the year code for centuries
    d) Finding the day of any random calendar date
3. Blood relations
    a) Defining the various relations among the members of a family
    b) Solving Blood Relation puzzles
    c) Solving the problems on Blood Relations using symbols and notations

TEXT BOOKS:
1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand , 'A modern approach to Logical reasoning'
3. R S Agarwal, S Chand, 'Quantitative Aptitude'
4. Quantitative Aptitude - G. L BARRONS
5. Quantitative Aptitude - Abhijit Guha Mc Graw Hills

REFERENCES:
1. www.careerbless.com/aptitude/qa/home.php
2. www.affairscloud.com/quantitative-aptitude-questions
3. www.careerafter.com/rs-aggarwal-quantitative-aptitude-pdf/
4. www.amazon.in/Quantitative-Aptitude-Competitive-Examinations.../8121924987
5. www.indiabix.com
6. www.practiceaptitudetests.com/numerical-reasoning-tests