Bapatla Engineering College

(Autonomous)

B.Tech

Information Technology

Curriculum Effective from A.Y. 2020-21
(R20 Regulation)

Bapatla Engineering College :: Bapatla

(Autonomous under Acharya Nagarjuna University)
(Sponsored by Bapatla Education Society)
BAPATLA - 522102 Guntur District, A.P., INDIA
www.becbapatla.ac.in

Contents

Vision & Mission of the College

Vision:

To build centers of excellence, impart high quality education and instill high standards of ethics and professionalism through strategic efforts of our dedicated staff, which allows the college to effectively adapt to the ever changing aspects of education.

To empower the faculty and students with the knowledge, skills and innovative thinking to facilitate discovery in numerous existing and yet to be discovered fields of engineering, technology and interdisciplinary endeavors.

Mission:

Our Mission is to impart the quality education at par with global standards to the students from all over India and in particular those from the local and rural areas. We continuously try to maintain high standards so as to make them technologically competent and ethically strong individuals who shall be able to improve the quality of life and economy of our country

Vision & Mission of the Department

Vision:

To provide and protect an environment that features, ”IT Abundance”; Wherein IT infrastructure, services, and solutions are innovatively designed and are made available to provide good support to students, faculty and staff in their endeavors to uphold the College mission.

Mission:

1. Catering to the needs of students by providing good infrastructure and by imparting skills relevant to the IT industry.
2. To motivate students and faculty members towards self-learning to acquire knowledge about emerging technologies in the IT industry.
3. Promoting research that leads to innovative projects using cutting-edge technology for the benefit of the society.
4. To inculcate team spirit, leadership qualities and ethics among the students and the staff.

B.Tech Regular Four Year Degree Programme

(For the batches admitted from the Academic Year 2020 - 21)

Preliminary Definitions and Nomenclature

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as Autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Acharya Nagarjuna University, Guntur).

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., one odd and one even.

Branch: Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Backlog Course: A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.

Commission: Means University Grants Commission (UGC), New Delhi.

Choice Based Credit System: The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Certificate Course: It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Internal Examination: It is an examination conducted towards sessional assessment.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

Detention in a Course: Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means Bapatla Engineering College, Bapatla, unless indicated otherwise by the context.

Massive Open Online Courses (MOOC): MOOCs inculcate the habit of self-learning. MOOCs would be additional choices in all the elective group courses.

Minor: Minors are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

Pre-requisite: A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, UG degree program: Bachelor of Technology (B.Tech).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research-based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

Registration: Process of enrolling into a set of courses in a semester of a program.

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as "BEC Regulations – R20" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally 90 working days. Odd semester commences usually in July and even semester in December of every year.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioural.

University: Means Acharya Nagarjuna University, Guntur.

Academic Regulations

(Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the Batches admitted from the academic year 2020-21)

1. **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. Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility, this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation. A lateral entry student pursues a course of study for not less than three academic years and in not more than six academic years

   ii. Registers for 160 credits and secures all 160 credits. However, a lateral entry student registers for 121 credits and secures all the 121 credits from III semester to VIII semester of Regular B. Tech. program.

   iii. The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits

   iv. A student will be permitted to register either for Honours degree or additional minor engineering but not both.

2. 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. A lateral entry student should complete the course within six academic years from the year of their admission, failing which his/her admission in B.Tech course stands cancelled

3. **Courses of study**

   The following courses of study are offered at present as specializations for the B. Tech. course

S.No.	Title of the UG Programme	Abbreviation
1.	Civil Engineering	CE
2.	Computer Science & Engineering	CS
3.	Electrical & Electronics Engineering	EE
4.	Electronics & Communication Engineering	EC
5.	Electronics & Instrumentation Engineering	EI
6.	Information Technology	IT
7.	Mechanical Engineering	ME
8.	Cyber Security	CB
9.	Data Science	DS

4. **Credits:**

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) 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 in a semester is assigned certain number of credits based on following

Course Type	Hours / Week	Credits
Theory	3	3
Tutorial	1	1
Practical	3	1.5
Internship (At the end of IV & VI evaluated in V & VII resp.)	-	1.5/3.0
Project work	-	12

5. **Course Structure**

Every course of the B.Tech program will be placed in one of the 8 categories with suggested credits as listed below.

S.No.	Category	Category Description	Abbreviated Category	Credits
1	Humanities and social science	Humanities and social science including Management courses	HS	10.5
2	Basic Sciences	Basic Science courses	BS	21
3	Engineering Science courses	Engineering Science Courses including workshop, drawing, basics of electrical / mechanical / computer etc.	ES	24
4	Professional core	Professional core Courses	PC	51
5	Open Electives	Open Elective Courses- from other technical / emerging and job oriented	OE	12
6	Professional Courses	Professional Elective Courses relevant to chosen specialization / branch	PE	18
7	Project Work	Project Work, Seminar, Internship in industry elsewhere	PW	16.5
8	Mandatory courses	Environmental Studies, Induction training, Universal human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge (Non-Credit)	MC	0
9	Skill Oriented Courses	Skill Oriented Courses relevant to domain, interdisciplinary, communication skill, industry	SC	10
Total Credits				160

6. Weightage for course evaluation

6.1 Course Pattern

- The entire course of study is for four academic years. Semester pattern shall be followed in all years.
- A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.
- When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

6.2 Evaluation Process

- The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded.
- The performance of a student in each course is assessed with alternate assessment methods, term examinations on a continuous basis during the semester called Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester, except where stated otherwise in the detailed Scheme of Instruction.
- The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Internships carried out after IV Semester & VI Semester shall be evaluated for 100 marks each and the Internship along with Project Work carried out in VIII Semester shall be evaluated for 150 marks. For theory subjects, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination. For practical subjects, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination. For project work, the distribution shall be 50 marks for Internal Evaluation and 100 marks for the End-Examination / Viva-Voce. The distribution of marks between Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to be conducted at the end of the semester will be as follows:

Nature of the course	**CIE**	**SEE**
Theory subjects	30	70
Drawing	30	70
Practical	30	70
Summer / Industrial / Research Internship	-	100
Project work	50	100

6.3 **Continuous Internal Evaluation (CIE) in Theory subjects:**

6.3.1 In each Semester there shall be two Term examinations and some **Alternate Assessment Tools (AAT)** like Home Assignment, Class Test, Problem Solving, Group Discussion, Quiz, Seminar and Field Study in every theory course. The Alternate Assessment Tools with detailed modality of evaluation for each course shall be finalized by the teacher concerned before beginning of the course. It will be reviewed and approved by the Department Committee.

The Term Examination is conducted in the regular mode according to a schedule which will be common for a particular year of study. The maximum weightage for Term Examinations, AATs and the calculation of marks for CIE in a theory course is given in the following table.

Particulars	**Term Exams (Max. 20 marks)**	**AAT (Max. 10 marks)**
Better Performed exam	75% of marks obtained	Continuous assessment by teacher as per the predetermined course delivery & assessment plan. (Minimum two and maximum four assessments) AAT marks shall be considered based on average of all tests conducted.
Other exam	25% of marks obtained	

A minimum of 15 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as qualified in that course and eligible to write the SEE of that course. If a student fails to obtain 15 marks in CIE, he can register for the course repetition as per the guidelines mentioned in 6.5.

6.3.2 **Semester End Examination (SEE) in Theory and Design courses:**

a) For each theory or design course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester for 70 marks, except where stated otherwise in the detailed Scheme of Instruction. Question paper setting shall be set by the teacher or teachers together in a multi section courses and are to be verified as described in policy document.

b) A minimum of 25 (Approx. 35%) marks are to be secured exclusively in the Semester End Examination (SEE) of theory or design course. However a minimum 40 marks are to be secured in CIE & SEE together for the award of the grade and securing the credits in that course.

6.3.3 **Continuous Internal Evaluation (CIE) in laboratory courses:**

The evaluation for Laboratory course is based on CIE and SEE. The CIE for 30 marks comprises of 15 marks for day to day laboratory work, 5 marks for record submission and 10 marks for a laboratory examination at the end of the semester. In any semester, a minimum of 90 percent of prescribed number of experiments / exercises specified in the syllabi for laboratory course shall be taken up by the students. They shall complete these experiments / exercises in all respects and get the record certified by the internal lab teacher concerned and the Head of the Department concerned to be eligible to appear for the Final Examination in that laboratory course.

A minimum of 15 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as qualified in that lab course and eligible to write the SEE of that lab course. If a student fails to obtain 15 marks in CIE, he can register for the course repetition as per the guidelines mentioned in 6.5.

6.3.4 **Semester End Examination (SEE) in laboratory courses:**

a) For each laboratory course, the Semester End Examination (SEE) shall be conducted by one internal and one external examiner appointed by the Principal and the duration of the exam shall be for three hours. The SEE is for 70 marks which include 15 marks for write up, 35 marks for lab experiment/exercise, 15 marks for Viva-voce and 5 marks for general impression.

b) A minimum of 25 (approx. 35%) marks are to be secured exclusively in the Semester End Examination (SEE) of laboratory course. However a minimum 40 marks are to be secured in CIE & SEE together for the award of the grade and securing the credits in that course.

6.3.5 **Evaluation of Summer Internship and Industrial/Research Internship:**

a) Summer Internship at the end of IV semester and Industrial/Research Internship at the end of VI carried out in industry are to be evaluated in V & VII semesters respectively based on the report and certificate provided by the industry. The report and certificate will be evaluated by the department committee for 100 marks. 50 marks shall be for the report and certificate and 50 marks based on seminars/presentation to the department committee by the student.

b) A minimum of 40 (40%) marks are to be secured exclusively to be declared as passed and securing the credits in the internships.

6.3.6 **Evaluation of the Project**

a) In case of the Project work, the evaluation shall be based on CIE and SEE. The CIE for 50 marks consists of a minimum of two Seminars / presentations for 20 marks and the Project Report submitted at the end of the semester which is evaluated for 30 marks.

b) A minimum of 25 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as passed in the Project Work and eligible to write the SEE in the Project Work.

c) SEE shall be evaluated in the form of a Viva- voce and the demonstration of the thesis work for 100 marks. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the Principal.

d) A minimum of 40 (40%) marks shall be obtained in SEE exclusively in order to be declared as passed in the Project and for the award of the grade.

NOTE : A student who is absent for any Test / Exam / Seminar / Presentation as a part of Continuous Internal Evaluation (CIE), for any reason whatsoever, shall be deemed to have scored zero marks in the respective component and no provision for make-up shall be provided.

6.4 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the mandatory course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 50% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

6.5 **Course Repetition (Repeater course)**

The students not qualified to write SEE in a course may register for the repeater courses through course repetition and summer semester. The students have to apply to the Principal through the respective HOD by paying prescribed fees.

Course repetition: A student can take up a maximum of two theory courses in a semester immediately after the semester end examinations of that particular semester in accordance with the guidelines recommended by the Academic Council. The students who are not taking regular semester courses may additionally register for one more theory course.

Summer semester: Further the students can register maximum three (theory + lab courses together) courses in the summer semester. Summer semester courses shall be of both even &

odd semesters. Summer semester shall be conducted immediately after completion of even semester end examinations.

The HODs concerned have to allot a teacher related to that course to conduct class work. The minimum number of periods to be conducted should not be less than 75% of the total prescribed periods for that course. The classes will be conducted in the vacation period or in the weekends or in the afternoons as decided by the HOD concerned. Teacher has to evaluate the student for his performance in CIE as per the autonomous norms and the qualified students should appear for a semester end examination. The pass criteria in both CIE & SEE should be as per autonomous norms.

The documents for monitoring the candidates registered for course repetition are available with the Heads of the Departments and Exam Section.

6.6 There shall be five Professional Elective Courses from V Semester to VII and for each elective there shall be choices such that the student shall choose a course from the list of choice courses offered by the department for that particular elective.

6.7 There shall be four Open Electives/ Job Oriented Courses common to all disciplines from V Semester to VII, where in the students shall choose the electives offered by various departments including his/her own department in such a manner that he/she has not studied the same course in any form during the Programme.

The students shall be permitted to pursue up to a maximum of two elective courses (either Professional Elective Courses in clause 6.6 or Open Electives/ Job Oriented Courses in clause 6.7) under MOOCs (Massive Open Online Courses) offered by NPTEL and other reputed organizations as notified by the Department during the semester. Each of the Courses must be of minimum 8 weeks in duration. The student has to acquire a certificate for the concerned course from the agency during the semester only in order to earn the credits for that course.

6.8 There shall be a mandatory **induction program** for three weeks before the commencement of first semester.

6.9 **Minor in a discipline** (Minor degree/programme) concept is introduced in the curriculum for all conventional B.Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B.Tech. programme.

a. i) Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering

ii) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

b. The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE,CE,ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.

c. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BOS.

d. There shall be no limit on the number of programs offered under Minor. The University/Institution can offer minor programs in emerging technologies based on

expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.

e. The concerned BOS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.

f. A student shall be permitted to register for Minors program at the beginning of 4th semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) upto the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA upto 3rd semester or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

g. A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

h. Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BOS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

i. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the university/academic council.

j. Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BOS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

k. A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BOS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

l. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

m. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree

with Minors and they will receive B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

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

o. Minimum enrolment for a Minor course to be offered is 12.

p. Students fulfilling the stipulated criterion can register for a Minor by paying a prescribed registration fee.

6.10 **Honors degree in a discipline:**
Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

a. A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired a minimum of 8.0 SGPA upto the end of 2 semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.

b. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.

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

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

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

f. The concerned BOS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.

g. Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the Annexure-2).

h. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the BOS/academic council.

i. The concerned BOS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student

shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

j. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

k. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

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

m. Minimum enrollment for the Honors to be offered is 12.

n. Students fulfilling the stipulated criterion can register for Honors by paying a prescribed registration fee.

6.11 National Service Scheme (NSS)/Yoga is compulsory for all the Undergraduate students. The student participation shall be for a minimum period of 45 hours during the first year. Grades will be awarded as Very good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets Unsatisfactory grade, he/she has to repeat the above activity in the subsequent years along with the next year students.

6.12 Students shall undergo two summer internships each for a minimum of six weeks duration at the end of second and third years of the programme for 1.5 credits & 3 credits respectively. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising Head of Department and two senior faculty. The student shall submit a detailed technical report along with internship certificate from the Internship organization in order to obtain the prescribed credits. The student shall submit the Internship Project Report along with Certificate of Internship. The evaluation of the first and second summer internships shall be conducted at the end of the V Semester & VII semester respectively.

There shall be internal evaluation for 100 marks and there shall not be external evaluation. The Internal Evaluation shall be made by the departmental committee (Head of the Department and two senior faculty of the department) on the basis of the project report submitted by the student.

Completion of the internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship in the subsequent summer provided that the student doesn't pursue two summer internships in the same summer.

Community Service Project focussing on specific local issues, shall be an alternative to the six weeks of summer Internship, whenever there is any emergency and when students cannot pursue their summer internships. The Community Service Project shall be for 6 weeks in duration which includes preliminary survey for 1 week, community awareness programs for one week, community immersion program in consonance with Government agencies for 3 weeks and a community exit report (a detailed report) for one week. The community service project shall be evaluated for 100 marks by the internal departmental committee comprising Head of the Department and two senior faculty of the department. **However, the first priority shall be given to the internship.**

6.13 There shall also be a mandatory full internship in the final semester (VIII Semester) of the Programme along with the project work. The organization in which the student wishes to carry out the Internship need to be approved by Internal Department Committee comprising Head of the Department and two senior faculty. The faculty of the respective department monitors the student internship program along with project work. At the end of the semester, the candidate shall submit a certificate of internship and a project report. The project report and presentation shall be internally evaluated for 50 marks by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. The Viva-Voce shall be conducted for 100 marks by a committee consisting of HOD, Project Supervisor and an External Examiner.

Completion of internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship along with project work for next six months.

6.14 There shall be five skill-oriented courses offered during III semester to VII semester. Out of the five skill courses, two shall be skill-oriented programs related to the domain and these two shall be completed in second year. Of the remaining three skill courses, one shall necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

The student can choose between a skill advanced course being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies which are duly approved by the Internal Department Committee. The credits assigned to the skill advanced course shall be awarded to the student upon producing the Course Completion Certificate from the agencies/professional bodies.

The Internal Department Committee comprising Head of Department and two senior faculty shall evaluate the grades/ marks awarded for a course by external agencies and convert to the equivalent marks/grades.

7. **Attendance Requirements:**

- A student shall be eligible to appear for semester end examinations (SEE), if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical ground duly approved by the Principal.
- Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- Further the student must obtain a minimum of 50% attendance in each subject failing which; the student shall not be permitted to write the SEE of that subject. Student has to register this subject through course repetition and satisfy the CIE qualification criteria of attendance and marks in the subsequent semesters.
- Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.
- A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

8. **Minimum Academic Requirements:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7

8.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project, if he/she secures not less than 15 marks in CIE and 25 marks in SEE. In case of internships, project work viva – voce, he/she should secure 40% of the total marks. For mandatory courses minimum 15 marks in CIE are to be secured.

8.2 A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular and two supplementary examinations of I Semester.
One regular and one supplementary examination of II Semester.
One regular examination of III semester.

Lateral Entry students: A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular examination of III semester.

8.3 A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and four supplementary examinations of I Semester.
One regular and three supplementary examinations of II Semester.
One regular and two supplementary examinations of III Semester.
One regular and one supplementary examinations of IV Semester.
One regular examination of V Semester.

Lateral entry students: A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and two supplementary examinations of III Semester.
One regular and one supplementary examinations of IV Semester.
One regular examination of V Semester.

And if a student is detained for want of credits for particular academic year by sections 8.2 and 8.3 above, the student may make up the credits through supplementary examinations and only

after securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

8.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained. In case of lateral entry students, the number of credits is 121.

8.5 Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

Lateral entry students who fail to earn 121 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

9. **Course Pattern:**

(i) A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

(ii) **With–holding of Results:**

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be with held and he/she will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

(iii) **Grading:**

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.

Range in which the marks in the subject fall	**Grade**	**Grade Points Assigned**
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

A student obtaining Grade "F" shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. Same is the case with a student who obtains "Ab" in end examination.

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. **Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):**

(i) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum_{i=1}^{n} C_i \times GP_i}{\sum_{i=1}^{n} C_i} \tag{1}$$

where, C_i is the number of credits of the i-th subject and GP_i is the grade point scored by the student in the i-th course.

(ii) The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$SGPA = \frac{\sum_{j=1}^{m} SGPA_j \times TC_j}{\sum_{j=1}^{m} TC_j} \tag{2}$$

where $SGPA_j$ is the $SGPA$ of the j-th semester and TC_j is the total number of credits in that semester.

(iii) Both $SGPA$ and $CGPA$ shall be rounded off to 2 decimal points and reported in the transcripts.

(iv) While computing the $SGPA$, the subjects in which the student is awarded Zero grade points will also be included.

(v) Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

(vi) Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

11. **Award of Class:**

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

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

12. **Gap Year:**

Gap year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit the student(s) to avail the Gap Year.

13. **Transitory Regulations:**

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which they get readmitted.

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work, and they will be in the academic regulations into which the candidate is presently re-joining.

14. **Minimum Instruction Days:**
The minimum instruction days including exams for each semester shall be 90 days.

15. **Medium of Instruction**

The Medium of Instruction is English for all courses, laboratories, internal and external examinations and project reports.

16. **Rules of Discipline**

(i) Use of mobile phones with camera, in the campus is strictly prohibited.

(ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.

(iii) Students shall not bring outsiders to the institution or hostels.

(iv) Students shall not steal, deface, damage or cause any loss to the institution property.

(v) Students shall not collect money either by request or coercion from others within the campus or hostels.

(vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.

(vii) Use of vehicles by the students inside the campus is prohibited.

(viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.

(ix) Any material to be uploaded to social media sites need to be approved by Head of the Department concerned/Dean/Principal.

(x) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period

(xi) **Dress Code**

Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls : All the girl students shall wear saree / chudidhar with dupatta.

17. **Punishments for Malpractice cases – Guidelines**
The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

SN	Nature of Malpractice / Improper conduct	Punishment
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course 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 student which can be used as an aid in the course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.
2	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 course.
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
4	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student 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 course only of all the students involved. In case of an outsider, he will be handed over to the police and a case shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.

SN	Nature of Malpractice / Improper conduct	Punishment
6	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
8	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 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.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case shall be registered against them.
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

SN	Nature of Malpractice / Improper conduct	Punishment
10	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	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 S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work 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 shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination including practicals and project work of that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, it shall be reported to the college academic council for further action and award suitable punishment.	
14	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

18. **Additional Academic Regulations:**

18.1 Any attempt to impress upon the teachers, examiners, faculty and staff of Examinations, bribing for either marks or attendance will be treated as malpractice.

18.2 When a component of Continuous Internal Evaluation (CIE) or Semester End Examination (SEE) is cancelled as a penalty, he/she is awarded zero marks in that component.

19. **Amendments to Regulations:**
    The Academic Council of Bapatla Engineering College (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations and / or Syllabi, Academic schedules, Examination schedules, Examination pattern, Moderation to students, Special opportunity to complete degree beyond stipulated time and any other matter pertained that meets to the needs of the students, society and industry without any notice and the decision is final.

Table 1: Distribution of Credits across Course Categories

S.No.	Category	Code	Credits		
			Proposed	APSCHE	AICTE
1	Humanities & Social Science including Management Courses	HSMC	10.5	10.5	12
2	Basic Science Courses	BSC	18	21	25
3	Engineering Science courses	ESC	24.5	24	24
4	Professional Core Courses	PCC	49.5	51	48
5	Professional Elective Courses	PEC	12	15	18
6	Open Elective Courses	OEC	18	12	18
7	Internship, Seminar & Project work	PROJ	16.5	16.5	15
8	Skill Oriented Courses	SC	11	10	-
9	Mandatory Courses	MC		non-credit	
	Total Credits		160	160	160

Table 2: Course Category wise Distribution of Credits across Semesters

Category Code	Semester							
	I	II	III	IV	V	VI	VII	VIII
HSMC	-	4.5	-	3	-	-	3	-
BSC	7.5	7.5	3	-	-	-	-	-
ESC	9	10.5	-	3	-	-	-	-
PCC	-	-	15	12	10.5	12	-	-
PEC	-	-	-	-	3	3	6	-
OEC	-	-	-	-	4.5	4.5	9	-
INT PROJ	-	-	-	-	1.5	-	3	12
SC	-	-	3.5	3.5	2	2	2	-
MC	0	-	0	-	0	0	-	-
Honors	-	-	-	4	4	4	4	4*
Minor	-	-	-	4	4	4	4	4*
Total Credits	16.5	22.5	21.5	21.5 (4)	21.5 (4)	21.5 (4)	23 (4)	12 (4)

Table 3: Distribution of credits across semesters

Semester	Credits	
	Proposed	APSCHE
I	16.5	19.5
II	22.5	19.5
III	23.5	21.5
IV	18.5	21.5
V	21.5	21.5
VI	21.5	21.5
VII	23.0	23.0
VIII	12.0	12.0
Total	160	160

Scheme of Instruction and Examination

B.Tech., I Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT101 /MA01	BS	Linear Algebra and Ordinary Differential Equations	3	0	0	3	30	70	100	3
20IT102 /CY01	BS	Engineering Chemistry	3	0	0	3	30	70	100	3
20IT103 /EE01	ES	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100	3
20ITL101 /MEL01	ES	Engineering Graphics	1	0	4	5	30	70	100	3
20ITL102 /CYL01	BS	Chemistry Lab	0	0	3	3	30	70	100	1.5
20ITL103 /EEL01	ES	Basic Electrical and Electronics Engineering Lab	0	0	3	3	30	70	100	1.5
20ITL104 /MEL2	ES	Workshop Practice Lab	0	0	3	3	30	70	100	1.5
MC01	MC	Environmental Studies	2	0	0	2	30	0	30	0
Induction Program	First Three Weeks (Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Familiarization to Dept./Branch & Innovations)									
TOTAL			**12**	**0**	**13**	**25**	**240**	**490**	**730**	**16.5**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., II Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT201 /MA02	BS	Numerical Methods and Advanced Calculus	3	0	0	3	30	70	100	3
20IT202 /PH03	BS	Semiconductor Physics	3	0	0	3	30	70	100	3
20IT203 /EL01	HS	Communicative English	3	0	0	3	30	70	100	3
20IT204 /CS01	ES	Programming for Problem Solving	3	0	0	3	30	70	100	3
20IT205	ES	Digital Logic Design	3	0	0	3	30	70	100	3
20IT206	ES	Discrete Mathematics	3	0	0	3	30	70	100	3
20ITL201 /PHL02	BS	Semiconductor Physics Lab	0	0	3	3	30	70	100	1.5
20ITL202 /ELL01	HS	English Communication Skills Lab	0	0	3	3	30	70	100	1.5
20ITL203 /CSL01	ES	Programming for Problem Solving Lab	0	0	3	3	30	70	100	1.5
NCC / NSS			0	0	3	3				0
TOTAL			**18**	**0**	**12**	**30**	**270**	**630**	**900**	**22.5**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., III Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT301	ES	Microprocessor and Microcontrollers	3	0	0	3	30	70	100	3
20IT302	PC	Data Structures	3	0	0	3	30	70	100	3
20IT303	PC	Object Oriented Programming	3	0	0	3	30	70	100	3
20IT304	PC	Operating System	3	0	0	3	30	70	100	3
20IT305	PC	Computer Organization	3	0	0	3	30	70	100	3
20IT306 /EL02	HS	Technical English	2	0	0	2	30	70	100	2
20ITL301	PC	Data Structures Lab	0	0	3	3	30	70	100	1.5
20ITL302	PC	Object Oriented Programming Lab	0	0	3	3	30	70	100	1.5
20ITL303 /SO01	SO	Linux Essentials	2	0	3	5	30	70	100	3.5
TOTAL			**19**	**0**	**9**	**28**	**270**	**630**	**900**	**23.5**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., IV Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT401 /MA03	BS	Probability and Statistics	3	0	0	3	30	70	100	3
20IT402	PC	Web Technologies	3	0	0	3	30	70	100	3
20IT403	PC	Database Management Systems	3	0	0	3	30	70	100	3
20IT404	PC	Design and Analysis of Algorithms	3	0	0	3	30	70	100	3
20ITL401	PC	Web Technologies Lab	0	0	3	3	30	70	100	1.5
20ITL402	PC	RDBMS Lab	0	0	3	3	30	70	100	1.5
20ITL403 /SO02	SO	Python Programming	2	0	3	5	30	70	100	3.5
MC02	MC	Professional Ethics & Human Values	2	0	0	2	30	0	30	0
Total			**16**	**0**	**9**	**25**	**240**	**490**	**730**	**18.5**
20ITH41_ 20ITM41_		**Honors(Set I) / Minor(Set II) Course**	**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**19**	**1**	**9**	**29**	**270**	**560**	**830**	**22.5**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., V Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT501	PC	Automata Theory & Formal Languages	3	0	0	3	30	70	100	3
20IT502	PC	Computer Networks	3	0	0	3	30	70	100	3
20IT503	PC	Software Engineering	3	0	0	3	30	70	100	3
20IT504	PE	Professional Elective - 1	3	0	0	3	30	70	100	3
20IT505	JO	Job Oriented Elective - 1	3	0	0	3	30	70	100	3
20ITL501	PC	Software Engineering Lab	0	0	3	3	30	70	100	1.5
20ITL502	JO	Job Oriented Elective Lab -1	0	0	3	3	30	70	100	1.5
20ITS501	SO	C# Programming	1	0	2	3	30	70	100	2
20ITINT1	INT	Summer Internship	0	0	0	0	0	0	0	1.5
MC03	MC	Constitution of India	2	0	0	2	30	0	30	0
Total			**18**	**0**	**8**	**26**	**270**	**560**	**830**	**21.5**
20ITH52_ 20ITM52_		**Honors(Set I) / Minor(Set II) Course**	**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**21**	**1**	**8**	**30**	**300**	**630**	**930**	**25.5**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., VI Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT601	PC	Compiler Design	3	0	0	3	30	70	100	3
20IT602	PC	Machine Learning	3	0	0	3	30	70	100	3
20IT603	PC	Cryptography and Network Security	3	0	0	3	30	70	100	3
20IT604	PE	Professional Elective -2	3	0	0	3	30	70	100	3
20IT605	JO	Job Oriented Elective - 2	3	0	0	3	30	70	100	3
20ITL601 /SO04	SO	Soft Skills	1	0	2	3	30	70	100	2
20ITL602	PC	Machine Learning Lab	0	0	3	3	30	70	100	1.5
20ITL603	PC	Cryptography and Network Security Lab	0	0	3	3	30	70	100	1.5
20ITL604	JO	Job Oriented Elective - 2 Lab	0	0	3	3	30	70	100	1.5
MC04	MC	Essence of Indian Traditional Knowledge	2	0	0	2	30	0	30	0
Total			**18**	**0**	**11**	**29**	**300**	**630**	**930**	**21.5**
20ITH63_ 20ITM63_		**Honors(Set I) / Minor(Set II) Course**	**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**21**	**1**	**11**	**33**	**330**	**700**	**1030**	**25.5**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., VII Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT701	PE	Professional Elective - 3	3	0	0	3	30	70	100	3
20IT702	PE	Professional Elective - 4	3	0	0	3	30	70	100	3
20IT703	JO	Job Oriented Elective - 3	3	0	0	3	30	70	100	3
20IT704	JO	Job Oriented Elective - 4	3	0	0	3	30	70	100	3
20IT705 /ME01	HS	Industrial Management & Entrepreneurship Development	3	0	0	3	30	70	100	3
20ITL701 /SO05	SO	DevOps	1	0	2	3	30	70	100	2
20ITL702	JO	Job Oriented Elective – 3 Lab	0	0	3	3	30	70	100	1.5
20ITL703	JO	Job Oriented Elective – 4 Lab	0	0	3	3	30	70	100	1.5
20ITINT2	SO	Industrial / Research Internship	0	0	0	0	0	0	0	3
Total			**16**	**0**	**8**	**24**	**240**	**560**	**800**	**23**
20ITH74_ 20ITM74_		**Honors(Set I) / Minor(Set II) Course**	**3**	**1**	**0**	**4**	**30**	**70**	**100**	**4**
Grand Total			**19**	**1**	**8**	**28**	**270**	**630**	**900**	**27**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Scheme of Instruction and Examination

B.Tech., VIII Semester

in

Information Technology

Course Code	Type	Course Title	Hours per week				Scheme of Examination (Maximum marks)			Credits
			Lec	Tut	Pra	Tot	CIE	SEE	Tot	
20IT801	PRJ	Project Work	0	0	0	0	50	100	150	12
20ITH81M 20ITM81M	**Honors / Minor Course**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
20ITH82M 20ITM82M	**Honors / Minor Course**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
Grand Total			**0**	**0**	**0**	**0**	**50**	**100**	**150**	**16**

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination

Lec : Lecture **Tut :** Tutorial **Pra :** Practical

Table 4: List of Professional Electives

SN	Title
1	Artificial Intelligence
2	Wireless Networks
3	Distributed Systems
4	Digital Image Processing
5	Design Patterns
6	Block chain Technologies
7	Bioinformatics
8	Deep Learning
9	Natural Language Processing

Table 5: List of Job Oriented Electives

SN	Title
1	Enterprise Programming using J2EE
2	Enterprise Programming using .NET
3	Advanced Web Technologies
4	Data Analytics
5	Cloud Programming
6	Cyber Security
7	Internet of Things
8	Big Data Analytics
9	Software Testing Methodologies
10	Computer Animation

Table 6: Set I, Additional courses offered to B.Tech., IT students to obtain Honors degree in Information Technology

Code	Title	Prerequisites
A	Advanced Data Structures	Data Structures (20IT302)
B	Advanced Computer Architecture	Computer Organization (20IT305)
C	Graph Theory	Data Structures (20IT302)
D	Numerical Optimization	None
E	Advanced Database Management Systems	Database Management Systems (20IT403)
F	Real Time Operating Systems	Operating Systems (20IT304)
G	Parallel Algorithms	Design and Analysis of Algorithms (20IT404)
H	Embedded Systems	Operating Systems (20IT304) and Microprocessor and Microcontrollers (20IT401)
I	Software Project Management	Software Engineering (20IT503)
J	Storage Area Networks	Operating Systems (20IT304) and Database Management Systems (20IT403)
K	Computational Complexity	Design and Analysis of Algorithms (20IT404)
L	Competitive Programming	Object Oriented Programming (20IT303), Computational Complexity (20ITHN11)
M	Game Theory	Numerical Optimization (20ITHN04)
N	Spatial Informatics	Database Management Systems (20IT403)
O	Perception and Computer Vision	Digital Image Processing
P	Virtual Reality	Computer Animation

Table 7: Set II, Courses offered to non CSE and IT branch B.Tech., students for obtaining Minor degree in Information Technology

Code	Title	Prerequisites
A	Computer System Architecture	None
B	Operating Systems	None
C	Data Structures	Programming for Problem Solving (CS01)
D	Object Oriented Programming	Programming for Problem Solving(CS01)
E	Discrete Mathematics	None
F	Design and Analysis of Algorithms	Programming for Problem Solving (CS01)
G	Database Management Systems	None
H	Computer Networks	None

Linear Algebra & Ordinary Differential Equations

B.Tech – I Semester (20IT101/MA01)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

UNIT - I (12 Hours)

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values(without proofs); Cayley-Hamilton theorem (without proof).

[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]

UNIT - II (12 Hours)

Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations; Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation $Mdx + Ndy = 0$.

Applications of a first order Differential equations: Newton's law of cooling; Rate of decay of Radio-active materials.

[Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8]

UNIT - III (12 Hours)

Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits.

[Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5]

UNIT - IV (12 Hours)

Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms.

[Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1]

TEXT BOOKS:

1. B.S.Grewal. *Higher Engineering Mathematics*. Khanna, 44 edition, 2017a

REFERENCES:

1. Erwin Kreyszig. *Advanced Engineering Mathematics*. John Wiley and Sons, 9 edition, a

2. N.P.Bali and M.Goyal. *A Text book of Engineering Mathematics*. Laxmi, 2010a

Engineering Chemistry

B.Tech – I Semester (20IT102/CY01)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

The student should be conversant:

COB 1: With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.

COB 2: To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.

COB 3: With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics.

COB 4: With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

Course Outcomes:

After studying this course, students will be able to:

CO 1: Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.

CO 2: Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.

CO 3: Have the capacity of applying energy sources efficiently and economically for various needs.

CO 4: Design economically and new methods of organic synthesis and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	3	1	-	-	2	3	-	-	-	-	3
CO 2	3	3	2	-	-	2	2	-	-	-	-	3
CO 3	3	3	-	-	-	2	3	-	-	-	-	3
CO 4	3	3	2	-	-	2	1	-	-	-	-	2

UNIT - I (12 Hours)

Water Chemistry
Introduction: water quality parameters.
Characteristics: Alkalinity, Hardness - Estimation & simple numerical problems.
Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;
Internal conditioning - phosphate, calgon and carbonate methods.
External conditioning - Ion exchange process & Zeolite process
WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration.
Disinfection methods: Chlorination, ozonization and UV treatment.
Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.

UNIT - II (12 Hours)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications.
Corrosion: Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion, Corrosion control – Cathodic protection, and electro plating (Au) & electoless Ni plating.

UNIT - III (12 Hours)

Fuels: Classification of fuels; Calorific value of fuels (lower, higher)
Solid fuels: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking.
Liquid Fuels: Petroleum refining and fractions, composition and uses. Knocking and anti- knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages.
Gaseous fuels: CNG and LP.
Flue gas analysis – Orsat apparatus.

UNIT - IV (12 Hours)

Organic reactions and synthesis of a drug molecule: Introduction to reactions involving substitution (SN1, SN2), addition (Markownikoff's and anti-Markwnikoff's rules) , elimination (E1 & E2), Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)
Polymers: Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications.
Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC.
Bio degradable polymers: Types, examples-Polyhydroxy buterate (PHB), Polyhydroxy buterate-co-β-hydroxy valerate (PHBV), applications.

TEXT BOOKS:

1. P.C. Jain and Monica Jain. *Engineering Chemistry*. Dhanpat Rai, 17 edition, 2017
2. Seshi Chawla. *Engineering Chemistry*. Dhanpat Rai, 13 edition, 2013

REFERENCES:

1. Arun Bahl, B.S. Bahl, and G.D.Tuli. *Essential Of Physical Chemistry*. S Chand, 12 edition, 2012
2. C.P. Murthy, C.V. Agarwal, and A. Naidu. *Text Book of Engineering Chemistry*. B.S, 2006
3. K. Maheswaramma. *Engineering Chemistry*. Pearson, 2015

Basic Electrical & Electronics Engineering

B.Tech – I Semester (20IT103/EE01)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

UNIT - I (12 Hours)

Electrical Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation.Superposition, Thevenin and Norton Theorems. Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - II (12 Hours)

Electrical Machines:

Magnetic materials, BH characteristics, Construction, working of DC machines, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor.Single-phase induction motor. Construction and working of synchronous generators.

UNIT - III (12 Hours)

Semiconductor Diodes and applications:

Semiconductor materials, semiconductor diode, Resistance levels, Diode equivalent circuits, Zener diode, Light emitting diode, Load line analysis, half wave rectification, Full wave rectification, Bridge rectifier, Use of capacitor filter in rectifier, Zener diode voltage regulator, Clippers, Clampers

Bipolar Junction Transistors:

Transistor construction and operation, Common base configuration, Transistor amplifying action, Common emitter configuration, Common collector configuration, Limits of operation. DC load line and bias point, Voltage divider bias of transistor.

UNIT - IV (12 Hours)

Field Effect Transistors:

Construction and characteristics of JFET and MOSFET

Operational Amplifiers:

Introduction, Differential and common mode operation, OP-AMP Basics, Practical OP-AMP circuits: Inverting amplifier, Non inverting amplifier, Unity follower, summing amplifier, Integrator and differentiator.

TEXT BOOKS:

1. S.K. Bhattacharya. *Basic Electrical and Electronics Engineering*. Pearson
2. Robert L. Boylestad and Louis Nashelsky. *Electronic Devices and Circuit Theory*. PHI, 11 edition

3. Nagsarkar T K and Sukhija M S. *Basics of Electrical and Electronics Engineering*. Oxford University Press

REFERENCES:

1. David A. Bell. *Electronic Devices and Circuits*. Oxford University Press, 5 edition
2. Muthusubramanian R, Salivahanan S, and Muraleedharan K A. *Basic Electrical, Electronics and Computer Engineering*. Tata McGraw Hill, 2 edition, 2006

Environmental Studies

B.Tech – I Semester (20IT104/CE01)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	0	Credits	:	0

Prerequisites:

None

Course Objectives:

To learn

COB 1: Understand the Ecosystems and need of Biodiversity.

COB 2: Develop an awareness and knowledge on natural resource protection and Sustainability

COB 3: Realize and Explore the Problems related to Environmental pollution and its Management & Acts associated with Environment.

COB 4: To know the global environmental problems. Apply the Role of Information analyze social issues,

Course Outcomes:

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

CO 1: Compare various ecosystems such as forest, grassland, desert, and aquatic case studies, relate to the environmental concepts & the levels of energy flow in an ecosystem, Discuss the preventive as well as remedial measures for conservation of biodiversity

CO 2: Integrate and analyse the various natural and man made factors that affect forests, environment & propose alternative sources of energy to meet the growing energy needs of our population. Identify the importance of sustainable growth and developmental

CO 3: Evaluate the pollution case studies and propose control measures of Urban and industrial wastes. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

CO 4: Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies, Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	-	-	-	-	-	2	2	-	1	1	-	2
CO 2	-	-	-	-	-	2	2	-	2	1	-	1
CO 3	-	-	-	-	-	3	3	1	2	3	2	1
CO 4	-	-	-	-	-	1	2	1	2	1	-	3

UNIT - I (12 Hours)

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries).

Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. Chipko movement case study

UNIT - II (12 Hours)

Natural resources:

Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. Forest: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. Water: Uses, floods and drought, Dams - benefits and problems.

Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. Silent Valley Project and Narmada Bachao Andolan case studies

Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management.

UNIT - III (12 Hours)

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Chernobyl Nuclear Disaster case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermicomposting.

Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act.

UNIT - IV (12 Hours)

Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment. Environmental Standards (ISO 14000, etc.)

Case Studies: Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare).

Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.

TEXT BOOKS:

1. Benny Joseph. *Environmental Studies*. Tata McGraw-Hill
2. JP Sharma. *Comprehensive environmental studies*. Laxmi Publications
3. Erach Bharucha. *Text Book of environmental Studies*

REFERENCES:

1. R.Rajagopalan. *Environmental studies*. Oxford University Press
2. Anjaneyulu Y. *Introduction to Environmental Science*. B S Publications
3. Jr. G. Tyler Miller. *Environmental Science*. Thomson Series, 11 edition

Engineering Graphics

B.Tech – I Semester (20ITL101/MEL01)

Lectures	:	1 Hours / Week	Tutorial	:	0	Practical	:	4
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

COB 1: Clear picture about the importance of engineering graphics in the field of engineering

COB 2: The drawing skills and impart students to follow Bureau of Indian Standards

COB 3: To give an idea about Geometric constructions, Engineering curves, orthographic projections and pictorial projections

COB 4: Imagination skills about orientation of points, lines, surfaces and solids

COB 5: Basic drafting skills of Auto CAD

Course Outcomes:

After completion of the course the students will be able to

CO 1: Draw projections of points and projections of lines using Auto CAD

CO 2: Plot projections of surfaces like circle, square and rhombus

CO 3: Plot the Projections of solids like Prisms and pyramids

CO 4: Convert the of Orthographic views into isometric views of simple objects

CO 5: Generate the of pictorial views into orthographic views of simple castings

UNIT - I

Introduction: Introduction to Drawing instruments and their uses, geometrical construction procedures
Introduction to auto CAD: Basics of sheet selection, Draw tools, Modify tools, dimensioning
Method of Projections: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

UNIT - II

Projections of Plane: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT - III

Projections of Solids: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones Inclined to one plane.

UNIT - IV

Isometric Projections: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).

UNIT - V

Orthographic Projections: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

TEXT BOOKS:

1. Dhananjay M. Kulkarni. *Engineering Drawing with AutoCAD*. PHI
2. N.D. Bhatt and V.M. Panchal. *Engineering Drawing-First angle projection*. Charotar Publishing House

REFERENCES:

1. Dhananjay A Jolhe. *Engineering Drawing*. Tata McGraw Hill
2. K.L.Narayana and R.K.Kannaiah. *Engineering Drawing*

Chemistry Lab

B.Tech – I Semester (20ITL102/CYL01)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIE Marks	:	30	SEE Marks	:	70	Credits	:	1.5

Prerequisites:

None

Course Outcomes:

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

CO 1: Familiar with fundamental basics of Chemistry lab

CO 2: Ability to estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.

CO 3: Gain the knowledge regarding the quality parameters of water like salinity, hardness, alkalinity etc.

CO 4: Able to analyse the given oil for saponification and iodine value.

CO 5: Ability to prepare high polymers and soap.

CO 6: Ability to understand the estimation of quality parameters by instrumentation technics.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	2	2	-	2	-	-	-	-	-	1
CO 3	2	2	2	2	-	2	-	-	-	-	-	1
CO 4	2	2	2	2	-	-	-	-	-	-	-	1
CO 5	2	-	-	2	-	-	-	-	-	-	-	1
CO 6	2	2	2	2	-	-	-	-	-	-	-	1

LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and error, accuracy, precision, theory of indicators, use of volumetric titrations).
2. Volumetric Analysis:
   (a) Estimation of Washing Soda.
   (b) Estimation of Active Chlorine Content in Bleaching Powder
   (c) Estimation of Mohr's salt by permanganometry.

(d) Estimation of given salt by using Ion-exchange resin using Dowex-50.

3. Analysis of Water:
   (a) Determination of Alkalinity of Tap water.
   (b) Determination of Total Hardness of ground water sample by EDTA method
   (c) Determination of Salinity of water sample
4. Estimation of properties of oil:
   (a) Estimation of Acid Value
   (b) Estimation of Saponification value
5. Preparations:
   (a) Preparation of Soap
   (b) Preparation of Urea-formaldehyde resin
   (c) Preparation of Phenyl benzoate
6. Demonstration Experiments (Any two of the following):
   (a) Determination of pH of given sample.
   (b) Determination of conductivity of given sample by conductometer.
   (c) Potentiometric Determination of Iron.

TEXT BOOKS:

1. K.Mukkanti. *Practical Engineering Chemistry*. B.S, 2009
2. Vogel. *Inorganic quantitative analysis*. Longman group, 5 edition, 1979

REFERENCES:

1. R.N. Goyal and Harrmendra Goel. *Text Book of engineering chemistry*
2. S.S. Dara. *A text book on experiments and calculations- Engineering Chemistry*
3. Chatwal Anand. *Instrumental methods of chemical analysis*. Himalaya

Basic Electrical and Electronics Engineering Lab

B.Tech – I Semester (20ITL103/EEL01)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	0	Credits	:	0

Prerequisites:

None

List of Experiments

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem
5. Parameters of choke coil
6. Measurement of low and medium resistance using volt ampere method
7. OC & SC test of single phase transformer
8. Load test on single phase transformer
9. V-I characteristics of PN junction Diode
10. V-I characteristics of Zener Diode
11. Characteristics of CE Configuration
12. Transfer and Drain Characteristics of JFET
13. Calculation of Ripple factor using Half wave rectifier
14. Calculation of Ripple factor using Full wave rectifier
15. Non linear wave shaping – clippers / clampers
    Note: Minimum 10 experiments should be carried out in the lab.

Workshop Practice Lab

B.Tech – I Semester (20ITL104/MEL2)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	0	Credits	:	0

Prerequisites:

None

Course Objectives:

COB 1: To impart student knowledge on various hand tools for usage in engineering applications.

COB 2: Be able to use analytical skills for the production of components.

COB 3: Design and model different prototypes using carpentry, sheet metal and welding.

COB 4: Make electrical connections for daily applications.

COB 5: To make student aware of safety rules in working environments.

Course Outcomes:

After completion of this course student should be able to:

CO 1: Make half lap joint, Dovetail joint and Mortise & Tenon joint

CO 2: Produce Lap joint, Tee joint and Butt joint using Gas welding

CO 3: Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools

CO 4: Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	2	1	-	-	-	-	-	-	-	-	-
CO 2	3	1	1	-	-	-	-	-	-	-	-	-
CO 3	3	3	2	-	-	-	-	-	-	-	-	-
CO 4	3	3	2	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	1	-
CO 2	-	1	-
CO 3	-	2	-
CO 4	-	3	-

List of Experiments

1. Carpentry
   (a) Half Lap joint
   (b) Dovetail joint
   (c) Mortise & Tenon joint
2. Welding using electric arc welding process/gas welding
   (a) Lap joint
   (b) Tee joint
   (c) Butt joint
3. Sheet metal operations with hand tools
   (a) Trapezoidal tray
   (b) Funnel
   (c) T-joint
4. House wiring
   (a) To control one lamp by a single switch
   (b) To control two lamps by a single switch
   (c) Stair-case wiring

TEXT BOOKS:

1. P.Kannaiah and K.L.Narayana. *Workshop Manual*. SciTech, 2009
2. K. Venkata Reddy. *Workshop Practice Manual*. BS Publications, 2008

Numerical Methods and Advanced Calculus

B.Tech – II Semester (20IT201/MA02)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

UNIT - I (12 Hours)

Numerical Solution of Equations: Introduction; Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi's iterative method, Gauss-Seidel iterative method.

[Sections: 28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2].

UNIT - II (12 Hours)

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton's interpolation formulae: Newton's forward interpolation formula, Newton's backward interpolation formula; Interpolation with unequal intervals; Lagrange's interpolation formula; Divided differences; Newton's divided difference formula; Numerical integration; Trapezoidal rule; Simpson's one-third rule; Simpson's three-eighth rule; Numerical solution of ODE's: Introduction; Picard's method; Euler's method; Runge-Kutta method.

[Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7].

UNIT - III (12 Hours)

Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volume as Triple integrals.

[Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2].

UNIT - IV (12 Hours)

Vector Calculus and its Applications: Scalar and vector point functions; Del applied to scalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green's theorem in the plane (without proof); Stokes theorem (without proof); Gauss divergence theorem (without proof).

[Sections: 8.4; 8.5; 8.5.1; 8.5.3; 8.6; 8.11.1; 8.12.2; 8.12.3; 8.13; 8.14; 8.16]

TEXT BOOKS:

1. B.S.Grewal. *Higher Engineering Mathematics*. Khanna, 44 edition, 2017b

REFERENCES:

1. Erwin Kreyszig. *Advanced Engineering Mathematics*. John Wiley and Sons, 9 edition, b

2. N.P.Bali and M.Goyal. *A Text book of Engineering Mathematics*. Laxmi, 2010b

Semiconductor Physics and Nano Materials

B.Tech – II Semester (20IT202/PH03)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Outcomes:

After studying this course, students will be able to:

CO 1: Understand the concepts of band structure of solids, hole and effective mass of electron in semi conductors.

CO 2: Understand the concept of fermi level and various semi conductor junctions.

CO 3: Understand the working principles of various opto-electronic devises and their applications.

CO 4: Understand the importance of nano materials and their characteristic properties.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	2	2	-	1	-	-	-	-	-	-	-	-
CO 2	3	1	2	2	-	-	-	-	-	-	-	-
CO 3	3	2	2	-	2	-	-	-	-	-	-	-
CO 4	3	2	2	-	2	-	-	-	-	-	-	-

UNIT - I

Electronic Materials: Sommerfeld free electron theory, Fermi level and energy, density of states, Failure of free electron theory (Qualitative), Energy bands in solids, E-K diagrams, Direct and Indirect band gaps. Types of Electronic materials: Metals, Semi conductors and Insulators, Occupation Probability, effective mass, Concept of hole.

UNIT - II

Semiconductors: Introduction to semiconductors, intrinsic and extrinsic semiconductors, carrier concentrations, Fermi level and temperature dependence, Continuity equation, Diffusion and drift, P-N junction (V-I characteristics), Metal – Semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for Opto-Electronic devices.

UNIT - III

Opto-Electronic Devices and Display Devices: Photo voltaic effect, principle and working of LED, Applications of Photo diode, Solar cell, PIN & APD Diode, Liquid crystal display.

Opto-Electric Effect: Faraday Effect and Kerr effect.

UNIT - IV

Nano-Materials: Introduction to nano technology, quantum confinement, surface to volume ratio, properties of nano materials.
Synthesis of Nano-Materials: CVD, sol-gel methods, laser ablation.
Carbon Nano Tubes: Types, properties, applications.
Characterization of Nano-Materials: XRD, SEM.
Applications of Nano-Materials.

TEXT BOOKS:

1. Avadhanulu and Kshirsagar. *A Text Book of Engineering Physics*. S.Chand and Co., 2013
2. P.Srinivasa Rao and K.Muralidhar. *Applied physics*
3. Charles Kittel. *Introduction to Solid State Physics*. 8 edition
4. S.O. Pillai. *Solid State Physics*

REFERENCES:

1. B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, and J. Murday. *Text book on Nanoscience and Nanotechnology*. Springer Science and Business Media, 2013
2. P.Srinivasa Rao and K.Muralidhar. *Basic Engineering Physics*. Himalaya, 2016

Communicative English

B.Tech – II Semester (20IT203/EL01)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

The course aims

COB 1: at enhancing the vocabulary competency of the students

COB 2: to enable the students to demonstrate proficiency in the use of written English, including proper spelling, grammar, and punctuation

COB 3: to enhance theoretical and conceptual understanding of the elements of grammar

COB 4: understand and apply the conventions of academic writing in English

COB 5: to enhance the learners' ability of communicating accurately and fluently

Course Outcomes:

The students would be able to

CO 1: understand how to build academic vocabulary to enrich their writing skills

CO 2: produce accurate grammatical sentences

CO 3: analyse the content of the text in writing

CO 4: produce coherent and unified paragraphs with adequate support and detail

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	-	-	-	-	-	-	-	2	-	3	2	2
CO 2	-	-	-	-	-	-	-	2	-	3	2	2
CO 3	-	-	-	-	-	-	-	2	-	3	2	2
CO 4	-	-	-	-	-	-	-	2	-	3	2	2

UNIT - I (10 Hours)

Vocabulary Development: Word formation-Formation of Nouns, Verbs and Adjectives from Root words-Suffixes and Prefixes
Essential Grammar: Prepositions, Conjunctions, Articles
Basic Writing Skills: Punctuation in writing
Writing Practices: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT - II (8 Hours)

Vocabulary Development: Synonyms and Antonyms
Essential Grammar: Concord, Modal Verbs, Common Errors
Basic Writing Skills: Using Phrases and clauses
Writing Practices: Hint Development, Essay Writing

UNIT - III (8 Hours)

Vocabulary Development: One word Substitutes
Essential Grammar: Tenses, Voices
Basic Writing Skills: Sentence structures (Simple, Complex, Compound)
Writing Practices: Note Making

UNIT - IV (9 Hours)

Vocabulary Development: Words often confused
Essential Grammar: Reported speech, Common Errors
Basic Writing Skills: Coherence in Writing: Jumbled Sentences
Writing Practices: Paraphrasing and Summarising

REFERENCES:

1. Sanjay Kumar and Pushpa Latha. *Communication Skills*. Oxford University Press, 2011a
2. Michael Swan. *Practical English Usage*. Oxford University Press, 1995
3. F.T.Wood. *Remedial English Grammar*. Macmillan, 2007
4. Liz Hamp lyons and Ben Heasley. *Study Writing*. Cambridge University Press, 2006

Programming for Problem Solving

B.Tech – I Semester (20IT204/CS01)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

Students will be able to

COB 1: Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetic rules.

COB 2: Develop problem solving skills to translate 'English' described problems into programs written using C language. written using C language.

COB 3: Use Conditional Branching, Looping, and Functions.

COB 4: Apply pointers for parameter passing, referencing and differencing and linking data structures.

COB 5: Manipulate variables and types to change the problem state, including numeric,character, array and pointer types, as well as the use of structures and unions, File.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Choose and Analyze the right data representation formats and algorithms to solve the problem.

CO 2: Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.

CO 3: Write the program on a computer, edit, compile, debug, correct, recompile and run it.

CO 4: Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	2	2	-	-	-	-	-	-	-	-	-
CO 2	2	3	2	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	-	-	-	-	-	-	-	-	-
CO 4	2	1	2	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	3	2
CO 2	-	2	1
CO 3	-	2	2
CO 4	-	2	1

UNIT - I **(12 Hours)**

Overview of C, Constants, Variables and Data Types, Operators and Expressions,Managing I/O Operations. Decision Making and Branching.

Programming Exercises for Unit I:C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic and logical errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, finding given year is leap year or not, and conversion of lower case character to its upper case.

UNIT - II **(12 Hours)**

Decision Making and Looping, Arrays, Character Arrays and Strings.

Programming Exercises for Unit II: To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number. To print graphic patterns of symbols and numbers. To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not with and without using String Handling Functions. Transpose of a matrix and sorting of names using arrays.

UNIT - III **(12 Hours)**

User-defined Functions,Structures and Unions,Pointers

Programming Exercises for Unit - III: Functions - Recursive functions to find factorial & GCD (Greatest Common Divisor), string operations using pointers and pointer arithmetic. Swapping two variable values. Sorting a list of student records on register number using array of pointers

UNIT - IV **(12 Hours)**

File Management in C,Dynamic Memory Allocation,Preprocessor

Programming Exercises for Unit - IV: Operations on complex numbers, and to read an input file of marks and generate a result file, sorting a list of names using command line arguments. Copy the contents of one file to another file. Allocating memory to variables dynamically.

TEXT BOOKS:

1. E.Balaguruswamy. *Programming in ANSI C*. McGraw Hill India, 8 edition, 3 2019. ISBN 978-93-5316-513-0

REFERENCES:

1. Kernighan BW and Dennis Ritchie M. *The C programming language*. Prentice Hall, 2 edition, 2015.

ISBN 987-93-325-4944-9

2. Herbert Schildt. *C: The Complete Reference*. McGraw Hill India, 4 edition, 2017a. ISBN 0-07-212124-6

3. Ashok N.Kamthane and Amit A.Kamthane. *Programming in C*. McGraw Hill India, 3 edition, 2015. ISBN 987-93-325-4355-3

Digital Logic Design

B.Tech – I Semester (20IT205)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Outcomes:

After the course the students are expected to be able to

CO 1: Understand fundamental concepts and techniques used in digital electronics and minimize boolean expressions by applying boolean algebra and k-map methods.

CO 2: Minimize boolean expressions by tabulation method and understand, analyze and design various combinational logic circuits.

CO 3: Use basic flip-flops, analyze and design synchronous and asynchronous sequential circuits.

CO 4: Understand the Design principles of Registers, Counters, Memories and Programmable Logic Devices.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	3	3	3	2	1	-	-	-	-	-	-
CO 2	3	3	3	3	2	1	-	-	-	-	-	-
CO 3	3	3	3	3	2	1	-	-	-	-	-	-
CO 4	3	3	3	3	2	1	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	1	-
CO 2	-	1	-
CO 3	-	1	-
CO 4	-	1	-

UNIT - I **(12 Hours)**

Digital Systems and Binary Numbers: Digital System, Binary Numbers, Number base Conversions, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Binary Codes,

Binary Storage and Registers, Binary Logic, Error Detection and Correction: 7 bit Hamming Code.
Boolean Algebra & Logic Gates: Introduction, Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Boolean functions, Canonical and Standard Forms, Other Logic Operations, Digital logic gates.
GATE–LEVEL MINIMIZATION: Introduction, The map method, Four-variable K-Map, Product-of-Sums Simplification, Don't–Care Conditions, NAND and NOR implementation, Other Two level Implementations.

UNIT - II **(12 Hours)**

Minimization: The Tabulation method, Determination of prime implicants, Selection of prime-implicants.
Combinational Logic: Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adders - Subtractor, Decimal Adder, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - III **(12 Hours)**

Synchronous Sequential Logic: Introduction, Sequential Circuits, Storage Elements - Latches, Storage Elements -Flip Flops, Analysis of Clocked Sequential Circuits: State Equations, State Table, State Diagram, Flip Flop Input Equations, Analysis with D, JK and T Flip Flops; State reduction and Assignment, Design Procedure.

UNIT - IV **(12 Hours)**

Registers and Counters: Registers, Shift registers, Ripple Counters, Synchronous Counters.
Memory and Programmable Logic: Introduction, Random Access Memory: Read and Write Operations, Types of Memories; Read Only Memory, Programmable Logic Devices: PROM, PLA, PAL.

TEXT BOOKS:

1. M. Morris Mano and Michael D. Ciletti. *Digital Design*. Prentice Hall, 5 edition, 1 2013. ISBN 978-013277420
2. A.Anandkumar. *Fundamentals of Digital Circuits*. PHI, 4 edition, 1 2016. ISBN 978-8120352681

REFERENCES:

1. John F. Wakerly. *Digital Design: Principles and Practices*. Pearson Prentice Hall, 4 edition, 2006. ISBN 978-0131863897
2. R. H. Katz and G. Borriello. *Contemporary Logic Design*. Pearson Prentice-Hall, 2 edition, 2005. ISBN 978-0201308570
3. Brain Holdsworth and Clive Woods. *Digital Logic Design*. Elsevier Publisher, 4 edition, 2002. ISBN 978-0080477305

Discrete Mathematics

B.Tech – I Semester (20IT206)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

Students will be able to

CO1: Understand set theory, relations and functions to read , understand Mathematical Induction and construct mathematical arguments.

CO2: Understand combinatorics,logic and mathematical reasoning to count or enumerate objects in systematic way.

CO3: Construct recurrence relations for elementary problems, and Apply generating functions to solve recurrence relations.

CO4: Understand the concept of lattices and graph theory.

Course Outcomes:

After the course the students are expected to be able to

CLO1: Verify the correctness of an argument using propositional and predicate logic and truth tables.

CLO2: Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.

CLO3: Solve problems involving recurrence relations and generating functions.

CLO4: Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	2	2	-	-	-	-	-	-	-	-	-
CO 2	2	3	2	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	-	-	-	-	-	-	-	-	-
CO 4	2	1	2	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	3	2
CO 2	-	2	1
CO 3	-	2	2
CO 4	-	2	1

UNIT - I **(12 Hours)**

Set Theory: Sets and subsets, Venn Diagrams, Operations on sets, laws of set theory, Power sets and products, Partition of sets, The principle of inclusion - Exclusion.

Relations: Definition, Types of relation, Composition of relations, Domain and range of a relation, Representation of Relations, Operations of relation, Special properties of a binary relation, Equivalence Relations and Partial Ordering Relations , POSET diagram and lattice, Paths and Closures.

Functions: Definition and types of functions, Composition, Inverse and Identity of functions.

UNIT - II **(12 Hours)**

Logic: Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication, First order Logic & Other methods of proof, Rules of Inference for Quantified propositions, Mathematical Induction.

Elementary Combinatorics: Basics of Counting, Combinations and Permutations,Enumerating Combinations and Permutations with repetitions.

UNIT - III **(12 Hours)**

Recurrence relations: Generating functions of sequences, Calculating Coefficients of Generating Functions.

Solving recurrence relations by Substitution and generating functions. The methods of characteristic roots, solutions of inhomogeneous recurrence relations.

UNIT - IV **(12 Hours)**

Graphs: Basic concepts, Directed Graphs and Adjacency Matrices, Application: Topological Sorting.Isomorphisms and Subgraphs, Planar Graphs, Euler's Formula; Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem.

TEXT BOOKS:

1. Joe L.Mott, Abraham Kandel, and Theodore P.Baker. *Discrete Mathematics for Computer Scientists and Mathematicians*. Pearson Education, 2 edition, 2008. ISBN 9788120315020
2. Ralph P. Grimaldi. *Discrete and Combinatorial Mathematics*. Pearson Education, 5 edition, 2004. ISBN 978-8177584240

REFERENCES:

1. Kenneth H. Rosen. *Discrete Mathematics and its Applications*. McGraw Hill, 7 edition, 2012. ISBN 9780073383095
2. D.S. Malik and M.K. Sen. *Discrete Mathematical Structures: Theory and Applications*. Thomson, 3 edition, 2004. ISBN 9780619212858

Semiconductor Physics Lab

B.Tech – I Semester (20ITL201/PHL02)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIE Marks	:	30	SEE Marks	:	70	Credits	:	1.5

Prerequisites:

None

List of Experiments

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of radius of curvature of a plano convex lens by forming Newton's rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
11. Draw the load characteristic curves of a solar cell.
12. Determination of Hall coefficient of a semiconductor.
13. Determination of voltage and frequency of an A.C. signal using C.R.O.
14. Determination of Forbidden energy gap of Si & Ge.
15. Determination of wavelength of laser source using Diode laser.

Any three experiments are virtual

TEXT BOOKS:

1. P.Srinivasarao and K.Muralidhar. *Engineering physics laboratory manual*. Himalaya

English Communication Skills Lab

B.Tech – I Semester (20ITL202/ELL01)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIE Marks	:	30	SEE Marks	:	70	Credits	:	1.5

English Communication Skills (ECS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.

Prerequisites:

None

Course Objectives:

COB 1: to sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm

COB 2: to bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking

COB 3: to improve students' fluency in English and neutralize their mother tongue

COB 4: to make them use effective vocabulary both in formal and informal situations

Course Outcomes:

The student would be able to

CO 1: better understand the nuances of English language through audio-visual experience and group activities

CO 2: develop neutralization of accent for intelligibility

CO 3: build confidence to enhance their speaking skills

CO 4: use effective vocabulary both in formal and informal situations

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	-	-	-	-	-	-	-	-	3	3	2	2
CO 2	-	-	-	-	-	-	-	-	2	3	2	2
CO 3	-	-	-	-	-	-	-	-	3	3	2	2
CO 4	-	-	-	-	-	-	-	-	3	3	2	2

UNIT - I (12 Hours)

1.1 Listening Skills; Importance – Purpose- Process- Types

1.2 Barriers to Listening

1.3 Strategies for Effective Listening

UNIT - II (12 Hours)

2.1 Phonetics; Introduction to Consonant, Vowel and Diphthong sounds

2.2 Stress

2.3 Rhythm

2.4 Intonation

UNIT - III (12 Hours)

3.1 Formal and Informal Situations

3.2 Expressions used in different situations

3.3 Introducing Yourself & Others-Greeting & Parting-Congratulating-Giving Suggestions & Advices-Expressing Opinions-Inviting People-Requesting-Seeking Permission-Giving Information-Giving Directions- Sympathizing- Convincing People- Complaining & Apologizing-Thanking Others- Shopping- Travelling- Conversational Gambits

UNIT - IV (12 Hours)

4.1 JAM Session

4.2 Debates

4.3 Extempore

TEXT BOOKS:

1. Sanjay Kumar and Pushpa Lata. *Communication Skills*. Oxford University Press, 2011
2. J.D.O Connor. *Better English Pronunciation*. Cambridge University Press, 1984
3. Jack C Richards. *New Interchange*. Cambridge University Press, 4 edition, 2015
4. Grant Taylor. *English Conversation Practice*. Mc Graw Hill, 2001

SOFTWARE:

1. Buzzers for conversations, New Interchange series
2. English in Mind series, Telephoning in English
3. Speech Solutions, A Course in Listening and Speaking

Programming for Problem Solving Lab

B.Tech – II Semester (20ITL203/CSL01)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIE Marks	:	30	SEE Marks	:	70	Credits	:	1.5

Prerequisites:

None

LIST OF EXPERIMENTS

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 200	0.50 per unit
201 – 400	100 plus 0.65 per unit
401 – 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Commercial Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 100	0.50 per unit
101 – 200	50 plus 0.6 per unit
201 – 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
   (a) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} +$…upto ten terms
   (b) $x + \frac{x^3}{3!} + \frac{x^5}{5!} +$ … upto 7 digit accuracy
3. Write a C program to check whether the given number is
   (a) Prime or not.
   (b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
   (a) Mean
   (b) Mode
   (c) Median
   (d) Variance.
5. Write a C program to read a list of numbers and perform the following operations
   (a) Print the list.
   (b) Delete duplicates from the list.

(c) Reverse the list.

6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message “Element not found in the List”.
7. Write a C program to read two matrices and compute their sum and product.
8. A menu driven program with options (using array of character pointers).
   (a) To insert a student name
   (b) To delete a student name
   (c) To print the names of students
9. Write a C program to read list of student names and perform the following operations
   (a) To print the list of names.
   (b) To sort them in ascending order.
   (c) To print the list after sorting.
10. Write a C program that consists of recursive functions to
    (a) Find factorial of a given number
    (b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.
11. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author, and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message “required copies not in stock” is displayed. Write a program for the above in structures with suitable functions.
12. Write a C program to read a data file of students’ records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

Microprocessor and Microcontrollers

B.Tech – III Semester (20IT301)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

COB 1: Explain the basics of Microprocessors including their structure, operation and interface with systems.

COB 2: Understand the basics of interfacing various types of memory with microprocessors and micro computer

COB 3: Understand the basics of microprocessors interrupts and various microcontrollers.

COB 4: Know the standard ports and interface devices on a typical microcontroller.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Determine the basics of Microprocessors including their structure, operation and interface with systems.

CO 2: Illustrate the basics of interfacing various types of memory with microprocessors and micro computer

CO 3: Identify the basics of microprocessor's interrupts and various microcontrollers.

CO 4: Use the information of the standard ports and interface devices on a typical microcontroller.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	2	2	2	1	2	1	-	-	-	2	1	3
CO 2	2	2	2	2	2	1	-	-	-	2	1	2
CO 3	2	2	2	1	2	1	-	-	-	2	1	2
CO 4	2	2	2	1	2	1	-	-	-	2	1	2

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	3	3	3
CO 2	2	2	2
CO 3	2	2	2
CO 4	2	2	2

UNIT - I **(12 Hours)**

The 8086 Microprocessor Family, the 8086 Internal Architecture: 8086 Microprocessor Family, 8086 Internal Architecture, Addressing Modes, Instruction Set, 8086 family assembly language programming, Implementing standard program structures in 8086 assembly language, Strings, Procedures and Macros.

UNIT - II **(12 Hours)**

8086 System Connections, Timing: The Basic8086 Microcomputer System, 8086 Bus activities during the Read and Write Machine Cycles, 8086 pin Diagram; 8086 Interrupts and Interrupt Applications: 8086 Interrupts and Interrupts Responses.

UNIT - III **(12 Hours)**

Interfacing Peripherals and Applications: Interfacing the Microprocessor to the Keyboard, Alphanumeric displays; 8259 Priority Interrupt Controller, 8237 DMA Controller. The 8051 Microcontrollers – Assembly language Programming- JUMP, LOOP, CALL instructions.

UNIT - IV **(12 Hours)**

MICRO CONTROLLERS: I/O port Programming- addressing Modes, Arithmetic, Logic, Single – bit instructions and Programming-Timer Counter programming in the 8051, Interrupts Programming.

TEXT BOOKS:

1. Douglas V. Hall and SSSP Rao. *Microprocessors and its Interfacing*. McGraw-Hill Education, 3 edition, 2017. ISBN 978-1-259-00615-9

2. Muhammad Ali Mazidi and Janice Gillespie Mazidi. *The 8051 Microcontroller and Embedded Systems*. Pearson Edition, 2 edition, 2018. ISBN 978-81-317-1026-5

REFERENCES:

1. Glenn A. Gibson Yu-cheng Liu. *Microcomputer systems: The 8086 /8088 Family architecture,Programming and Design*. Pearson Edition, 2 edition, 2015. ISBN 978-9332550087

2. Barry B. Brey. *The Intel Microprocessors*. Pearson, 8 edition, 2018. ISBN 978-81-317-2622-8

Data Structures

(Common to CSE & IT)

B.Tech – III Semester (20IT302)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

Programming for Problem Solving (20IT204)

Course Objectives:

Students will be able to

CO1: Understand and remember algorithms and its analysis procedure and Compute the complexity of various algorithms.

CO2: Introduce the concept of data structures through ADT including List, Stack, Queues, dynamic equivalence problem and smart union algorithm.

CO3: Understand the concept of Binary tree, binary search tree,AVL tree and their applications.

CO4: Learn Hashing,graph representations and traversal methods.

Course Outcomes:

After the course the students are expected to be able to

CLO1: Determine the time complexities of different algorithms, and implement ADTâ€™s of different types of linked lists and applications.

CLO2: Implement stack and queue ADTs using arrays and linked lists and their applications.

CLO3: Construct and implement different tree algorithms.

CLO4: Implement and analyze various hashing techniques and Graph traversal methods.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	2	3	2	-	-	-	-	-	-	-	-	-
CO 2	2	3	3	-	-	-	-	-	-	-	-	-
CO 3	1	3	2	-	-	-	-	-	-	-	-	-
CO 4	1	2	3	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	3	2
CO 2	-	3	2
CO 3	-	2	1
CO 4	-	2	1

UNIT - I **(12 Hours)**

Algorithm Analysis: Mathematical Background, Model, what to Analyze, Running Time Calculations.
Lists: Abstract Data Types, The List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT: addition, multiplication operations.

UNIT - II **(12 Hours)**

Stacks and Queues: The Stack ADT and its applications such as Infix to Postfix expression conversions, Evaluation of Postfix expressions. The Queue ADT, Queue Application-Radix sort.
Basic Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Shell sort.

UNIT - III **(13 Hours)**

Trees: Preliminaries, Binary Trees, Expression trees, The Search Tree ADT, Binary Search Trees, Implementation. AVL Trees, Single Rotations, Double rotations, Implementations.

UNIT - IV **(13 Hours)**

Hashing: General Idea, Hash Function, Separate Chaining, Open Addressing.
Priority Queues (Heaps): Model, Simple implementations, Binary Heap, Heap Sort.
Disjoint Set ADT: Dynamic equivalence problem, Basic Data Structure, Smart Union Algorithms, Path Compression.

TEXT BOOKS:

1. Mark Allen Weiss. *Data Structures and Algorithm Analysis in C*. Pearson Education, 2 edition, 2013. ISBN 978-81-7758-358-8

REFERENCES:

1. M.J.Augeustein Y.Langsam and A.M.Tenenbaum. *Data Structures Using C*. Pearson Education Asia, 2 edition, 2006. ISBN 81-203-1177-9
2. Behrouz A. Forouzan Richard F.Gilberg. *Data Structures – A Pseudocode Approach with C*. ThomsonBrooks / COLE, 2 edition, 1998. ISBN 978-0-534-39080-8
3. J.E. Hopcroft Alfred Aho and J.D. Ullman. *Data Structures and Algorithms*. Pearson Education Asia, 1 edition, 1983. ISBN 978-0201000238

Object Oriented Programming

(Common to CSE & IT)

B.Tech – III Semester (20IT303)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

Programming for Problem Solving(20IT204)

Course Objectives:

COB 1: This course provides an introduction to object oriented programming (OOP) features encapsulation, abstraction and inheritance using the Java programming language.

COB 2: Understand the concept of Packages and Exception handling.

COB 3: Implement java applications using applets and events.

COB 4: Understand the AWT and Swing concepts in java.

COB 5: Be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Understand fundamentals of java programming such as variables, conditional and iterative execution, methods, etc.

CO 2: Understand the principles of inheritance.

CO 3: Analyze the concept of exception handling mechanism.

CO 4: Design the java applications using Java applet and Event handling and develop java applications using AWT and Swings.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	3	3	-	1	-	-	-	2	-	2	2
CO 2	-	2	3	-	2	-	-	-	-	-	-	-
CO 3	-	2	3	-	-	-	-	-	-	-	-	-
CO 4	-	2	2	-	-	-	-	-	2	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	2	-
CO 2	-	2	-
CO 3	-	3	-
CO 4	-	3	-

UNIT - I **(12 Hours)**

The History and Evolution of Java, An Overview of Java, Data Types, Variables and Arrays, Operators, Control Statements, Introducing Classes, A Closer Look at Methods and Classes.

UNIT - II **(12 Hours)**

Inheritance

Packages and Interfaces

Strings: String Constructors, Program using 10 String methods StringBuffer class, Program using 10 StringBuffer methods Introducing StringBuilder class.

Type Wrappers: Auto boxing/unboxing.

Collections: Collections Overview, Names of Collection Interfaces, Classes. Programs using Collection classes LinkedList <String>, ArrayList < String >

UNIT - III **(12 Hours)**

Exception Handling

Multithreaded Programming

I/O: I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter class, Reading and Writing Files, Automatically Closing a File

UNIT - IV **(12 Hours)**

The Applet Class: Applet Architecture, An Applet Skeleton, Applet program to draw shapes, setting Color, Font using Graphics class

Event Handling:

Introduction to AWT: Window Fundamentals, Program using AWT components Label, Text Field, Text Area, Checkbox, Checkbox Group, Button, Program using Flow Layout, Grid Layout, and Border Layout.

GUI Programming with Swing: The Origins of Swing, Advantages of Swing over AWT, The MVC Connection, Program using Swing Components JLabel, JText Field, JText Area, JCheck box, JButton, JTabbed Pane, JTable, JTree, JCombo Box

TEXT BOOKS:

1. Herbert Schildt. *Java The Complete Reference*. Tata McGraw Hill, 9 edition, 7 2017b. ISBN 978-5845917591

REFERENCES:

1. John Wiley Cay Horstmann and Sons. *Big Java*. Wiley, 4 edition, 2009. ISBN 978-0470509487
2. H.M.Dietel and P.J.Dietel. *Java How to Program (Early Objects)*. Pearson Education, 11 edition, 2018. ISBN 978-9353062033

Operating System

(Common to CSE & IT)

B.Tech – III Semester (20IT304)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

COB 1: Have a thorough understanding of the fundamentals of Operating Systems

COB 2: Learn the mechanisms of OS to handle processes and threads and their communication

COB 3: Learn the mechanisms involved in memory management in contemporary OS and Gain knowledge on Mutual exclusion algorithms, deadlock detection algorithms

COB 4: Gain knowledge on file I/O operations and protection of various OS.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Understand different structures, services of the operating system and the use of scheduling and operations on process.

CO 2: Understand the use of scheduling, operations on process, the process scheduling algorithms and synchronization concepts.

CO 3: Understand the concepts of deadlock, memory and virtual memory management techniques.

CO 4: Understand the concepts of File System, Input/output systems and system protection of various operating systems.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	-	1	2	-	1	-	-	-	1	-	-	-
CO 2	-	1	2	1	-	-	-	-	-	-	-	-
CO 3	-	-	-	1	-	-	-	-	-	-	-	-
CO 4	-	-	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	2	-
CO 2	1	2	-
CO 3	-	1	-
CO 4	-	1	-

UNIT - I (12 Hours)

Introduction: What OSs do?, Computer System Operation, Storage structure, OS Structure, OS Operations.

Operating-System Structures: OS Services, User and operating system Interface, System Calls, Types of System Calls, System Programs, OS Design and Implementation, OS Structure.

Processes: Process Concept, Process Scheduling, Operations on Processes, Inter- process Communication.

Threads: Overview, Multicore Programming, Multithreading Models.

Sections:1.1, 1.2.1, 1.2.2, 1.4, 1.5, 1.5.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.7.1, 2.7.2, 2.7.3, 2.7.4, 3.1, 3.2, 3.3, 3.4, 4.1, 4.2, 4.3

UNIT - II (12 Hours)

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of Synchronization, Monitors.

Sections: 6.1, 6.2, 6.3, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8

UNIT - III (12 Hours)

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery.

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table.

Virtual-Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Other Considerations.

Sections: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.9

UNIT - IV (12 Hours)

File System Interface: File concept, Access Methods, Directory and Disk Structure. **File System Implementation**: File System Structures, Directory Implementation, Allocation Methods. **Protection**: Goals of Protection, Principles of Protection, Domain of Protection- Domain Structure, Access Matrix, Implementation of Access Matrix.

Mass Storage Structure: Over View, Disk Structure, Disk Scheduling, Disk Management, RAID levels

Sections:10.1, 10.2, 10.4, 10.5, 10.7, 11.1, 11.2, 11.3, 11.5, 12.1, 12.3, 12.4, 14.1, 14.2, 14.3, 14.3.1, 14.4, 14.5

TEXT BOOKS:

1. Greg Gagne Avil Silberschatz, Peter Baer Galvin. *Operating system Concepts*. 4 2018. ISBN 978-1-118-06333-0. doi: https://www.os-book.com/OS10/

REFERENCES:

1. William stallings. *Operating system : Internals and Design principles*. Pearson, 9 edition, 2019. ISBN 978-9352866717

2. Herbert Bos Andrew S. Tanenbaum. *Moderen Operating systems*. Prentice Hall, 4 edition, 2015. ISBN 978-0-13-359162-0

Computer Organization

(Common to CSE & IT)

B.Tech – III Semester (20IT305)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

Digital Logic Design(20IT205)

Course Objectives:

Students will be able to

COB 1: Conceptualize the basics of organizational and architectural issues of a digital computer and Classify and compute the performance of machines, Machine Instructions.

COB 2: Learn about various data transfer techniques in digital computer and the I/O interfaces.

COB 3: Estimate the performance of various classes of Memories, build large memories using small memories for better performance and Relate to arithmetic for ALU implementation

COB 4: Understand the basics of hardwired and micro-programmed control of the CPU, pipelined architectures , Hazards and Superscalar Operations.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Explain the basics of organizational and architectural issues of a digital computer and Classify and compute the performance of machines, Machine Instructions.

CO 2: Describe various data transfer techniques in digital computer and the I/O interfaces.

CO 3: Analyze the performance of various classes of Memories, build large memories using small memories for better performance and analyze arithmetic for ALU implementation

CO 4: Describe the basics of hardwired and micro-programmed control of the CPU, pipelined architectures , Hazards and Superscalar Operations

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	2	-	-	-	-	-	-	-	-	1	-	1
CO 2	2	-	3	-	-	-	-	-	-	1	3	1
CO 3	-	3	3	-	-	-	2	-	1	1	-	1
CO 4	3	-	3	-	-	-	-	-	-	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	2	-
CO 2	3	2	-
CO 3	-	2	-
CO 4	-	2	-

UNIT - I (11 Hours)

Data Representation: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation.

Register Transfer Language and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, Logic micro operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

UNIT - II (11 Hours)

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic.

Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit.

UNIT - III (11 Hours)

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer vs Complex Instruction Set Computers.

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms.

UNIT - IV (12 Hours)

The Memory System: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor.

TEXT BOOKS:

1. Hamacher Carl, ZvonkoVranesic, and SafwatZaky. *Computer Organization and Embedded Systems*. McGraw Hill, 6 edition, 2014. ISBN 9781259005275

REFERENCES:

1. Stallings William. *Computer Organization and Architecture*. Pearson/PHI, 11 edition, 03 2019. ISBN 9780135188941

2. Kaufmann Morgan. *Computer Architecture –A Quantitative Approach*. Pearson/PHI, 6 edition, 12 2017. ISBN 978-0128119051

3. M. Morris Mano. *Computer Systems Architecture*. Pearson/PHI, 3 edition, 5 2004. ISBN 978-9332585607

4. Hayes John P. *Computer Architecture and Organization*. McGraw Hill, 3 edition, 6 1998. ISBN 9781259028564

Technical English

B.Tech – III Semester (20IT306/EL02)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	2

Prerequisites:

None

Course Objectives:

The course aims

COB 1: at enhancing the vocabulary competency of the students

COB 2: to introduce corrective measures to eliminate grammatical errors in speaking and writing

COB 3: to learn writing as a process, including various invention heuristics (such as brainstorming), gathering evidence, considering audience, drafting, revising, editing, and proofreading

COB 4: use grammatical, stylistic, and mechanical formats and conventions appropriate for a variety of purposes

COB 5: produce coherent, organized, readable prose for a variety of rhetorical situations

Course Outcomes:

The student would be able to

CO 1: make use of contextual clues to infer meanings of unfamiliar words from context

CO 2: understand how to apply technical information and knowledge in practical documents for a variety of purposes

CO 3: use grammatical, stylistic, and mechanical formats and conventions appropriate to various audiences and disciplines

CO 4: build confidence to participate actively in writing activities (individually and in collaboration) that model effective technical communication in the workplace

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	-	-	-	-	-	-	1	2	-	3	2	2
CO 2	-	-	-	-	-	-	-	2	-	3	2	2
CO 3	-	-	-	-	-	-	-	2	-	3	2	2
CO 4	-	-	-	-	-	-	-	2	2	3	2	2

UNIT - I (12 Hours)

Vocabulary Development: Familiarising Idioms & Phrases
Grammar for Academic Writing: Making Requests
Language Development: Using Transition & Link words
Technical Writing: Letter Writing & Email Writing

UNIT - II (10 Hours)

Vocabulary Development: Analogous words, Gender Sensitive language
Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The Future: Predicting & Proposing
Language Development: Cloze tests
Technical Writing: Technical Reports

UNIT - III (10 Hours)

Vocabulary Development: Abbreviations & Acronyms
Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival & Adverbial groups
Language Development: Transcoding (Channel conversion from chart to text)
Technical Writing: Circular, Memos, Minutes of Meeting

UNIT - IV (10 Hours)

Vocabulary Development: Corporate vocabulary
Grammar for Academic Writing: Inversions & Emphasis
Language Development: Reading Comprehension
Technical Writing: Resume Preparation

REFERENCES:

1. Sanjay Kumar and Pushpa Latha. *Communication Skills*. Oxford University Press, 2011b
2. *Technical Communication Principles and Practice*. Oxford University Press, 2014
3. Michael Vince. *Advanced Language Practice*. MacMilan Publishers, 2003
4. Edgar Thorpe and Showick. *Objective English*. Pearson Education, 3 edition, 2009
5. Angela Downing and Philip Locke. *English Grammar: A University Course*. Taylor and Francis Group, 2 edition, 2016

Data Structures Lab

(Common to CSE & IT)

B.Tech – III Semester (20ITL301)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIA Marks	:	30	SEE Marks	:	70	Credits	:	1.5

List of Experiments

1. Write a program to perform the following operations on Array List 1.Creation,2.Insertion, 3.Deletion, 4.Search, 5.Display.
2. Write a program that reads two lists of elements, prints them, reverses them,Prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list using array list.
3. Write a program to perform the following operations on Single Linked List. a)Creation b)Insertion c)Deletion d)Search e)Display.
4. Write a program to perform the following operations on Doubly Linked List. a)Creation b)Insertion c)Deletion d)Search e)Display.
5. Write a program to perform addition and multiplication of two polynomials using single Linked List.
6. Write a program to implement the following using stack. a) infix to postfix conversion b) postfix evaluation
7. Write a program that performs Radix sort on a given set of elements using queue.
8. Write a program to perform the following operations on Disjoint Set. a)Make-Set b)Find-Set c)Union.
9. Write a program to read n numbers in an array. Redisplay the arraylist with elements being sorted in ascending order using Heap Sort.
10. Write a program to demonstrate Binary Expression tree.
11. Write a program to perform Binary Search tree operations and traversals.
12. Write a program to implement AVL tree that interactively allows (a) Insertion (b)Deletion (c) Find_min (d) Find_max.
13. Write a program to implement DFS & BFS graph traversing techniques.
14. Write a program to find an element using Open Addressing.

Object Oriented Programming Lab

(Common to CSE & IT)

B.Tech – III Semester (20ITL302)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIA Marks	:	30	SEE Marks	:	70	Credits	:	1.5

List of Experiments

1. Write a java program to demonstrate static member, static method and static block.
2. Write a java program to demonstrate method overloading and method overriding.
3. Write a java program to implement multiple inheritance.
4. Write a java program to demonstrate finals, blank finals, final methods, and final classes.
5. Write a program to demonstrate packages.
6. Write a java program to demonstrate interfaces.
7. Write a java program to crate user defined exception class and test this class.
8. Write a java program to demonstrate synchronous keyword.
9. Write am applet program to demonstrate Graphics class.
10. Write GUI application which uses awt components like label, button, text filed, text area, choice, checkbox, checkbox group.
11. Write a program to demonstrate MouseListener, MouseMotionListener, KeyboardListener, ActionListener, ItemListener.
12. Develop swing application which uses JTree, Jtable, JComboBox.

Linux Essentials

(Common to CSE & IT)

B.Tech – III Semester (20ITS301) List of Experiments

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	3
CIA Marks	:	30	SEE Marks	:	70	Credits	:	3.5

Lab Cycle I: AWK Programming

1. Design a command wishme that will greet you good morning, good afternoon when you enter time.
2. Design a command verbosedate that displays day and month completely spelled.
3. Design a command fages that will list the files and their ages, to date.
4. Design a command word-freq that will print the words and number of occurrences of that word in the given text.
5. Design a command reminders that will print the events happening today, where events and their dates are edited in the file events.
6. Design a command backwards that will prints the line and reverse order.
7. Design a command sales-totals that will consolidate the sales made by salespersons, from the file sales where each line contains the name of sales person and sales made.
8. Design a command wcount that will count the number of words in a file.
9. Design a command sqeeze that will convert tabs or more than one blank space to one blank one blank space.
10. Design a command replaceover that will replace the variable with the specified variable in a file.

Lab Cycle II: Shell Scripts and Programming

1. Design a command which prints the path of the command (file) given as argument.
2. Design a command search that prints the path of the given file as argument located in your home directory.
3. Design a command file list $[-c < char >]$ which prints all file names beginning with the character specified as argument to the command, if the option is not specified it should print all the file names.
4. Design a command monthly-file $[-m < month >]$ which lists the files created in a given month where month is an argument to the command. If the option is not specified, it lists the files in all the months.
5. Design a command getline $[-f < filename > -n < lineno >]$ which prints the line number lineno in the file specified with $-f$ option. If the line number is not specified it should list all the lines in the given file.
6. Design a command listlines $[-f < filename > -v < varname >]$ which prints the line from the given file filename, which containing the variable varname. If varname is not specified it should list all the lines.

7. Program which takes two file names as arguments, if their contents are same then remove the second file.

Lab Cycle III: : File & Process Management Programming

1. Write a program for copy data from source file to destination file, where the file names are provided as command-line arguments.
2. Write a program that reads every 100th byte from the file, where the file name is given as command line argument.
3. Write a program to display information of a given file which determines type of file and inode information, where the file name is given as command-line argument.
4. Write a program to display information about the file system.
5. Write a program for demonstrating dup and dup2 system calls.
6. Write a program that prints entries in a directory.
7. Write a program that prints files recursively in a given directory.
8. Write a program to create a process by using fork()system call.
9. Write a program to create an Orphan Process.
10. Writea program to demonstrate Zombie process.
11. Write a program to demonstrate a parent process that use wait() system call to catch child's exit code.
12. Program that demonstrates both child and parent processes writes data to the same file.

Lab Cycle IV: : Signal and IPC Programming

1. Write a program for Requesting an alarm signal to executes user defined alarm handler.
2. Write a program to demonstate terminal signals (control-c & control-z).
3. Write a program to Override child termination signal by the parent process.
4. Write a program to demonstrate Suspending and Resuming Processes.
5. Write a program for Un-named pipes to send data from first process to the second process.
6. Write two C programs that demonstrates Named pipes, Reader and Writer Processes.
7. Write C program that demonstrates IPC through shared memory.

Probability and Statistics

B.Tech – IV Semester (20IT401/MA03)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

UNIT - I (12 Hours)

Probability Densities: Continuous Random Variables, The Normal Distribution, The Normal Approximation to the Binomial Distribution, The Uniform Distribution, The Gamma Distribution, The Beta Distribution, The Weibull distribution, Joint Distributions - Discrete and Continuous.
(Sections 5.1, 5.2, 5.3, 5.5, 5.7, 5.8, 5.9, 5.10 of the Text Book)

UNIT - II (12 Hours)

Sampling Distributions: Populations and Samples, The sampling distribution of the mean (σ known), The sampling distribution of the mean (σ unknown), The sampling distribution of the variance.
Inferences Concerning a Mean: Point estimation, Interval estimation, Tests of Hypotheses, Null Hypotheses and Tests of hypotheses, Hypothesis concerning one mean.
(Sections 6.1, 6.2, 6.3, 6.4, 7.1, 7.2, 7.4, 7.5, 7.6 of the Text Book)

UNIT - III (12 Hours)

Comparing Two Treatments: Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Matched pairs comparisons.
Inferences Concerning Variances: The estimation of variances, Hypotheses concerning one variance, Hypotheses concerning two variances.
(Sections 8.2, 8.3, 8.4, 9.1, 9.2, 9.3 of the Text Book)

UNIT - IV (12 Hours)

Inferences Concerning Proportions: Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions.
Regression Analysis: The method of least squares, Curvilinear regression, Multiple regression, Correlation.
(10.1, 10.2, 10.3, 11.1, 11.3, 11.4, 11.6 of the Text Book)

TEXT BOOKS:

1. Richard A. Johnson. *Miller and Freund's Probability and Statistics for Engineers*. PHI, 8 edition

REFERENCES:

1. R.E Walpole, R.H. Myers, and S.L. Myers. *Probability & Statistics for Engineers and Scientists*. PHI, 6 edition

Web Technologies

B.Tech – IV Semester (20IT402)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

Students will be able to

CO1: Analyze a web page and identify its elements and attributes.

CO2: Create web pages using HTML5 and Cascading Styles sheets.

CO3: Build dynamic web pages using JavaScript (client side programming).

CO4: Design web pages with functionality using jQuery.

Course Outcomes:

After the course the students are expected to be able to

CLO1: Design web pages with different elements and attributes.

CLO2: Build websites with dynamic functionality using javascript.

CLO3: Identify the functionality of XML and create an XML document and display data from XML document.

CLO4: Create Ajax based web applications.

UNIT - I **(15 Periods)**

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.

UNIT - II **(15 Periods)**

CSS: Overview of CSS, 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.
Dynamic HTML: Overview of JavaScript, JavaScript Functions, Events, Image Maps, and Animations.

UNIT - III **(15 Periods)**

Dynamic HTML(Cont..): JavaScript Objects, Working with Browser Objects, Working with Document Object.
Document Object Model: Understanding DOM Nodes, Understanding DOM Levels, Understanding DOM Interfaces - Node , Document, Element, Attribute.

UNIT - IV **(15 Periods)**

XML: Working with Basics of XML, Implementing Advanced Features of XML, Working with XSLT.
AJAX: Overview of AJAX, Asynchronous Data Transfer with XMLHttpRequest, Implementing AJAX Frameworks, Working with jQuery.

TEXT BOOKS:

1. Kogent Learning Solutions Inc. *HTML 5 Black Book:Covers CSS3, Javascript,XML,XHTML,AJAX,PHP,and jQuery*. Wiley India Pvt. Ltd, 7 2011. ISBN 978-9350040959

REFERENCES:

1. Abbey Deitel Paul Deitel, Harvey Deitel. *Internet and World wide web: How to program*. Pearson, 11 edition, 2011. ISBN 9780132990455

2. Dori smith Tom Negrino. *Javascript and Ajax for the Web*. Peachpit Press PTG, 7 edition, 2009. ISBN 9780321564085

Database Management System

B.Tech – IV Semester (20IT403)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

Students will be able to

COB 1: Describe the fundamental elements of relational database management systems.

COB 2: Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

COB 3: Design ER-models to represent simple database application scenarios.

COB 4: Improve the database design by normalization.

COB 5: Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B trees and B+ trees.

COB 6: Familiar with basic concurrency control techniques and recovery techniques.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Ability to apply knowledge of database design methodology which give a good formal foundation in relational data model and Understand and apply the principles of data modeling using ER Model.

CO 2: Familiar with relational DB theory and will able to write relational algebra expressions, Relational Calculus and SQL.for query

CO 3: Design database schema and Identify and solve the redundancy problem in database tables using normalization.

CO 4: Understand transaction processing, concurrency control and recovery techniques.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	1	3	3	-	-	-	-	-	-	-	-	-
CO 2	-	2	2	-	-	-	-	-	-	-	2	2
CO 3	1	3	3	-	1	-	-	-	-	-	2	2
CO 4	-	-	2	-	-	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	-	1	-
CO 2	-	-	-
CO 3	-	1	-
CO 4	-	1	-

UNIT - I **(12 Hours)**

Databases and Database Users: Introduction - An Example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach.

Database System Concepts and Architecture: DataModels, Schemas and Instances ,Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs.

Data Modelling Using the Entity-Relationship (ER) Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database - ER Diagrams, Naming Conventions, and Design Issues.

UNIT - II **(12 Hours)**

The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, The Tuple Relational Calculus, The Domain Relational Calculus.

Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE, and UPDATE Statements in SQL , Views (Virtual Tables) in SQL.

UNIT - III **(12 Hours)**

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes - Dynamic Multilevel Indexes Using B-Trees and B+-Trees.

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

Relational Database Design Algorithms and Further Dependencies: Properties of Relational Decompositions -Lossless Join Decomposition and Dependency Preserving Decomposition, Algorithms for Relational Database Schema Design, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT - IV **(12 Hours)**

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability.

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multi version Concurrency Control Techniques, Validation (Optimistic) Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking.

Database Recovery Techniques: Recovery Concepts, Recovery Techniques Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging.

TEXT BOOKS:

1. Ramez Elmasri and Navate. *Fundamentals of Database Systems*. Pearson Education, 6 edition, 2017. ISBN 978-0-136-08620-8

REFERENCES:

1. Johannes Gehrke Raghurama Krishnan. *Data base Management Systems*. TATA McGrawHill, 3 edition, 2014. ISBN 978-8131769591
2. Korth Silberschatz. *Data base System Concepts*. McGraw hill, 6 edition, 2013. ISBN 978-9332901384
3. C.J.Date. *Introduction to Database Systems*. Pearson Education, 8 edition, 2006. ISBN 978-8177585568

Design and Analysis of Algorithms

B.Tech – IV Semester (20IT404)

Lectures	:	3 Hours / Week	Tutorial	:	0	Practical	:	0
CIE Marks	:	30	SEE Marks	:	70	Credits	:	3

Prerequisites:

None

Course Objectives:

The purpose of this course is to acquaint the student with an overview of the theoretical foundations of computer science from the perspective of formal languages.

COB 1: Understand about designing and effectiveness of an algorithm, and divide and conquer method.

COB 2: Understand the optimal solution finding with the greedy and dynamic programming method

COB 3: Easy know the major graph algorithms and their analyses, and backtracking information.

COB 4: Get the ability to branch with bound value and NP problems.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Explains Algorithm design and efficiency and master theorem

CO 2: Solve divide and conquer and greedy problems.

CO 3: Design the algorithms like dynamic and graph type tasks.

CO 4: Recognize the solutions for back tacking and branch and bound and also NP problems.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO 1	3	2	3	2	3	-	2	-	-	2	2	3
CO 2	2	2	2	2	2	-	2	-	-	2	2	2
CO 3	3	3	3	3	3	-	2	-	-	2	2	3
CO 4	2	2	1	2	2	-	2	-	-	2	2	2

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	3	3	1
CO 2	2	3	1
CO 3	2	3	2
CO 4	2	3	2

UNIT - I **(12 Hours)**

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh-notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis

Master Theorem: Introduction, Generic Form- Case1, Case2, Case3, Inadmissible equations, Application to common algorithms

UNIT - II **(12 Hours)**

Divide and conquer : General method , applications - Quick sort, Merge sort, Strassen's matrix multiplication.

Greedy method : General method, applications-Job sequencing with deadlines, Fractional knapsack problem, Minimum cost spanning trees - Prims, Kruskal, Single source shortest path problem - Dijkstra.

UNIT - III **(12 Hours)**

Dynamic Programming: General method, applications - 0/1 knapsack problem, Travelling salesperson problem, Longest common sequence algorithm, Multistage graphs using Forward & Backward approach, Reliability design.

Graph Searching and Traversal: Graph traversals - Depth first, Breadth first, Bio Connected Components, Strongly Connected Components.

UNIT - IV **(12 Hours)**

Back tracking: General method, applications-n-queen problem, sum of subsets problem.

Branch and Bound: General method, applications - 0/1 knapsack problem- LC Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP-Hard and NP Complete classes, Cook's theorem.

TEXT BOOKS:

1. S. Sahni E. Horowitz and S.Rajsekran. *Fundamentals of Computer Algorithms*. Orient Longman, 2 edition, 2018. ISBN 978-8-173-71612-6

REFERENCES:

1. Michael Soltys-kulinicz. *Introduction to the Analysis Of Algorithms*. World Scientific, 3 edition, 2018. ISBN 978-9813235908

2. Anany Levitin. *Introduction to the Design and Analysis of Algorithms*. Pearson, 3 edition, 2017. ISBN 978-9332585485

Web Technologies Lab

B.Tech – IV Semester (20ITL401)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIE Marks	:	30	SEE Marks	:	70	Credits	:	1.5

List of Experiments

1. Design web pages to demonstrate different types of styles in CSS.
2. Write java scripts covering Function, recursive functions, Arrays and Objects.
3. Demonstrate collection objects.
4. Demonstrate event model.
5. Write well-formed and valid XML documents.
6. Write code for displaying XML using XSL.
7. Demonstrate Document Object Model for an XML document.
8. Demonstrate web applications using AJAX.
9. Installation of IIS and Apache Tomcat servers.
10. Demonstrate web applications using Jquery.

RDBMS Lab

B.Tech – IV Semester (20ITL402)

Lectures	:	0 Hours / Week	Tutorial	:	0	Practical	:	3
CIE Marks	:	30	SEE Marks	:	70	Credits	:	1.5

Prerequisites:

None

List of Experiments

1. **Working with DDL, DML, DCL and Key Constraints**
   Creation, Altering and Dropping of Tables and Inserting Rows into a Table (Use Constraints While Creating Tables) Examples Using Select Command.

2. **Working with Queries and Nested QUERIES**
   Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.

3. **Working with Queries USING Aggregate Operators & views**
   Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and Dropping of Views.

4. **Working with Conversion Functions & String Functions**
   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.

5. **Working with LOOPS using PL/SQL**
   Program Development using WHILE LOOPS, FOR LOOPS, Nested Loops using ERROR Handling.

6. **Working with Functions Using PL/SQL**
   Program Development using Creation of Stored Functions, Invoke Functions in SQL Statements and Write Complex Functions.

7. **Working with Stored Procedures**
   Programs Development using Creation of Procedures, Passing Parameters IN and OUT of PROCEDURES.

8. **Working with CURSORS**
   Develop Programs using Features Parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of Clause and CURSOR Variables.

9. **Working with Triggers using PL/SQL**
   Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

TEXT BOOKS:

1. Benjamin Rosenzweig and Elena Silvestrova. *Oracle PL/SQL by Example*. Pearson Education, 3 edition
2. Scott Urman. *Oracle Database Logic PL/SQL Programming*. Tata Mc-Graw Hill
3. P.S. Deshpande. *SQL and PL/SQL for Oracle 10g - Black Book*

Python Programming

B.Tech – IV Semester (20ITL403/SO02)

Lectures	:	1 Hours / Week	Tutorial	:	0	Practical	:	2
CIE Marks	:	30	SEE Marks	:	70	Credits	:	2

Prerequisites:

None

Course Objectives:

The course aims

COB 1: to enable the students to identify the syntax and semantics of Python

COB 2: to enable students to write python scripts for solving real time problems

COB 3: to enhance the object oriented programming skills of the students

Course Outcomes:

After completing the course the students would be able to

CO 1: write programs using basic Python constructs

CO 2: write programs using sequences in Python

CO 3: write programs using object oriented programming concepts

CO 4: write programs that handle exceptional conditions

UNIT - I

(4 Hours)

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.

Conditional execution: Boolean expressions, logical operators, conditional execution, alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, short-circuit evaluation of logical expressions.

Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.

Functions: function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

UNIT - II

(5 Hours)

Strings: a string is a sequence, getting the length of a string using len, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.

Files I/O: persistence, opening files, text files and lines, reading files, searching through a file, letting the user choose the file name, using try except and open, writing files.

Lists: a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments.

Dictionaries: dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.

Tuples: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignment with dictionaries, the most common words, using tuples as keys in dictionaries, sequences.

UNIT - III

(3 Hours)

Regular expressions: character matching in regular expressions, extracting data using regular expressions, combining searching and extracting, escape character.

ObjectOriented Programming: Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem: Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances, Inheritance.

UNIT - IV

(2 Hours))

Exception Handling: Errors and Exceptions(From Web References text 1).

Using Databases and SQL: Database concepts, Database Browser for SQLite, creating a database table, Structured Query Language summary, Basic data modeling, Programming with multiple tables, three kinds of keys, Using JOIN to retrieve data.

LIST OF EXPERIMENTS

1. Write a script to print some Pythagorean triples.
2. Write a script that demonstrates string handling capabilities of Python.
3. Write a script that demonstrates associated arrays support in Python.
4. Write a script to print Fibonacci numbers up to and including the first command line argument.
5. Write a simple script that reads from a file details of students in a section and finds top ten meritorious students in the section.
6. Write a script to Implement Stack
7. Write a script to Implement Queue

Textbooks

1. Charles R Severance. *Python for Everybody: Exploring Data in Python 3*. 4 2016. ISBN 978-1530051120. doi: https://www.py4e.com/book

2. Ljubomir Perkovic. *Introduction to Computing Using Python: An Application Development Focus*. Wiley, 2 edition, 8 2015. ISBN 978-1118890943

3. Guido van Rossum and Jr Fred L. Drake. *Python Tutorial*. Python Software Foundation. doi: https://docs.python.org/3/

References

1. Kenneth A. Lambert. *Fundamentals oF Python : First Programs*. Cengage, 2 edition, 2019. ISBN 978-1337560092

Professional Ethics & Human Values

(Common to CSE & IT)

B.Tech – IV Semester (MC02)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	0	Credits	:	0

Prerequisites:

None

Course Objectives:

Student will be able to

CO1: Comprehend a specific set of behaviours and values any professional must know and must abide by, including confidentiality, honesty and integrity. Understand engineering as social experimentation.

CO2: Know, what are safety and Risk and understand the responsibilities and rights of an engineer such as collegiality, loyalty, bribes/gifts.

CO3: Recognize global issues visualizing globalization, cross-cultural issues, computer ethics and also know about ethical audit

CO4: Discuss case studies on Bhopal gas tragedy, Chernobyl and about codes of Institute of Engineers, ACM

Course Outcomes:

Student will be able to

CLO1: Comprehend a specific set of behaviours and values the professional interpreter must know and must abide by, including confidentiality, honesty and integrity

CLO2: Understand professional responsibilities and rights, prejudice in not asking for clarification, fear of law and plain neglect will lead to the occurrence of many repetitions of past mistakes

CLO3: Understand the responsibility of engineer to ensure safety of public by making risk-benefit analysis.

CLO4: Address the global issues that curbs ethics in environment and computer discipline. The students can speak out against issues in these areas affecting the public interest

CLO5: Understand the supplemented guidelines that are intended for decision making in the conduct of professional work

UNIT - I **(12 Hours)**

Human Values: Morals, Values and Ethics, Integrity, Work Ethics, Service and Learning, Civic Virtue, Respect for Others, Living Peacefully, Caring and Sharing, Honesty, Courage, Value Time, Cooperation, Commitment and Empathy,Spirituality,Character.

Engineering Ethics: History of Ethics, Engineering Ethics, Consensus and Controversy, Profession and Professionalism, Professional Roles of Engineers, Self Interest, Customs and Religion, Uses of Ethical Theories, Professional Ethics, Types of Inquiry, Kohlberg's Theory, Gilligan's Argument, Heinz's Dilemma.
Engineering as Social Experimentation: Comparison with Standard Experiments, Knowledge Gained, Conscientiousness, Relevant Information, Learning from the Past, Engineers as Managers, Consultants, and Leaders, Accountability, Roles of Codes, Codes and Experimental Nature of Engineering.

UNIT - II **(12 Hours)**

Engineers' Responsibility for Safety and Risk: Safety and Risk, Types of Risks, Safety and the Engineer, Designing for Safety, Risk-Benefit Analysis, Accidents.
Responsibilities and Rights: Collegiality, Two Senses of Loyalty, Obligations of Loyalty, Misguided Loyalty, Professionalism and Loyalty, Professional Rights, Professional Responsibilities, Conflict of Interest, Self-interest, Customs and Religion, Collective Bargaining, Confidentiality, Acceptance of Bribes/Gifts, Occupational Crimes, Whistle Blowing.

UNIT - III **(12 Hours)**

Global Issues: Globalization, Cross-cultural Issues, Environmental Ethics, Computer Ethics, Weapons Development, Ethics and Research, Analyzing Ethical Problems in Research, Intellectual Property Rights (IPRs).
Ethical Audit: Aspects of Project Realization, Ethical Audit Procedure, The Decision Makers, Variety of Interests, Formulation of the Brief, The Audit Statement, The Audit Reviews.

UNIT - IV **(12 Hours)**

Case Studies: Bhopal Gas Tragedy, The Chernobyl Disaster.
Appendix1: Institution of Engineers (India): Sample Codes of Ethics.
Appendix2: ACM Code of Ethics and Professional Conduct.

TEXT BOOKS:

1. V.S.SenthilKumar M.GovindaRajan, S.Natarajan. *Professional Ethics and Human Value*. PHI, 2013. ISBN 9788120348165

REFERENCES:

1. Ronald Schinzinger Mike W Martin. *Ethics in Engineering*. TMH, 7 2017. ISBN 9780072831153

Bibliography

Technical Communication Principles and Practice. Oxford University Press, 2014.

A.Anandkumar. *Fundamentals of Digital Circuits*. PHI, 4 edition, 1 2016. ISBN 978-8120352681.

J.E. Hopcroft Alfred Aho and J.D. Ullman. *Data Structures and Algorithms*. Pearson Education Asia, 1 edition, 1983. ISBN 978-0201000238.

Chatwal Anand. *Instrumental methods of chemical analysis*. Himalaya.

Herbert Bos Andrew S. Tanenbaum. *Moderen Operating systems*. Prentice Hall, 4 edition, 2015. ISBN 978-0-13-359162-0.

Avadhanulu and Kshirsagar. *A Text Book of Engineering Physics*. S.Chand and Co., 2013.

Greg Gagne Avil Silberschatz, Peter Baer Galvin. *Operating system Concepts*. 4 2018. ISBN 978-1-118-06333-0. doi: https://www.os-book.com/OS10/.

Arun Bahl, B.S. Bahl, and G.D.Tuli. *Essential Of Physical Chemistry*. S Chand, 12 edition, 2012.

David A. Bell. *Electronic Devices and Circuits*. Oxford University Press, 5 edition.

Erach Bharucha. *Text Book of environmental Studies*.

N.D. Bhatt and V.M. Panchal. *Engineering Drawing-First angle projection*. Charotar Publishing House.

S.K. Bhattacharya. *Basic Electrical and Electronics Engineering*. Pearson.

Robert L. Boylestad and Louis Nashelsky. *Electronic Devices and Circuit Theory*. PHI, 11 edition.

Barry B. Brey. *The Intel Microprocessors*. Pearson, 8 edition, 2018. ISBN 978-81-317-2622-8.

B.S.Grewal. *Higher Engineering Mathematics*. Khanna, 44 edition, 2017a.

B.S.Grewal. *Higher Engineering Mathematics*. Khanna, 44 edition, 2017b.

Kernighan BW and Dennis Ritchie M. *The C programming language*. Prentice Hall, 2 edition, 2015. ISBN 987-93-325-4944-9.

Hamacher Carl, ZvonkoVranesic, and SafwatZaky. *Computer Organization and Embedded Systems*. McGraw Hill, 6 edition, 2014. ISBN 9781259005275.

John Wiley Cay Horstmann and Sons. *Big Java*. Wiley, 4 edition, 2009. ISBN 978-0470509487.

Seshi Chawla. *Engineering Chemistry*. Dhanpat Rai, 13 edition, 2013.

C.J.Date. *Introduction to Database Systems*. Pearson Education, 8 edition, 2006. ISBN 978-8177585568.

J.D.O Connor. *Better English Pronunciation*. Cambridge University Press, 1984.

S.S. Dara. *A text book on experiments and calculations- Engineering Chemistry*.

P.S. Deshpande. *SQL and PL/SQL for Oracle 10g - Black Book*.

Angela Downing and Philip Locke. *English Grammar: A University Course*. Taylor and Francis Group, 2 edition, 2016.

S. Sahni E. Horowitz and S.Rajsekran. *Fundamentals of Computer Algorithms*. Orient Longman, 2 edition, 2018. ISBN 978-8-173-71612-6.

E.Balaguruswamy. *Programming in ANSI C*. McGraw Hill India, 8 edition, 3 2019. ISBN 978-93-5316-513-0.

Ramez Elmasri and Navate. *Fundamentals of Database Systems*. Pearson Education, 6 edition, 2017. ISBN 978-0-136-08620-8.

F.T.Wood. *Remedial English Grammar*. Macmillan, 2007.

R.N. Goyal and Harrmendra Goel. *Text Book of engineering chemistry*.

Ralph P. Grimaldi. *Discrete and Combinatorial Mathematics*. Pearson Education, 5 edition, 2004. ISBN 978-8177584240.

Douglas V. Hall and SSSP Rao. *Microprocessors and its Interfacing*. McGraw-Hill Education, 3 edition, 2017. ISBN 978-1-259-00615-9.

H.M.Dietel and P.J.Dietel. *Java How to Program (Early Objects)*. Pearson Education, 11 edition, 2018. ISBN 978-9353062033.

Brain Holdsworth and Clive Woods. *Digital Logic Design*. Elsevier Publisher, 4 edition, 2002. ISBN 978-0080477305.

Kogent Learning Solutions Inc. *HTML 5 Black Book:Covers CSS3, Javascript,XML,XHTML,AJAX,PHP,and jQuery*. Wiley India Pvt. Ltd, 7 2011. ISBN 978-9350040959.

P.C. Jain and Monica Jain. *Engineering Chemistry*. Dhanpat Rai, 17 edition, 2017.

Hayes John P. *Computer Architecture and Organization*. McGraw Hill, 3 edition, 6 1998. ISBN 9781259028564.

Richard A. Johnson. *Miller and Freund's Probability and Statistics for Engineers*. PHI, 8 edition.

Dhananjay A Jolhe. *Engineering Drawing*. Tata McGraw Hill.

Benny Joseph. *Environmental Studies*. Tata McGraw-Hill.

Nagsarkar T K and Sukhija M S. *Basics of Electrical and Electronics Engineering*. Oxford University Press.

R. H. Katz and G. Borriello. *Contemporary Logic Design*. Pearson Prentice-Hall, 2 edition, 2005. ISBN 978-0201308570.

Charles Kittel. *Introduction to Solid State Physics*. 8 edition.

K.L.Narayana and R.K.Kannaiah. *Engineering Drawing*.

K.Mukkanti. *Practical Engineering Chemistry*. B.S, 2009.

Erwin Kreyszig. *Advanced Engineering Mathematics*. John Wiley and Sons, 9 edition, a.

Erwin Kreyszig. *Advanced Engineering Mathematics*. John Wiley and Sons, 9 edition, b.

Dhananjay M. Kulkarni. *Engineering Drawing with AutoCAD*. PHI.

Sanjay Kumar and Pushpa Lata. *Communication Skills*. Oxford University Press, 2011.

Sanjay Kumar and Pushpa Latha. *Communication Skills*. Oxford University Press, 2011a.

Sanjay Kumar and Pushpa Latha. *Communication Skills*. Oxford University Press, 2011b.

Kenneth A. Lambert. *Fundamentals oF Python : First Programs*. Cengage, 2 edition, 2019. ISBN 978-1337560092.

Anany Levitin. *Introduction to the Design and Analysis of Algorithms*. Pearson, 3 edition, 2017. ISBN 978-9332585485.

Joe L.Mott, Abraham Kandel, and Theodore P.Baker. *Discrete Mathematics for Computer Scientists and Mathematicians*. Pearson Education, 2 edition, 2008. ISBN 9788120315020.

Liz Hamp lyons and Ben Heasley. *Study Writing*. Cambridge University Press, 2006.

K. Maheswaramma. *Engineering Chemistry*. Pearson, 2015.

D.S. Malik and M.K. Sen. *Discrete Mathematical Structures: Theory and Applications*. Thomson, 3 edition, 2004. ISBN 9780619212858.

M. Morris Mano. *Computer Systems Architecture*. Pearson/PHI, 3 edition, 5 2004. ISBN 978-9332585607.

M. Morris Mano and Michael D. Ciletti. *Digital Design*. Prentice Hall, 5 edition, 1 2013. ISBN 978-013277420.

Muhammad Ali Mazidi and Janice Gillespie Mazidi. *The 8051 Microcontroller and Embedded Systems*. Pearson Edition, 2 edition, 2018. ISBN 978-81-317-1026-5.

V.S.SenthilKumar M.GovindaRajan, S.Natarajan. *Professional Ethics and Human Value*. PHI, 2013. ISBN 9788120348165.

Ronald Schinzinger Mike W Martin. *Ethics in Engineering*. TMH, 7 2017. ISBN 9780072831153.

Jr. G. Tyler Miller. *Environmental Science*. Thomson Series, 11 edition.

Kaufmann Morgan. *Computer Architecture –A Quantitative Approach*. Pearson/PHI, 6 edition, 12 2017. ISBN 978-0128119051.

C.P. Murthy, C.V. Agarwal, and A. Naidu. *Text Book of Engineering Chemistry*. B.S, 2006.

B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, and J. Murday. *Text book on Nanoscience and Nanotechnology*. Springer Science and Business Media, 2013.

Ashok N.Kamthane and Amit A.Kamthane. *Programming in C*. McGraw Hill India, 3 edition, 2015. ISBN 987-93-325-4355-3.

N.P.Bali and M.Goyal. *A Text book of Engineering Mathematics*. Laxmi, 2010a.

N.P.Bali and M.Goyal. *A Text book of Engineering Mathematics*. Laxmi, 2010b.

Abbey Deitel Paul Deitel, Harvey Deitel. *Internet and World wide web: How to program*. Pearson, 11 edition, 2011. ISBN 9780132990455.

Ljubomir Perkovic. *Introduction to Computing Using Python: An Application Development Focus*. Wiley, 2 edition, 8 2015. ISBN 978-1118890943.

S.O. Pillai. *Solid State Physics*.

P.Kannaiah and K.L.Narayana. *Workshop Manual*. SciTech, 2009.

P.Srinivasarao and K.Muralidhar. *Engineering physics laboratory manual*. Himalaya.

Muthusubramanian R, Salivahanan S, and Muraleedharan K A. *Basic Electrical, Electronics and Computer Engineering*. Tata McGraw Hill, 2 edition, 2006.

Johannes Gehrke Raghurama Krishnan. *Data base Management Systems*. TATA McGrawHill, 3 edition, 2014. ISBN 978-8131769591.

P.Srinivasa Rao and K.Muralidhar. *Applied physics*.

P.Srinivasa Rao and K.Muralidhar. *Basic Engineering Physics*. Himalaya, 2016.

K. Venkata Reddy. *Workshop Practice Manual*. BS Publications, 2008.

Behrouz A. Forouzan Richard F.Gilberg. *Data Structures – A Pseudocode Approach with C*. ThomsonBrooks / COLE, 2 edition, 1998. ISBN 978-0-534-39080-8.

Jack C Richards. *New Interchange*. Cambridge University Press, 4 edition, 2015.

Kenneth H. Rosen. *Discrete Mathematics and its Applications*. McGraw Hill, 7 edition, 2012. ISBN 9780073383095.

Benjamin Rosenzweig and Elena Silvestrova. *Oracle PL/SQL by Example*. Pearson Education, 3 edition.

R.Rajagopalan. *Environmental studies*. Oxford University Press.

Herbert Schildt. *C: The Complete Reference*. McGraw Hill India, 4 edition, 2017a. ISBN 0-07-212124-6.

Herbert Schildt. *Java The Complete Reference*. Tata McGraw Hill, 9 edition, 7 2017b. ISBN 978-5845917591.

Charles R Severance. *Python for Everybody: Exploring Data in Python 3*. 4 2016. ISBN 978-1530051120. doi: https://www.py4e.com/book.

JP Sharma. *Comprehensive environmental studies*. Laxmi Publications.

Korth Silberschatz. *Data base System Concepts*. McGraw hill, 6 edition, 2013. ISBN 978-9332901384.

Michael Soltys-kulinicz. *Introduction to the Analysis Of Algorithms*. World Scientific, 3 edition, 2018. ISBN 978-9813235908.

William stallings. *Operating system : Internals and Design principles*. Pearson, 9 edition, 2019. ISBN 978-9352866717.

Michael Swan. *Practical English Usage*. Oxford University Press, 1995.

Grant Taylor. *English Conversation Practice*. Mc Graw Hill, 2001.

Edgar Thorpe and Showick. *Objective English*. Pearson Education, 3 edition, 2009.

Dori smith Tom Negrino. *Javascript and Ajax for the Web*. Peachpit Press PTG, 7 edition, 2009. ISBN 9780321564085.

Scott Urman. *Oracle Database Logic PL/SQL Programming*. Tata Mc-Graw Hill.

Guido van Rossum and Jr Fred L. Drake. *Python Tutorial*. Python Software Foundation. doi: https://docs.python.org/3/.

Michael Vince. *Advanced Language Practice*. MacMilan Publishers, 2003.

Vogel. *Inorganic quantitative analysis*. Longman group, 5 edition, 1979.

John F. Wakerly. *Digital Design: Principles and Practices*. Pearson Prentice Hall, 4 edition, 2006. ISBN 978-0131863897.

R.E Walpole, R.H. Myers, and S.L. Myers. *Probability & Statistics for Engineers and Scientists*. PHI, 6 edition.

Mark Allen Weiss. *Data Structures and Algorithm Analysis in C*. Pearson Education, 2 edition, 2013. ISBN 978-81-7758-358-8.

Stallings William. *Computer Organization and Architecture*. Pearson/PHI, 11 edition, 03 2019. ISBN 9780135188941.

Anjaneyulu Y. *Introduction to Environmental Science*. B S Publications.

M.J.Augeustein Y.Langsam and A.M.Tenenbaum. *Data Structures Using C*. Pearson Education Asia, 2 edition, 2006. ISBN 81-203-1177-9.

Glenn A. Gibson Yu-cheng Liu. *Microcomputer systems: The 8086 /8088 Family architecture,Programming and Design*. Pearson Edition, 2 edition, 2015. ISBN 978-9332550087.