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	21.5	21.5
IV	21.5	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)			Cred
			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/SO03	SO	Soft Skills	1	0	2	3	30	70	100	2
20ITL502	PC	Software Engineering Lab	0	0	3	3	30	70	100	1.5
20ITL503	JO	Job Oriented Elective Lab -1	0	0	3	3	30	70	100	1.5
20ITL504/INT01	INT	Summer Internship	0	0	0	0	0	0	0	1.5
20IT506/MC03	MC	Essence of Indian Traditional Knowledge	2	0	0	2	30	0	30	0
Total			**18**	**0**	**8**	**26**	**270**	**560**	**830**	**21.5**
20ITH5_ 20ITM5_		**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)			Credi
			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–	PE	Professional Elective -2	3	0	0	3	30	70	100	3
20IT605/JO–	JO	Job Oriented Elective - 2	3	0	0	3	30	70	100	3
20ITL601/SO04	SO	Advanced skill oriented - 1	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
20IT606/MC04	MC	Constitution of India	2	0	0	2	30	0	30	0
Total			**18**	**0**	**11**	**29**	**300**	**630**	**930**	**21.5**
20ITH6_ 20ITM6_		**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–	PE	Professional Elective - 3	3	0	0	3	30	70	100	3
20IT702/PE–	PE	Professional Elective - 4	3	0	0	3	30	70	100	3
20IT703/JO–	JO	Job Oriented Elective - 3	3	0	0	3	30	70	100	3
20IT704/JO–	JO	Job Oriented Elective - 4	3	0	0	3	30	70	100	3
20IT705 /ME05	HS	Industrial Management & Entrepreneurship Development	3	0	0	3	30	70	100	3
20ITL701 /SO05	SO	Advanced skill oriented - 2	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
20ITL704 /INT02	INT	Industrial / Research Internship	0	0	0	0	0	0	0	3
Total			**16**	**0**	**8**	**24**	**240**	**560**	**800**	**23**
20ITH7_ 20ITM7_		**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	PW	Project Work	0	0	0	0	50	100	150	12
20ITH8 20ITM8	**Honors / Minor Course (MOOCS-1)**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
20ITH8 20ITM8	**Honors / Minor Course (MOOCS-2)**		**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	Wireless Networks
2	Data Warehousing & Data Mining
3	Distributed Systems
4	Artificial Intelligence
5	Digital Image Processing
6	Block Chain Technologies
7	Protocols for Secure Electronics Commerce Bioinformatics
8	ANN & Deep Learning
9	Natural Language Processing

Table 5: List of Job Oriented Electives

SN	Title
1	Enterprise Programming
2	Middleware Technologies
3	Mobile Application Development
4	Cloud Programming
5	R Programming
6	Cyber Security
7	Internet of Things
8	Big Data Analytics
9	Software Testing Methodologies

Table 6: List of Advanced Skill Oriented Electives

SN	Title
1	Introduction to Computer Animation
2	Full Stack Development
3	DevOps
4	Robotic Process Automation
5	Introduction to Game Design

Table 7: 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 8: 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 operations on discrete structures such as sets, functions, and relations. Formulate short proofs using methods of proof of an implication. Verify the correctness of an argument using propositional logic and truth tables. Understand predicate logic and first order logic. Construct mathematical arguments using logical connectives and quantifiers.

CO2: Verify the correctness of an argument using rules of inference for quantified propositions. Apply algorithms and use definitions to solve problems to prove statements in elementary number theory. Understand counting and indirect counting techniques and combinatory in the context of discrete probability.

CO3: Understand sequences, generating functions, and recurrence relations. Understand and compute coefficients for generating functions. Understand and solve homogeneous recurrence relations.

CO4: Understand and solve Inhomogeneous recurrence relations. Understand the properties of binary relations, partial orderings and lattices. Construct graphs and adjacency matrices for binary relations.

Course Outcomes:

After studying this course , the student will able to:

CLO1: Understand the basic principles of sets and operations on sets. Identify the type of given binary relation. Determine when a function is one to one and ”onto”. Use the rules of inference and verify the correctness of an argument.

CLO2: Use the rules of inference for quantified propositions and verify the correctness of an argument. Prove that the given statement is correct by using mathematical induction. Solve counting problems by using indirect counting. Solve combinations and permutation problems for no repetition, constrained repetition and unlimited repetitions.

CLO3: Build generating functions for sequences. Compute coefficients for generating functions. Solve homogeneous recurrence relations using various methods.

CLO4: Solve Inhomogeneous recurrence relations. Construct digraph for the given binary relation. Construct hasse diagrams for posets. Find out the transitive closure of given relation.

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)**

Foundations: Sets, Relations and Functions, Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication, First order Logic & Other methods of proof.

UNIT - II **(12 Hours)**

Rules of Inference for Quantified propositions, Mathematical Induction.

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

UNIT - IV **(12 Hours)**

Recurrence Relations: Solutions of inhomogeneous recurrence relations.

Relations: Special properties of binary relations, Operations on relation. Ordering relations, Lattice, Paths and Closures, Directed Graphs and Adjacency Matrices.

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)

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

Prerequisites:

–

Course Objectives:

Students will be able to

COB 1: Organize and manipulate files and directories.

COB 2: Use the vi text editor to create and modify files.

COB 3: Use SED command for insertion, deletion, and search and replace (substitution).

COB 4: Understand pattern scanning and processing using AWK.

COB 5: Create structured shell programming which accept and use positional parameters and exported variables.

COB 6: Understand File management system calls to provide I/O support for storage device types and multiple users.

Course Outcomes:

After the course the students are expected to be able to

CO 1: Understand the major components and describe the architecture of the UNIX operating system, use the UNIX system documentation and UNIX utilities to create simple tools for the information processing

CO 2: Understand SED command in Unix to support regular expression which allows it perform complex pattern matching, use Awk in a scripting language for manipulating data and generating reports

CO 3: Understand how the shell functions at the user interface and command line interpreter, shell flow control and conditional branching constructs (while, for, case, if, etc.), Modify built-in shell variables, create and use user-defined shell variables

CO 4: Use system calls for creation,deletion of files,Reading and writing from files

UNIT - I

Directory commands: pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names.

File related commands: Editing with vi, cat, mv, rm, cp , wc . File attributes and permissions and knowing them. The ls command with options. Changing file permissions: (chmod) the relative and absolute permissions changing methods. Recursively changing file permissions. Directory Permissions.

Other Basic commands: cal, date, df, du, find, jobs, kill ,less and more, ps, set, wc, who.

Work Sheet

1. Obtain the following results (i) To print the name of operating system (ii) To print the login name (iii) To print the host name.
2. Find out the users who are currently logged in and find the particular user too.
3. Display the calendar for (i) Jan 2000 (ii) Feb 1999 (iii) 9th month of the year 7 A.D (iv) For the current month (v) Current Date Day Abbreviation , Month Abbreviation along with year.
4. Display the time in 12-Hour and 24 Hour Notations.
5. Display the Current Date and Current Time.
6. Display the message ―GOOD MORNING in enlarged characters.
7. Display the name of your home directory.
8. Create a directory SAMPLE under your home directory.
9. Create a subdirectory by name TRIAL under SAMPLE.
10. Change to SAMPLE.
11. Change to your home directory.
12. Change from home directory to TRIAL by using absolute and relative pathname.
13. Remove directory TRIAL.
14. Create a directory TEST using absolute pathname.
15. Using a single command change from current directory to home directory.
16. Remove a directory using absolute pathname.
17. Create files my file and your file under Present Working Directory.
18. Display the files my file and your file.
19. Append more lines in the my file and your file files.
20. How will you create a hidden file?.
21. Copy myfile file to emp.
22. Write the command to create alias name for a file.
23. Move yourfile file to dept.

24. Copy emp file and dept file to TRIAL directory
25. Compare a file with itself.
26. Compare myfile file and emp file.

UNIT - II

The Stream Editor(sed): Line addressing, multiple instructions, context addressing, writing selected lines to a file, text editing ,substitution, basic regular expressions.
File Handling and Text Processing utilities: grep, egrep, fgrep.
AWK: sample awk filtering , splitting a line into fields, formatting output, variables and expressions, comparison operators, number processing, storing awk programs in a file, the BEGIN and END sections, Built in variables and arrays, control structures.

Work Sheet

1. **Create the following file as sed.lab: unix is great os. unix is open source. unix is free os. learn operating system. Unix linux which one you choose.(Each sentence in a line)**

    - Replace _unix‘ with _linux‘.
    - Replace only the third (3rd) instance of _unix‘ with _linux‘.
    - Try sed ‘s/unix/linux/g‘ sed.lab.
    - Replace _unix‘ with _linux‘ but only on line 3.
    - Add a new line, _Actually Windows is best‘ after the second line.

2.
    - Viewing a range of lines of a document
    - Viewing the entire file except a given range
    - Viewing non-consecutive lines and ranges
    - Replacing words or characters inside a range
    - Using regular expressions
    - Viewing lines containing with a given pattern
    - Inserting spaces in files
    - Performing two or more substitutions at once

3.
    - Design a command **“wishme”** that will great you ―good morning‖,‖good Afternoon‖, according to current time.
    - Design a command **“fags”** thats will list the files and their ages, to date.
    - Design a command **“word-freq”** that will print the words and number of Occurrences of that word in the given text.

UNIT - III

Shell programming: shell,functions of shell,metacharacters,input redirections and output redirections,pipes, shell as a programming language,shell variables,predefined local variables,predefined environment variables,arithmetic and conditional expressions ,control structures,positional parameters,passing command line arguments,built in shell comands,shell programs,functions and arrays.

Work Sheet

1.
   - Design a command **" which"** that prints the path of the command given as Argument
   - Design a command **"filelist[-c <char>]"** which prints all file names beginning with The charter specified as argument to the command ,if the position is not specified It should print all the file names.
   - Design a command **getline[-f <filename> -n <line number>]** 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
   - Design a command **monthly-file[-m <month>]** which list the files created in a given month where month is argument to be command. If the options is not specified it list the files in all the months.
2.
   - Design a command **list lines[-f <file name> -v <varname>]** which prints the line from the given file file name ,which containing the variable varname.if arname Is not specified it should list ,all the lines.
   - Design a command **avg[-n <colon> -f <file name>]** which prints the average of the given column in a file where colon and file name are arguments to the commands

UNIT - IV

File management System calls: Regular File management system calls: open(), read(), write(), lseek(), close(), unlink(), stat(), getdents().

Work Sheet

1. Write a C program to copy data from source file to destination file, where the file names are provided as command-line arguments.
2. Write a C program that reads every 100th byte from the file, where the file name is given as command-line argument.
3. Write a C program to display information of a given file which determines the type of file and inode information, where the file name is given as command-line arguments.

TEXT BOOKS:

1. UNIX Concepts and Applications, Sumitabha Das, 4th edition, TATA McGraw Hill.
2. UNIX for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson education.

REFERENCES:

1. The Design of UNIX operating System, Maurice J.Bach, PHI.
2. Advanced programming in the UNIX environment, W Richard Stevens, 2nd Edition, Pearson education.
3. UNIX programming environment, Kernighan and pike, Pearson Education.
4. Your UNIX the ultimate guide, Sumitabha Das, TMH, 2nd edition.
5. Advanced UNIX programming, Marc J. Rochkind, 2nd edition, Pearson Education.

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

Automata Theory and Formal Languages

(Common to CSE & IT)

B.Tech – V Semester (20IT501)

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

Prerequisites:

Discrete Mathematical Structures(20CS205)

UNIT - I (12 Hours)

Automata: Why Study Automata Theory, The central concepts of automata theory - Alphabets, Strings, Languages, Problems.

Finite Automata: An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition function, the language of DFA, Non deterministic finite automata (NFA) – Definition of NFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA. Automata with ϵ transitions: Use of ϵ - transition, notation for an ϵ - NFA, Epsilon closures, extended transitions and languages, Eliminating I - transitions.

UNIT - II (12 Hours)

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions.

Properties of Regular Languages: Proving languages are not regular – Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata – Minimization of DFA.

UNIT - III (12 Hours)

(Construction based treatment & proofs are excluded)

Context Free Grammars: Context Free Grammars, Parse Trees, ambiguous grammars.

Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA‘s and CFG‘s.

Context free languages: Normal form‘s for context- Free grammars, the pumping lemma for context free languages.

UNIT - IV (12 Hours)

Properties of Context free languages: closure properties for context free languages, Decision properties for CFL‘s.

Introduction to Turing Machines: The Turing Machine, programming techniques for Turing machines.

Undecidability: a language that is not recursively enumerable, an undecidable problem that is RE, Undecidability problems about TM, Post‘s Correspondence problem.

TEXT BOOKS:

1. John E Hopcroft, Rajeev Motwani, and Jeffery D Ullman. *Introduction to Automata Theory Languages and Computations*. Pearson, 3 edition, 2008. ISBN 9780321564085

REFERENCES:

1. KLP Mishra and N Chandrasekharan. *Theory of Computation*. PHI, 1 edition, 2020. ISBN 9780321564085
2. H R Lewis and C H Papadimitriou. *Elements of the Theory of Computation*. Pearson, 2 edition, 2003. ISBN 9780321564085

Computer Networks

(Common to CSE & IT)

B.Tech – V Semester (20IT502)

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

Prerequisites:

None

UNIT - I (12 Hours)

Data Communications & Networking Overview: A Communications Model, Data Communications, Data Communication Networking.

Protocol Architecture: The Need for a Protocol Architecture, A Simple Protocol Architecture, OSI, The TCP/IP Protocol Architecture.

Digital Data Communication Techniques: Asynchronous & Synchronous Transmission, Types of Errors, Error Detection, Error Correction.

UNIT - II (12 Hours)

Data Link Control: Flow Control, Error Control.

Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit & Datagram Subnets.

Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control.

UNIT - III (12 Hours)

Quality of Service: Requirements, Techniques for Achieving Good Quality of Service

The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols.

The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley sockets

Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery.

UNIT - IV (12 Hours)

The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol.

The Internet Transport Protocol (TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management.

The Domain Name System(DNS): The DNS Name Space, Resource Records, Name Servers.

TEXT BOOKS:

1. Behrouz A. Forouzan. *Data Communications and Networking*. TMH, 4 edition, 2020. ISBN 9780321564085
2. Tanenbaum. *Computer Networks*. Pearson, 4 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Wayne Tomasi. *Introduction to Data Communications and Networking*. PHI, 1 edition, 2020. ISBN 9780321564085
2. GodBole. *Data Communications and Networking*. TMH, 1 edition, 2020. ISBN 9780321564085
3. Nader F. Mir. *Computer and Communication Networks*. PHI, 1 edition, 2020. ISBN 9780321564085

Software Engineering

(Common to CSE & IT)

B.Tech – V Semester (20IT503)

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

Prerequisites:

None

UNIT - I (12 Hours)

Introduction to Software Engineering: The Evolving Role of Software, Software, the Changing Nature of Software, Legacy Software, Software Myths.

A Generic View of Process: Software Engineering - A Layered Technology, a Process Framework, the CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Product and Process.

Process Models: Prescriptive Models, the Waterfall Model, Incremental Process Models, Evolutionary Models, the Unified Process.

UNIT - II (12 Hours)

An Agile View of Process: What Is Agility? , What Is an Agile Process? , Agile Process Models.

Requirements Engineering: A Bridge To Design and Construction, Requirements Engineering Tasks, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use-cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Building The Analysis Model: Requirements Analysis, Analysis Modelling Approaches, Data Modelling Concepts, Flow-Oriented Modelling, Class Based Modelling Creating a Behavioural Model.

UNIT - III (12 Hours)

Design Engineering: Design within the Context of Software Engineering, Design Process and Design Quality, Design Concepts The Design Model, Pattern Based Software Design.

Creating An Architectural Design: Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design, Assessing Alternative Architectural Designs.

Modelling Component-Level Design: What Is a Component? , Designing Class-Based Components, Conducting Component-Level Design, Designing Conventional Components.

Performing User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

UNIT - IV (12 Hours)

Software Process And Project Metrics: Introduction, Metrics Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics with Process.

Software Quality Assurance: Quality Concepts, Quality Movement, SQA, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Reliability, ISO 9000 Quality Standards, SQA Plan.

Software Testing Strategies: Strategic Approach, Strategic Issues, Test strategies for Conventional Software, White box testing, Black Box testing, Test strategies for Object Oriented Software, Validation Testing, System Testing, The Art of Debugging.

TEXT BOOKS:

1. Roger S. Pressman. *Software Engineering A Practitioner's Approach*. Pearson, 8 edition, 2020. ISBN 9780321564085

REFERENCES:

1. K.K. Aggarwal and Yogesh Singh. *Software Engineering*. New Age International, 1 edition, 2005. ISBN 9780321564085
2. Pankaj Jalote. *An Integrated Approach to Software Engineering*. Springer, 2 edition, 2020. ISBN 9780321564085
3. Ian Sommerville. *Software Engineering*. Pearson, 6 edition, 2020. ISBN 9780321564085
4. Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli. *Fundamentals of Software Engineering*. PHI, 2 edition, 2020. ISBN 9780321564085
5. RajibMall. *Fundamentals of Software Engineering*. PHI, 2 edition, 2020a. ISBN 9780321564085

Software Engineering Lab

B.Tech – V Semester (20ITL501)

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

List of Experiments

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user‘s view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram
7. To perform the behavioral view diagram for the suggested system : Sequence diagram, Collaboration diagram
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.

Choose any one of the following projects and do any 8 of the above exercises for that project

1. Student Result Management System
2. Library management system
3. Inventory control system
4. Accounting system
5. Fast food billing system
6. Bank loan system
7. Blood bank system
8. Railway reservation system
9. Automatic teller machine
10. Video library management system
11. Hotel management system
12. Hostel management system

13. E-ticking
14. Share online trading
15. Hostel management system
16. Resource management system
17. Court case management system

Soft Skills

(Common to all branches)

B.Tech – V Semester (20ITL501/SO03)

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

Prerequisites:

None

UNIT - I (12 Hours)

Body Language & Identity Management: Facial Expressions – Kinesics - Occulesics, Haptics - Proxemics, Para Linguistics, Appearance, Identity Management Communication

UNIT - II (12 Hours)

Emotional Intelligence & Life Skills: Self Awareness through Johari Window and SWOC analysis, Self Motivation, Empathy, Assertiveness & Managing Stress, Positive Attitude, Time Management.

Goal Setting: Short term, Long Term, Vision, Mission.

UNIT - III (12 Hours)

Business Presentations: Preparing effective Presentations Power Point Presentations, Power Point Presentations, Using Visual Aids, Mock Presentations.

UNIT - IV (12 Hours)

Employability Skills: Group Discussion, Team Building and Leadership Qualities, Interview Skills.

REFERENCES:

1. Barun K. Mithra. *Personality Development and Soft skills*. Oxford University Press, 2 edition, 2016. ISBN 9780321564085
2. Allan and Barbara. *The Definitive Book of Body Language*. Pease International, 1 edition, 2004. ISBN 9780321564085
3. Daniel Goleman. *Working with Emotional Intelligence*. Bloomsbury, 1 edition, 1998. ISBN 9780321564085
4. Lina Mukhopadhyay. *English for Jobseekers*. Cambridge University Press, 1 edition, 2013. ISBN 9780321564085
5. Stephen R. Covey. *The 7 Habits of Highly Effective People*. St. Martin's Press, 1 edition, 2014. ISBN 9780321564085

Essence of Indian Traditional Knowledge

(Common to all branches)

B.Tech – V Semester (MC03)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	00	Credits	:	0

Prerequisites:

None

UNIT - I (10 Hours)

Historical Background: TKS during the Pre-colonial and Colonial Period

Indian Traditional Knowledge System

Traditional Medicine: Ayurveda, Simple Definition, Origin, Texts, The Great Three Classics of Ayurveda, The Lesser Three Classics of Ayurveda, The Branches of Ayurveda, Basic Concepts of Ayurveda, Purusha/Prakruti, Manifestation of Creation, Space, Air, Fire, Water, Earth, Mental Constitution, Satvic Mental Constitutions, Rajasic Mental Constitutions, Tamasic Mental Constitutions, Vata, Pitta and Kapha: The Three Doshas

UNIT - II (12 Hours)

Traditional Production and Construction Technology: Social Conditions and Technological Progress, The Impetus for Metallurgy, Social Needs and Technological Applications, Scientific Rationalism and Technological Efficacy, Cultural Mores and Technological Innovation, State Support of Technology, Limitations of Pre-Industrial Manufacturing, India and the Industrial Revolution.

History of Physics and Chemistry: Philosophy and Physical Science, Particle Physics, Optics and Sound, Astronomy and Physics, The Laws of Motion, Experimentation versus Intuition, The Social Milieu, The Five Basic Physical Elements, Indian Ideas about Atomic Physics.

Traditional Art and Architecture and Vastu Shashtra: Vastu, The Principles of Vastu are Simple.

UNIT - III (12 Hours)

Origin of Mathematics

Astronomy and Astrology

TKS and the Indian Union: Protection and the Legislative Frameworks in India, Comment, Sui Generis System, Trade Secrets and Know-how, Geographical Indications Bill, Protection of Plan varieties and Farmers Rights Bill, Rights of Communities, Monitoring Information on Patent Applications World-wide, Frameworks for Supporting R&D Activities in the Area of TKS.

UNIT - IV (12 Hours)

Common Yoga Protocol: Introduction, What is Yoga? Brief History and Development of Yoga, The fundamentals of Yoga, Traditional Schools of Yoga, Yogic practices for health and wellness General Guidelines for Yoga Practice: Before the practice, During the Practice, After the Practice, Food for Thought, How Yoga can Help.

1. Invocation
2. Sadilaja/Cālana Kriyās /Loosening Practices,
3. Yogāsanas:

- Standing Postures: Tāḍāsana (Palm Tree Posture), Vṛkṣāsana (The Tree Posture), Pāda-Hastāsana (The Hands to Feet Posture), Ardha Cakrāsana (The Half Wheel Posture), Trikonāsana (The Triangle Posture)
- Sitting Postures: Bhadrāsana (The Firm/Auspicious Posture), Vajrāsana (Thunderbolt Posture), Uṣṭrāsana (Camel Posture), Śaśakāsana (The Hare Posture), Vakrāsana (The Spinal Twist Posture),
- Prone Postures: Makarāsana (The Crocodile Posture), Bhujaṅgāsana (The Cobra Posture), Śalabhāsana (The Locust Posture),
- Supine Postures: Setubandhāsana (The Bridge Posture), Uttāna Pādāsana (Raised feet posture), Pavana Muktāsana (The Wind Releasing Posture), Śavāsana (The Corpse/ Dead Body Posture)

4. Kapālabhāti
5. Prānāyāma: naḍīśodhana or anuloma viloma prānāyāma (Alternate Nostril Breathing), Śītalī Prāṇāyāma, Bhrāmarī Prāṇāyāma (Bhrāmarī Recaka)
6. Dhyāna
7. Sankalpa
8. Śantih pātha

TEXT BOOKS:

1. Amit Jha. *Traditional Knowledge System in India*. Pearson, 1 edition, 2009. ISBN 9780321564085
2. Ministry of Ayush. *Common YOGA Protocol*. Ministry of Ayush, 1 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Basanta Kumar Mohanta and Vipin Kumar Singh. *Traditional Knowledge System and Technology in India*. Pearson, 1 edition, 2012. ISBN 9780321564085

Compiler Design

(Common to CSE & IT)

B.Tech – VI Semester (20IT601)

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

Prerequisites:

Automata Theory & Formal Languages (20IT501)

UNIT - I (12 Hours)

Introduction: Language Processors, The Structure of a Compiler.

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical-Analyzer Generator LEX.

Syntax Analysis: Introduction, Writing a Grammar: elimination of left recursion, left factoring, Top-Down Parsing: Recursive-Descent Parsing, FIRST and FOLLOW, LL(1) Grammars, Non recursive Predictive Parsing.

UNIT - II (12 Hours)

Bottom-Up Parsing: Introduction to LR Parsing: Simple LR, More Powerful LR Parsers: Canonical LR(1) Items, Constructing LR(1) Sets of Items, Canonical LR(1) Parsing Tables, Constructing LALR Parsing table. The Parser Generator YACC.

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Construction of syntax trees.

UNIT - III (12 Hours)

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address codes, Translation of expressions: Operations within expressions, Incremental translation, control flow: Boolean expressions: Short circuited code Flow of control statements, Control flow translation of Boolean expressions, Back patching for Boolean Expressions.

Code Generation: Issues in the Design of a Code Generator, Basic Blocks and Flow Graphs, Optimization of Basic Blocks,A Simple Code Generator

UNIT - IV (12 Hours)

Runtime Environment: Storage Organization, Static allocation strategy, Stack Allocation of Space: Activation trees, Activation records, calling sequence, variable length data on the stack.

Symbol Tables: Symbol table entries, Data structures to symbol tables, representing scope information.

TEXT BOOKS:

1. Alfred V Aho, RaviSethi, and JD Ullman. *Compilers Principles, Techniques and Tools*. Pearson, 2 edition, 2013. ISBN 9780321564085

REFERENCES:

1. Alfred V Aho and Jeffrey D Ullman. *Compilers Principles, Techniques and Tools*. Narosa, 1 edition, 2020. ISBN 9780321564085

2. John R Levine, Tony Mason, and Doug Brown. *Lex and YACC*. Oreilly, 1 edition, 2020. ISBN 9780321564085

3. Andrew N Appel. *Modern Compiler Implementation in C*. Cambridge University Press, 1 edition, 2020. ISBN 9780321564085

Machine Learning

(Common to CSE & IT)

B.Tech – VI Semester (20IT602)

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

Prerequisites:

None

UNIT - I (12 Hours)

Introduction: Introduction to machine learning, Essential Python Libraries: Scikit-learn, Jupyter Notebook, NumPy, matplotlib, Pandas. A First Application: Classifying iris species using Sci-kit learn.
Linear Regression: Simple linear regression. Batch gradient decent algorithm, Stochastic gradient descent algorithm, Multiple linear regression, Locally weighted linear regression.

UNIT - II (12 Hours)

Decision Tree Learning: Decision Tree representation, Decision Tree learning, hypothesis space search in Decision Tree learning, inductive bias in Decision Tree learning and issues in Decision Tree learning.
Artificial Neural Networks: Neural Network representations, Perceptron, Perceptron Training rule, Gradient Descent and the delta rule, Multilayer Networks and the Back propagation algorithm and remarks on the Back propagation algorithm.

UNIT - III (12 Hours)

Generative Classifiers: Learning classifiers based on Bayes Rule, Naïve Bayes Algorithm, Conditional Independence, Derivation of Naïve Bayes Algorithm, Naïve Bayes for discrete-valued Inputs, Naïve Bayes for continuous inputs.

Discriminative Classifiers: Logistic Regression, Estimating Parameters for Logistic Regression, Regularization in Logistic Regression

UNIT - IV (12 Hours)

Computational learning theory: Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis spaces.
Instance Based Learning: Introduction, k-Nearest Neighbor learning.
Unsupervised Learning: K-means clustering algorithm, Gaussian mixture model, EM algorithm.

TEXT BOOKS:

1. Andreas C. Mueller and Sarah Guido. *Introduction to Machine Learning with Python*. O'Reilly Media, 1 edition, 2020a. ISBN 9780321564085
2. Andrew Ng. *Machine Learning Lecture Notes*. Stanford University, 1 edition, 2020b. ISBN 9780321564085
3. Tom M. Mitchell. *Machine Learning*. Mc.Graw Hill Publishing, 1 edition, 2020a. ISBN 9780321564085

REFERENCES:

1. Andrew Ng. *Machine Learning Lecture Notes*. Stanford University, 1 edition, 2020a. ISBN 9780321564085

Cryptography and Network Security

(Common to CSE & IT)

B.Tech – VI Semester (20IT603)

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

Prerequisites:

Computer Networks (20IT502)

UNIT - I (12 Hours)

Introduction: Security Goals, Attacks, Service and Mechanism, Techniques

Traditional symmetric key ciphers: Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers

Data Encryption Standard (DES): Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES

Encipherment using Modern Symmetric Key Ciphers: Use of Modern Block Ciphers

UNIT - II (12 Hours)

Advanced Encryption Standard: Introduction, Transformations, Key Expansion, Ciphers.

Asymmetric Key Cryptography: Introduction, RSA Cryptosystem, Robin Cryptosystem, Elgamal Cryptosystem.

Message Integrity and Message Authentication: Message Integrity, Message Authentication.

Cryptographic Hash Functions: Introduction, SHA-512.

UNIT - III (12 Hours)

Digital Signatures: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Standard.

Key Management: symmetric key distribution, Kerberos, Symmetric Key Agreement, Public Key Distribution.

Security at the Application Layer: E-Mail, PGP.

UNIT - IV (12 Hours)

Security at the Transport Layer: SSL Architecture, Four Protocols, SSL Message Format, Transport Layer Security.

Security at the Network Layer: Two Modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange, ISAKMP.

TEXT BOOKS:

1. Behrouz A. Forouzan. *Cryptography and network security*. Tata Mcgraw Hill Education Private Limited, 1 edition, 2011a. ISBN 9780321564085

REFERENCES:

1. William Stallings. *Cryptography and Network Security*. Pearson Education/PHI, 4 edition, 2020a. ISBN 9780321564085

2. Kaufman, Perlman, and Speciner. *NETWORK SECURITY*. PHI / Eastern Economy Edition, 2 edition, 2020a. ISBN 9780321564085

3. Trappe and Washington. *Introduction to Cryptography with Coding Theory*. Pearson, 2 edition, 2020a. ISBN 9780321564085

Machine Learning Lab

B.Tech – VI Semester (20ITL602)

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

List of Experiments

1. Write a program to implement the linear regression using stochastic gradient descent approach of training for a sample training data set stored as a .CSV file.
2. Write a program to implement the linear regression using Batch gradient descent approach of training for a sample training data set stored as a .CSV file.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an perceptron training model to learn linearly separable datasets and test the same using appropriate data sets.
5. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Write a program to implement the Logistic regression for a sample training data set stored as a .CSV file and test the same using appropriate data sets
8. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
9. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.

TEXT BOOKS:

1. Andreas C. Mueller and Sarah Guido. *Introduction to Machine Learning with Python*. O'Reilly Mediad, 1 edition, 2020b. ISBN 9780321564085
2. Andrew Ng. *Lecture Notes*. Stanford University, 1 edition, 2020d. ISBN 9780321564085
3. Tom M. Mitchell. *Machine Learning*. Mc. Graw Hill Publishing, 1 edition, 2020b. ISBN 9780321564085

REFERENCES:

1. Andrew Ng. *Lecture Notes*. Stanford University, 1 edition, 2020c. ISBN 9780321564085

Cryptography & Network Security Lab

B.Tech – VI Semester (20ITL603)

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

List of Experiments

1. Write a program to implement Caesar Cipher
2. Write a program to implement Multiplicative Cipher
3. Write a program to implement Affine Cipher
4. Write a program to implement Playfair Cipher
5. Write a program to implement Hill Cipher
6. Write a program to implement Vigenere Cipher
7. Write a program to implement the DES algorithm.
8. Write a program to implement the Rijndael algorithm.
9. Write a program to implement RSA Cryptosystem.
10. Write a program to implement SHA-1 Algorithm.
11. Write a program to implement Digital Signature Standard
12. Write a program to implement the Diffie-Hellman Key Exchange mechanism.

TEXT BOOKS:

1. Behrouz A. Forouzan. *Cryptography and network security*. Tata Mcgraw Hill Education Private Limited, 1 edition, 2011b. ISBN 9780321564085

REFERENCES:

1. William Stallings. *Cryptography and Network Security*. Pearson Education/PHI, 4 edition, 2020b. ISBN 9780321564085
2. Kaufman, Perlman, and Speciner. *NETWORK SECURITY*. PHI / Eastern Economy Edition, 2 edition, 2020b. ISBN 9780321564085
3. Trappe and Washington. *Introduction to Cryptography with Coding Theory*. Pearson, 2 edition, 2020b. ISBN 9780321564085

Constitution of India

(Common to all branches)

B.Tech – VI Semester (MC04)

Lectures	:	2 Hours / Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	30	SEE Marks	:	00	Credits	:	0

Prerequisites:

None

UNIT - I (12 Hours)

Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the constitution of India, Scheme of fundamental rights.

UNIT - II (12 Hours)

The scheme of the fundamental duties and its legal status, The Directive principles of state policy- its importance and implementation, Federal structure and distribution of legislative and financial powers between the union and the states, Parliamentary form of government of India – the constitution powers and status of the president of India.

UNIT - III (12 Hours)

Amendment of constitutional powers and procedure, The historical perspectives of the constitutional amendments in India, Emergency provisions: National Emergency, President Rule, Financial Emergency, Local Self Government – constitutional scheme in India

UNIT - IV (12 Hours)

Scheme of the Fundamental Right to Equality, Scheme of the Fundamental Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21.

TEXT BOOKS:

1. D.D.Basu and Lexisnexis. *Introduction to constitution of India*. Universal, 26 edition, 2020. ISBN 9780321564085
2. P. M. Bhakshi. *The constitution of India*. Universal law publishing, 1 edition, 2020. ISBN 9780321564085

Wireless Networks

(Common to CSE & IT)

B.Tech (20ITPE01)

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

Prerequisites:

Computer Networks (20IT502)

UNIT - I (12 Hours)

Introduction: Applications, Short History of Wireless Communications, Simplified Reference Model.
Wireless Transmission: Frequencies, Signals, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, and Cellular Systems.

Medium Access Control: Motivation for a Specialized MAC, SDMA, FDMA, TDMA, CDMA, and Comparison.

UNIT - II (12 Hours)

Telecommunication Systems: GSM, DECT, TETRA, UMTS and IMT-2000: System Architecture and Radio Interface.
Satellite Systems: History, Applications, Basics, Routing, Localization, and Handover.

UNIT - III (12 Hours)

Wireless LAN: Infrared Vs. Radio Transmission, Infrastructure and Ad Hoc Networks, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, and MAC Management.
Mobile Network Layer: Mobile IP: Entities and Terminology, IP packet delivery, Agent discovery, Registration, and Tunneling and Encapsulation, Dynamic Host Configuration Protocol. Ad Hoc Networks.

UNIT - IV (12 Hours)

Mobile Transport Layer: Traditional TCP, Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit / Fast Recovery, Transmission / Time-Out Freezing, Selective Retransmission, and Transaction Oriented TCP.
Support for Mobility: Wireless Application Protocol: Architecture, Wireless Datagram Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Wireless Session protocol, and Wireless Application Environment.

TEXT BOOKS:

1. Jochen. Schiller. *Mobile communications*. Addison-Wesley, 2 edition, 2003. ISBN 9780321564085

REFERENCES:

1. William Stallings. *Wireless Communication Networks*. Addison-Wesley, 1 edition, 2020c. ISBN 9780321564085

2. UWE Hansmann, Lother Merk, Martin S. Nicklous, and Thomas Stober. *Principles of Mobile Computing*. Addison-Wesley, 1 edition, 2020. ISBN 9780321564085

Data Warehousing & Data Mining

(Common to CSE & IT)

B.Tech (20ITPE02)

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

Prerequisites:

Database Management Systems (20IT403)

UNIT - I (12 Hours)

Data Mining: Introduction, Kinds of Data, Data Mining Functionalities, Classification of DataMining Systems, Major Issues in Data Mining.

Data Pre-processing: Importance of Data Process, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT - II (12 Hours)

Data Warehouse and OLAP Technology: Introduction, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation from Data Warehousing to Data Mining.

Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction An Alternative Method for Data Generalization and Concept Description.

UNIT - III (12 Hours)

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and a Road Map, Efficient and Scalable Frequent Item-set Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT - IV (12 Hours)

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods- k-Means and k-Medoids, Hierarchical Methods- Agglomerative and Divisive Hierarchical Clustering, Density-Based Methods- DBSCAN, Grid- Based Methods- STING, Outlier Analysis.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber. *Data Mining Concepts and Techniques*. Morgan Kaufmann Publishers, 2 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Sam Anahory and Dennis Murray. *Data Warehousing in the real world-A Practical guide for Building decision support systems*. Pearson Education, 1 edition, 2020. ISBN 9780321564085
2. Margaret H. Dunham. *Data Mining (Introductory and Advances Topics)*. Pearson Education, 1 edition, 2020. ISBN 9780321564085

Distributed Systems

(Common to CSE & IT)

B.Tech (20ITPE03)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction: What is a distributed system? Design goals, Types of distributed systems.
Architectures: Architectural styles, Middleware organization, System architecture, Example architectures.

UNIT - II (12 Hours)

Processes: Threads, Virtualization, Clients, Servers, Code migration. Communication: Types of Communication, Remote procedure call, Message-oriented communication, Multicast communication.

UNIT - III (12 Hours)

Naming: Names, identifiers, and addresses, Flat naming, Structured naming, Attribute-based naming.
Coordination: Clock synchronization, Logical clocks, Mutual exclusion, Election algorithms, Location systems.

UNIT - IV (12 Hours)

Consistency and replication: Introduction, Data-centric consistency models, Client-centric consistency models, Replica management, Consistency protocols.
Fault tolerance: Introduction to fault tolerance, Process resilience, Reliable client-server communication, Reliable group communication, Distributed commit, Recovery.

TEXT BOOKS:

1. Andrew S.Tanenbaum and Maarten Van Steen. *Distributed Systems*. Pearson Education/PHI, 3 edition, 2017. ISBN 9780321564085

REFERENCES:

1. Coulouris, Dollimore, and Kindberg. *Distributed Systems-Concepts and Design*. Pearson Education, 3 edition, 2020. ISBN 9780321564085
2. Mukesh Singhal and Niranjan G. Shivarathri. *Advanced Concepts in Operating Systems*. TMH, 1 edition, 2020. ISBN 9780321564085
3. Sinha. *Distributed Operating System – Concepts and Design*. PHI, 1 edition, 2020. ISBN 9780321564085

Artificial Intelligence

(Common to CSE & IT)

B.Tech (20ITPE04)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction to AI: What is AI? , Foundations of AI, History of AI, State of the Art. Intelligent Agents: Agents and Environments, Good Behavior: Concept of Rationality, The Nature of Environments And The Structure of Agents.

Solving Problems by Searching: Problem Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth First Search, Uniform Cost Search, Depth First Search, Iterative Deepening DFS and Bi-directional Search.

Informed (Heuristics) Search Strategies: Greedy BFS, A* Algorithm, Heuristics Functions.

Beyond Classical Search: Local Search Algorithms and Optimization Problems-Hill Climbing, Simulated Annealing, Searching with Non Deterministic Actions: AND-OR Graphs, Online Search Agents and Unknown Environments.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Local Search in CSPs, Structure of Problems.

UNIT - II (12 Hours)

Logical Agents: Knowledge Based Agents, The Wumpus World, Logic and Propositional Logic: Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and Backward chaining, Agents Based on Propositional Logic.

First Order Logic: Representation, Revisited Syntax and Semantics of First Order Logic, Using First Order Logic, Knowledge Engineering in First Order Logic.

Inferences in First Order Logic: Propositional vs. First Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT - III (12 Hours)

Slot and Filler Structures: Semantic Nets, Conceptual Dependency, Scripts.

Planning: Overview - An Example Domain: The Blocks Word - Component of Planning Systems – Goal Stack Planning - Non-linear Planning using constraint posting Hierarchical planning, Reactive systems.

UNIT - IV (12 Hours)

Learning: What is learning? Rote learning - Learning by taking advice learning in problem solving, learning from example: Induction Explanation Based Learning.

Expert Systems: Representing and using domain knowledge Expert system shells Explanation Knowledge

TEXT BOOKS:

1. Stuart Russell and Peter Norvig. *Artificial Intelligence-A Modern Approach*. Pearson Education/PHI, 3 edition, 2020. ISBN 9780321564085
2. E. Rich and K. Knight. *Artificial Intelligence*. TMH, 3 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Saroj Kaushik. *Artificial Intelligence*. CENGAGE Learning, 1 edition, 2020. ISBN 9780321564085
2. Patterson. *Introduction to Artificial Intelligence*. PHI, 1 edition, 2020a. ISBN 9780321564085
3. Patrick Henry Winston. *Artificial Intelligence*. Pearson Education, 3 edition, 2020. ISBN 9780321564085
4. Shivani Goel. *Artificial Intelligence*. Pearson Education, 1 edition, 2020. ISBN 9780321564085
5. Patterson. *Artificial Intelligence and Expert systems*. Pearson Education, 1 edition, 2020b. ISBN 9780321564085
6. George F Lugar. *Artificial intelligence, structures and Strategies for Complex problem solving*. PEA, 5 edition, 2020. ISBN 9780321564085
7. Ertel Wolf Gang. *An Introduction to Artificial Intelligence*. Springer, 1 edition, 2020. ISBN 9780321564085
8. Nils J Nilsson. *Artificial Intelligence, A new Synthesis*. Elsevier, 1 edition, 2020. ISBN 9780321564085

Digital Image Processing

(Common to CSE & IT)

B.Tech (20ITPE05)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction: What Is Digital Image Processing? The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, An introduction to the mathematical tools used in Digital Image Processing.

UNIT - II (12 Hours)

Intensity Transformations And Spatial Filtering: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Filtering In The Frequency Domain: Background, Extension to Functions of two variables, Some properties of 2D Discrete Fourier Transform, The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Selective filtering.

UNIT - III (12 Hours)

Image Restoration: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter.

Color Image Processing: Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Image Segmentation based on Color, Noise in Color Images, Color Image Compression.

UNIT - IV (12 Hours)

Image Compression: Fundamentals, Some basic compression Methods, Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run length coding, Symbol based coding, Bit plane coding, Block transform coding, Predictive coding.

Morphological Image Processing: Preliminaries, Erosion and Dilation, Opening and Closing, The Hit & Miss Transformation.

TEXT BOOKS:

1. R C Gonzalez and R E Woods. *Digital Image Processing*. Pearson Education Publishers, 4 edition, 2019. ISBN 9780321564085

REFERENCES:

1. S Jayaraman, S Esakkirajan, and T Veerakumar. *Digital Image Processing*. Mc-Grah Hill Publications, 1 edition, 2010. ISBN 9780321564085

2. Milan Sonka, Vaclav Hlavac, and Roger Boyle. *Image Processing Analysis and Machine Vision*. Thomson learning, 2 edition, 2001. ISBN 9780321564085

3. S.Sridhar. *Digital Image Processing*. Oxford University Press, 1 edition, 2016. ISBN 9780321564085

Block chain Technologies

(Common to CSE & IT)

B.Tech (20ITPE06)

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

Prerequisites:

UNIT - I **(12 Hours)**

Introduction, Structure of a Block, The Genesis Block, Linking Blocks in the Blockchain, Tiers of blockchain technology, Types of blockchain, Features of a blockchain Applications of blockchain technology.

UNIT - II **(12 Hours)**

Bitcoin Bitcoin definition, Transactions, The transaction life cycle, The transaction structure, Types of transaction, Bitcoin network, Mining, Wallets Bitcoin payments, Bitcoin improvement proposals (BIPs) Alternative Coins, Namecoin, Litecoin, Primecoin, Zcash, Trading Zcash, Mining guide, Bitcoin installation, Bitcoin programming and the command-line interface, Bitcoin limitations, Privacy and anonymity.

UNIT - III **(12 Hours)**

Hyperledger, a Linux Foundation Project, Ten Steps to Your First Blockchain application Ethereum Intr Contract creation transaction, Message call transaction Elements of the Ethereum blockchain, Ethereum virtual machine (EVM) Execution environment, Applications developed on Ethereum, Ethereum blockchain, The consensus mechanism, The world state Transactions.

UNIT - IV **(12 Hours)**

Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Insurance, Media. **Scalability and Other Challenges**: Scalability, Proof of Stake, Privacy, Security, Benefits and limitations of blockchain.

TEXT BOOKS:

1. Imran Bashir. *Mastering Blockchain*. Packet Publishing, 1 edition, 2020. ISBN 9780321564085
2. Andreas Antonopoulos. *Mastering Bitcoin: Unlocking Digital Cryptocurrencies*. John Wiley Sons, 1 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Melanie Swa. *Blockchain*. O'Reilly, 1 edition, 2020. ISBN 9780321564085

Protocols for Secure Electronic Commerce

(Common to CSE & IT)

B.Tech (20ITPE07)

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

Prerequisites:

UNIT - I (12 Hours)

Overview of Electronic Commerce:- What Is Electronic Commerce, Categories of Electronic Commerce, The Influence of the Internet, Infrastructure for Electronic Commerce, Network Access, Consequences of E-Commerce, Summary.

Money and Payment Systems:- The Mechanisms of Classical Money, Instruments of Payment, Types of Dematerialized Monies, Purses and Holders, Transactional Properties of Dematerialized Currencies, Overall Comparison of the Means of Payment, The Practice of Dematerialized Money, Banking Clearance and Settlement, Summary.

UNIT - II (12 Hours)

Algorithms and Architectures for Security:- Security of Commercial Transactions, Security of Open Financial Networks, Security Objectives, OSI Model for Cryptographic Security, Security Services at the Link Layer, Security Services at the Network Layer, Security Services at the Application Layer, Message Confidentiality, Data Integrity, Identification of the Participants, Authentication of the Participants, Access Control, Denial of Service, Nonrepudiation, Secure Management of Cryptographic Keys, Exchange of Secret Keys: Kerberos, Public Key Kerberos, Exchange of Public Keys, ISAKMP (Internet Security Association and Key Management Protocol), SKIP (Simple Key Management for Internet Protocols), Key Exchange Algorithm, Certificate Management, Encryption Cracks, Summary.

Business-to-Business Commerce:- Overview of Business-to-Business Commerce, Examples of Business-to-Business Electronic Commerce, Business-to-Business Electronic Commerce Platforms, Obstacles Facing Business-to-Business Electronic Commerce, Business-to-Business Electronic Commerce Systems, Structured Alphanumeric Data, Structured Documents or Forms, EDI Messaging, Security of EDI, Relation of EDI with Electronic Funds Transfer, Electronic Billing, EDI Integration with Business Processes, Standardization of the Exchanges of Business-to-Business Electronic Commerce, Summary.

UNIT - III (12 Hours)

SSL (Secure Sockets Layer):- General Presentation of the SSL Protocol, SSL Subprotocols, Example of SSL Processing, Performance Acceleration, Implementations, Summary.

TLS (Transport Layer Security) and WTLS (Wireless Transport Layer Security):- From SSL to TLS, WTLS, Summary.

The SET Protocol:- SET Architecture, Security Services of SET, Certification, Purchasing Transaction, Optional Procedures in SET, SET Implementations, Evaluation, Summary.

UNIT - IV (12 Hours)

Composite Solutions:- C-SET and Cyber-COMM, Hybrid SSL/SET Architecture, 3-D Secure, Payments with CD-ROM, Summary.

Micropayments and Face-to-Face Commerce:- Characteristics of Micropayment Systems, Potential

Applications, Chipper, GeldKarte, Mondex, Proton, Harmonization of Electronic Purses, Summary.
Remote Micropayments:- Security without Encryption: First Virtual, NetBill, KLELine, Millicent, PayWord, MicroMint, eCoin, Comparison of the Different First-Generation Remote Micropayment Systems, Second-Generation Systems, Summary.

TEXT BOOKS:

1. Mostafa Hashem Sherif. *Protocols for Secure Electronic Commerce*. CRC PRESS, 1 edition, 2000. ISBN 9780321564085

Artificial Neural Networks and Deep Learning

(Common to CSE & IT)

B.Tech (20ITPE08)

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

Prerequisites:

UNIT - I (12 Hours)

Artificial Neural Networks: Introduction to Artificial Neural Networks and Deep Learning, Feature Descriptors, Machine Learning and Deep Learning, Discriminative and Generative models, Optimization Techniques, Gradient Descent, Batch Optimization. Multilayer Perceptron, Back Propagation Learning, Loss Functions, Unsupervised Learning with Deep Network, Autoencoders- Training and variants.

UNIT - II (12 Hours)

Convolutional Neural Networks: Introduction to Neural Network, Convolutional Neural Network, Building blocks of CNN, LeNet, AlexNet, VGG16, GoogleNet, Transfer Learning, Vanishing and Exploding Gradient.

UNIT - III (12 Hours)

Optimizers and Normalization: Momentum Optimizer, RMSProp, AdaDelta, Adam, Effective training in Deep Net - early stopping, Dropout, Batch Normalization, Instance Normalization, Group Normalization.

Applications: Classical Supervised Tasks with Deep Learning - Face Detection, Image Denoising, Semantic Segmentation, Object Detection.

UNIT - IV (12 Hours)

Generative Models: Recurrent Neural Networks, LSTM Networks, Introduction to Variational Autoencoder and Generative Adversarial Network.

TEXT BOOKS:

1. Ian Goodfelllow, Yoshua Benjio, and Aaron Courville. *Deep Learning*. The MIT Press, 1 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Richard O Duda, Peter E Hart, and David G Stork. *Pattern Classification*. John Wiley , Sons Inc, 1 edition, 2020. ISBN 9780321564085
2. Francois Challet. *Deep Learning with Python*. Manning Publishers, 1 edition, 2020. ISBN 9781617294433

Natural Language Processing

(Common to CSE & IT)

B.Tech (20ITPE09)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction: - Understanding natural language processing, Understanding basic applications, Advantages of togetherness-NLP and Python, Environment setup for NLTK.

Practical Understanding of a Corpus and Database: - What is a corpus? Why do we need a corpus? Understanding corpus analysis, Understanding types of data attributes, Exploring different file formats for corpora, Resources for accessing free corpora, Preparing a dataset for NLP applications, Web scraping.

UNIT - II (12 Hours)

Understanding the Structure of a Sentence: - Understanding components of NLP, Natural language understanding, Defining context-free grammar, Morphological analysis, Syntactic analysis, Discourse integration, Pragmatic analysis.

UNIT - III (12 Hours)

Preprocessing: - Handling corpus-raw, Handling corpus-raw sentences, Basic preprocessing, Practical and customized preprocessing.

UNIT - IV (12 Hours)

Feature Engineering and NLP Algorithms:- Understanding feature engineering, Basic feature of NLP, Basic statistical feature of NLP, Advantages of features engineering, Challenges of features engineering.

TEXT BOOKS:

1. Jalaj Thanaki. *Python Natural Language Processing*. Packt Publishers, 1 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Tanvir Siddiqui. *Natural Language Processing*. Oxford Publishers, 1 edition, 2020. ISBN 9780321564085

Enterprise Programming

(Common to CSE & IT)

B.Tech (20ITJO01)

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

Prerequisites:

Object Oriented Programming(20IT303), Web Technologies(20IT402)

UNIT - I (12 Hours)

Introduction: Java EE Architecture, The Many Variations of Java EE Applications, Packaging and Deploying the Java EE Application, Java EE Platform and Implementations.

Classic Memories - JDBC: Introduction to JDBC, Structured Query Language, The JDBC APIs. Java Servlets and Web Applications - Foundations of the Web Tier: The HTTP Protocol, Introducing Java Servlets, Understanding the Java Servlet API, Web Applications, Java Servlets: The Good and the Bad.

UNIT - II (12 Hours)

Dynamic Web Pages - JSP: JSP Runtime Architecture, JSP Syntax, The Java Environment for JSPs, JSP Standard Tags, Custom Tag Libraries, Expression Language.

Assembling Dynamic Web Pages - JavaServer Faces: Architecture of a JSF Application, JavaServer Faces Tags, Java EE Managed Beans, f: Core Tags, JSTL Core Tags, Extensibility and Modularity.

UNIT - III (12 Hours)

Web Sites for Non-browsers - JAX-RS: What Are RESTful Web Services, The Java API for RESTful Web Services, Deploying JAX-RS Resources, Content Production, Content Consumption, Accessing Web Service Context, Exception Mapping, Number of Instances of Resource Classes, Path Mapping.

JSON Processing: Streaming API : Consuming JSON Using the Streaming API, Producing JSON Using the Streaming API; Object Model API : Consuming JSON Using the Object Model API , Producing JSON Using the Object Model API.

Java WebSockets: Introduction to the WebSocket Protocol, The WebSocket Lifecycle, Overview of the Java WebSocket API, Java WebSocket Encoders and Decoders, Message Processing Modes, Path Mapping, Deployment of Server Endpoints.

UNIT - IV (12 Hours)

The Fundamentals of Enterprise Beans: Introduction to Enterprise Beans, Hello Enterprise Beans, Flavors of Enterprise Beans, Exposing Enterprise Beans, Finding Enterprise Beans, EJB Lifecycle, Packaging Enterprise Beans.

Advanced Thinking with Enterprise Beans: Multi-threading and Enterprise Beans, Asynchronous Enterprise Beans, Enterprise Bean Contexts, The Timer Service, Transactions and Enterprise Beans, Interceptors.

The Java Persistence API: Persistence Entities, The Entity Manager, Java Persistence Query Language, Configuring JPA Applications.

TEXT BOOKS:

1. Dr. Danny Coward. *Java EE 7: The Big Picture*. oracle press, 1 edition, 2020. ISBN 9780321564085
2. Arun Gupta. *Java EE 7 Essentials*. O'Reilly, 1 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Antonio Goncalves. *Beginning Java EE 7*. apress, 1 edition, 2020. ISBN 9780321564085

Middleware Technologies

(Common to CSE & IT)

B.Tech (20ITJO02)

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

Prerequisites:

UNIT - I (12 Hours)

The .NET Framework: C#, VB, and the .NET Languages, Intermediate languages, Common language runtime, the .NET class library.

Elements of C#: The C# keywords, Identifiers, Data Types, Literals, Variables, Operators & Program Control Statements.

Arrays and Strings: Arrays, Multidimensional Arrays, Jagged Arrays, Assigning Array References, Using the Length Property, Implicitly Typed Arrays, the foreach Loop, Exploring String Class Methods.

Introducing Classes and Objects: Class Fundamentals, How Objects Are Created, Reference Variables and Assignment, Methods, Constructors, the new Operator Revisited, Garbage Collection and Destructors, this Keyword.

A Closer Look at Methods and Classes: Controlling Access to Class Members, Pass References to Methods, Use ref and out Parameters, Use a Variable Number of Arguments, Return Objects, Method Overloading, Overload Constructors, Object Initializers, Optional Arguments, Named Arguments, The Main() Method, Recursion, Understanding static, Static Classes, Properties.

UNIT - II (12 Hours)

Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Inheritance and Name Hiding, Creating a Multilevel Hierarchy, When Are Constructors Called, Base Class References and Derived Objects, Virtual Methods and Overriding, Applying Virtual Methods, Using Abstract Classes.

Interfaces: Interfaces, Implementing Interfaces.

Exception Handling: Exception-Handling Fundamentals, A simple exception example using following keywords: try, catch, finally and throw.

Delegates & Events: Delegates, Events-Delegates, Events, Namespaces.

UNIT - III (12 Hours)

Web Form Fundamentals: Understanding the anatomy of an ASP.NET application, Introducing server controls, improving the currency converter, taking a deeper Look at HTML control classes, using the page class, using Application events.

Web Controls: Stepping up to web controls, web control classes, List controls, Table controls, Web control events and AutoPostBack, An interactive web page.

State Management: Understanding the problem of the state, using View State, Transferring information between pages, using cookies, managing session state, Configuring session state, using application state.

Validation: Understanding the validation, using the validation controls.

UNIT - IV (12 Hours)

ADO.NET Fundamentals: Understanding databases, configuring your database, Understanding SQL basics, Understanding the data provider model, using direct data Access, using disconnected data access.

Data Binding: Introducing data binding, using single valued data binding, using repeated value data binding, working with data source controls.
The Data Controls: The grid view, formatting the gridview, selecting a grid view row, Editing with a grid view row, sorting and paging in gridview, using grid view templates, The details view and form view.

TEXT BOOKS:

1. Herbert Schildt. *C# 4.0 The Complete Reference*. Tata McGraw Hill, 1 edition, 2010. ISBN 9780321564085
2. Matthew MacDonald. *Beginning ASP.NET 4.5 in C#.* Apress Publishing Company, 1 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Ian Griffiths. *Programming C# 5.0*. O'REILLY, 1 edition, 2012. ISBN 9780321564085
2. Jesse Liberty. *Programming C#.* O'REILLY, 2 edition, 2002. ISBN 9780321564085
3. Jesse Liberty and Donald Xie. *Programming C# 3.0*. O'Reilly, 5 edition, 2020. ISBN 9780321564085

Mobile Application Development

(Common to CSE & IT)

B.Tech (20ITJO03)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction:- ANDROID: AN OPEN PLATFORM FOR MOBILE DEVELOPMENT, Android SDK Features, Introducing the Development Framework.

Getting Started:- What You Need to Begin, Creating Your First Android Application, Types of Android Applications.

UNIT - II (12 Hours)

Creating Applications and Activities:- What Makes an Android Application?, Introducing the Application Manifest File, Externalizing Resources, The Android Application Lifecycle, A Closer Look at Android Activities, Creating Activities, The Activity Lifecycle, Activity States.

Building User Interfaces:- Fundamental Android UI Design, Android User Interface Fundamentals, Introducing Layouts, Introducing Fragments.

UNIT - III (12 Hours)

Intents and Broadcast Receivers:- Introducing Intents, Creating Intent Filters and Broadcast Receivers.

Saving State and Preferences:- Creating and Saving Shared Preferences , Retrieving Shared Preferences Persisting the Application Instance State.

UNIT - IV (12 Hours)

Databases and Content Providers:- Introducing Android Databases, Introducing SQLite, Content Values and Cursors, Working with SQLite Databases, Creating Content Providers, Using Content Providers

Working in the Background:- Creating and Controlling Services, Binding Services to Activities

Expanding the User Experience:- Introducing the Action Bar ,Creating and Using Menus and Action Bar Action Items

TEXT BOOKS:

1. Reto Meier, John Wiley, and Sons. *Professional Android 4 Application Development*. John Wiley and Sons, Inc., 1 edition, 2012. ISBN 9780321564085

REFERENCES:

1. Brian Hardy, Bill Phillips, and Big Nerd Ranch. *Android Programming The Big Nerd Ranch Guide*. O'REILLY, 5 edition, 2022. ISBN 9780321564085

2. Brian Hardy, Bill Phillips, and Big Nerd Ranch. *Android Programming The Big Nerd Ranch Guide*. O'REILLY, 5 edition, 2022. ISBN 9780321564085

Cloud Programming

(Common to CSE & IT)

B.Tech (20ITJO04)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction to Cloud Computing & Windows Azure Platform – What is Azure?, Overview of Cloud Computing, Comparison of on-premises versus Azure, Service models, Deployment models, Azure services, Azure Resource Manager, Azure subscriptions, Azure registration, Exploring Management portal.

Windows Azure Websites - WebMatrix – Razor syntax, Forms and validation, Working with data, Creating and publishing simple and database driven ASP.NET web sites, Websites with PHP and MySQL – PHP language features, Forms, Database connectivity, Deploying and monitoring websites.

UNIT - II (12 Hours)

Cloud Applications - Software Development Kits, Windows Azure Tools for Visual Studio, Cloud Project with a Web Role, Deployment to Windows Azure, Configuration and Upgrading, Service Definition File, Service Configuration File and Role Properties. Windows Azure tools for Eclipse and Windows Azure Deployment Project in Java. Cloud applications using ASP.NET and J2EE.

Windows Azure Storage - Local Storage Vs Azure Storage, Windows Azure Storage Account, Windows Azure Management Tool, Blobs, Tables, Queues, Files. Worker Roles - Queue Service.

UNIT - III (12 Hours)

Virtual Machines – Introduction to Azure Virtual Machine, Virtual machine models, Virtual machine components, Virtual Machine creation, connecting to a virtual machine, configuring and managing virtual machine, scaling Azure virtual machine, Installing SQL server and J2EE Platform, Connecting to SQL Server on Virtual Machine.

Azure Virtual Networks – Introduction, Network Security Groups, Cross-premises connection options, Point-to-site network.

UNIT - IV (12 Hours)

Azure SQL – Azure SQL Features, Database Server Creation in the Cloud, Azure SQL Relational Engine Features, Azure SQL Access, Existing Database Migration, Applications connecting to SQL Azure, Comparing Azure SQL Database with SQL Server in Azure Virtual Machines, Database alternatives – MySQL, NoSQL.

Service Bus - Service Bus, Relayed messaging, Brokered Messaging- Queues, Topics, Event Grid, Event Hubs.

TEXT BOOKS:

1. Microsoft. *Windows Azure Technical Documentation Library-MSDN*. Microsoft, 1 edition, 2020. ISBN 9780321564085

2. Steve Lydford. *Building ASP. NET web pages with Microsoft WebMatrix*. Apress, 1 edition, 2012. ISBN 9780321564085

3. Collier, Michael, and Robin Shahan. *Microsoft Azure Essentials-Fundamentals of Azure*. Microsoft Press, 1 edition, 2015. ISBN 9780321564085

REFERENCES:

1. Moroney and Laurence. *Introducing Microsoft® WebMatrixTM*. O'REILLY, 1 edition, 2011. ISBN 9780321564085

2. Brunetti and Roberto. *Windows Azure step by step*. Microsoft Press, 1 edition, 2011. ISBN 9780321564085

3. Krishnan and Sriram. *Programming Windows Azure: Programming the Microsoft Cloud*. O'REILLY, 1 edition, 2010. ISBN 9780321564085

R Programming

(Common to CSE & IT)

B.Tech (20ITJO05)

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

Prerequisites:

UNIT - I **(12 Hours)**

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes. R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT - II **(12 Hours)**

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files, Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ; Customizing Graphs, Saving Graphs to Files.

UNIT - III **(12 Hours)**

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance,Testing of Hypothesis(T-Test,F-Test, ANOVA Test).

UNIT - IV **(12 Hours)**

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests

TEXT BOOKS:

1. Norman Matloff and Cengage Learning. *The Art of R Programming*. William Pollock, 1 edition, 2020. ISBN 9780321564085
2. Lander. *R for Everyone*. Pearson, 1 edition, 2012. ISBN 9780321564085

REFERENCES:

1. Paul Teetor. *R Cookbook*. O'REILLY, 1 edition, 2020. ISBN 9780321564085
2. Manning RobertKabacoff. *R in Action*. Manning publisher, 1 edition, 2020. ISBN 9780321564085

Cyber Security

(Common to CSE & IT)

B.Tech (20ITJO06)

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

Prerequisites:

UNIT - I (12 Hours)

Installing & Basic Over View: Installing Kali with VM ware player, updating kali, Installing VM ware Tools for Linux, installing Metasploitable 2, Installing Windows OS, Installing Veil frame work, Installing DVWA.

Metasploit Tutorial: Introduction to metasploit: Metasploit overview, picking an exploit, Setting exploit options, Multiple Target types, Picking a payload, Setting payload options, Running the exploit.

Meterpreter Shell: Basic Meterpreter Commands, Core commands, File system Commands, Network Commands, System Commands, Capturing Webcam Video, Screen shots.

UNIT - II (12 Hours)

Information Gathering & Mapping: Recon Tool, Dmitry, netdiscover, nmap, Zenmap, Nessus.

Viruses, Malware, Trojan, Types of cyber security attacks: malware, phishing, SQL injection attack (sqlmap), cross-site scripting, denial of service, session hijacking and man-in-the middle attacks.

UNIT - III (12 Hours)

Web application hijacking tools - Burp suite, OWASPZAP.

Web based password cracking Techniques: Introduction, Authentication Techniques, password cracking: definition, password cracking Tools and techniques.

Wireless Network Attacks: Wireless Security Protocols, Using MacChanger to Change the Address (MAC) of your Wi-Fi Card, Fern WIFI Cracker, aircrack-ng, Wi-Fi Testing with WiFite, Kismet: Scanning with Kismet, Analysing the Data.

UNIT - IV (12 Hours)

Troubleshooting and configuring of network devices: Firewalls-what is firewall, packet, traffic, protocol, port, tool: IPtables (rules), IDS and IPS: what is IDS and IPS, installation procedure for snort, snort rules.

Incident Response: What is IR, Need for IR, Goals of IR.

IR Methodologies: Based on procedure: Phases of IR, Pre-incident Preparation, Detection and Analysis, Containment, Eradication and Recovery, Post Incident Activity. Based on Artifacts: Investigating Unix Systems.

Disk analysis: FTK imager.

REFERENCES:

1. Daniel W. Dieterle. *Basic Security Testing with Kali Linux*. Independent Publishing Platform, 1 edition, 2020. ISBN 9780321564085

2. JOEL SCAMBRAY MIKE SHEMA. *Hacking exposed web applications*. McGraw-Hill, 1 edition, 2020. ISBN 9780321564085

Internet of Things

(Common to CSE & IT)

B.Tech (20ITJO07)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction to IoT: The flavour of the IoT, the technology of the IoT, characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels & deployment templates.

UNIT - II (12 Hours)

Elements of IoT: Hardware Components-Computing (Arduino, Raspberry Pi), Sensors, Actuators, I/O interfaces, Communication Protocols (ZigBee, Bluetooth, 6LoPAN, and MQTT), Software Components-Programming API‟s (using Python/Arduino).

UNIT - III (12 Hours)

M2M and IoT Design Methodology: M2M, Differences and Similarities between M2M and IoT, IoT Design Methodology.

UNIT - IV (12 Hours)

Cloud for IoT and Case Studies: Introduction, IoT with Cloud – Challenges, Selection of Cloud Service Provider for IoT Applications, Introduction to Fog Computing, Cloud Computing: Security Aspects.
Case Studies: Smart Lighting, Home Intrusion Detection, Smart Parking, Weather Monitoring System, Smart Irrigation, and Adafruit Cloud.

TEXT BOOKS:

1. Arsh deep Bahga and Vijay Madisetti. *Internet of Things: A Hands-on-Approach*. Universities Press, 1 edition, 2014. ISBN 9780321564085
2. Shriram K Vasudevan, Abhishek S Nagarajan, and RMD Sundaram. *Internet of Things*. John Wiley & Sons, 1 edition, 2019. ISBN 9780321564085
3. Adrian McEwen and Hakim Cassimally. *Designing the Internet of Things*. John Wiley and Sons, 1 edition, 2014. ISBN 9780321564085
4. Raj Kamal. *Internet of Things: Architecture and Design*. McGraw Hill Education, 1 edition, 2017. ISBN 9780321564085

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1. Jeeva Jose. *Internet of Things*. Khanna Publishing, 1 edition, 2018. ISBN 9780321564085
2. Olivier Hersent, David Boswarthick, and Omar Elloumi. *The Internet of Things: key applications and Protocols*. Wiley, 1 edition, 2015. ISBN 9780321564085

Big Data Analytics

(Common to CSE & IT)

B.Tech (20ITJO08)

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

Prerequisites:

UNIT - I (12 Hours)

Big Data Analytics: Introduction to Big Data Analytics, Characteristics of Big Data, Sources of Big Data, Applications of Big Data.

HADOOP: Introduction to Hadoop, Hadoop components, Configuration of Hadoop.

The Hadoop Distributed File System: The design of HDFS,HDFS concepts, The command line interpreter , Basic File system operations, Hadoop File System, Interfaces Data flow, parallel copying with distcp.

UNIT - II (12 Hours)

YARN: Anatomy of YARN application run, YARN compared to Map Reduce 1, Scheduling in YARN.

How Map Reduce Works?: Anatomy of Map Reduce job run, Failures, Shuffle and sort, Task execution. Map Reduce Features-Counters, sorting, joins side data distribution, Writing map reduce programs, deploying map reduce programs on Hadoop Cluster.

UNIT - III (12 Hours)

Pig: Installing and Running Pig-Execution Types, Running Pig Programs, Grunt, Pig Latin Editors, An Example, Comparison with Databases, Pig Latin-Structure, Statements, Expressions, Types, Schemas, Functions, Macros, User-Defined Functions-A Filter UDF, An Eval UDF, Data Processing Operators-Loading and Storing Data, Filtering Data, Grouping and Joining Data, Sorting Data, Combining and Splitting Data, Pig in Practice-Parallelism, Anonymous Relations, Parameter Substitution.

Hive: The Hive Shell, An example, Running Hive, Configuring Hive, Hive Services, The Metastore, Comparison with traditional databases, Schema on Read versus Schema on Write, Update, transactions and Indexes, SQL on Hadoop alternatives, HiveQL, Data types, Operators and functions, Tables, Querying Data-sorting and aggregating, MapReduce Script, joins, Sub queries, Views.

UNIT - IV (12 Hours)

Spark: Installing spark, an example spark application, jobs, stages, tasks, a scalastand alone application, anatomy of spark job run, job submission, DAG construction, task scheduling, task execution, execution cluster managers, spark on YARN.

Sqoop: Getting Sqoop, Sqoop Connectors, A Sample Import, Text and Binary File Formats, Generated Code, Additional Serialization Systems, Imports: A Deeper Look, Controlling the Import, Imports and Consistency.

TEXT BOOKS:

1. Tom White. *HADOOP "The Definitive Guide":Black Book on Big Data*. O'Reilly Publications, 4 edition, 2020. ISBN 9780321564085

REFERENCES:

1. Jeffrey Aven. *Hadoop in Action,Hadoop Beginner's Guide, Optimizing Hadoop for Map Reduce, Scaling Big Data with Hadoop and Solr*. O'Reilly Media, 1 edition, 2020. ISBN 9780321564085

Software Testing Methodologies

(Common to CSE & IT)

B.Tech (20ITJO09)

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

Prerequisites:

UNIT - I (12 Hours)

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II (12 Hours)

Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

Paths, Path products and Regular expressions: path products and path expression, reduction procedure, applications, regular expressions and flow anomaly detection.

UNIT - III (12 Hours)

Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications. State, State Graphs and Transition testing: state graphs, good and bad state graphs, state testing,Transition testing.

UNIT - IV (12 Hours)

Software Quality: What Is Quality, Software Quality- ISO 9126 Quality Factors, McCall's Quality Factors.

Software Quality Assurance: Background Issues , Elements of Software Quality Assurance SQA Tasks, Goals, and Metrics, SQA Tasks, Goals, Attributes, and Metrics ,Formal Approaches to SQA, Statistical Software Quality Assurance, A Generic Example, Six Sigma for Software Engineering ,Software Reliability, Measures of Reliability and Availability, Software Safety , The ISO 9000 Quality Standards ,The SQA Plan.

TEXT BOOKS:

1. Boris Beizer. *Software Testing Techniques*. Dreamtech, 2 edition, 2020. ISBN 9780321564085
2. Roger S.Pressman. *Software Engineering- A Practitioner's Approach*. Tata McGraw-Hill International, 7 edition, 2020. ISBN 9780321564085

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1. Perry. *Effective Methods of Software Testing*. John Wiley, 1 edition, 2020. ISBN 9780321564085
2. Edward Kit. *Software Testing in the Real World*. Pearson, 1 edition, 2020. ISBN 9780321564085
3. RajibMall. *Fundamentals of Software Engineering*. PHI, 2 edition, 2020b. ISBN 9780321564085

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

Allan and Barbara. *The Definitive Book of Body Language*. Pease International, 1 edition, 2004. ISBN 9780321564085.

Sam Anahory and Dennis Murray. *Data Warehousing in the real world-A Practical guide for Building decision support systems*. Pearson Education, 1 edition, 2020. ISBN 9780321564085.

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.

Andreas Antonopoulos. *Mastering Bitcoin: Unlocking Digital Cryptocurrencies*. John Wiley Sons, 1 edition, 2020. ISBN 9780321564085.

Andrew N Appel. *Modern Compiler Implementation in C*. Cambridge University Press, 1 edition, 2020. ISBN 9780321564085.

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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/.

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Francois Challet. *Deep Learning with Python*. Manning Publishers, 1 edition, 2020. ISBN 9781617294433.

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

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