ACADEMIC REGULATIONS PROGRAM STRUCTURE AND DETAILED SYLLABUS

Information Technology

FOR

CHOICE BASED CREDIT SYSTEM (CBCS) BASED B.TECH FOUR YEAR DEGREE PROGRAM

(Applicable for the batches admitted from the AY 2019-20)

Geethanjali College of Engineering and Technology

(Autonomous)

Cheeryal (V), Keesara (M), Medchal Dist., Telangana – 501 301

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., 501 301

Department of Information Technology

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ACADEMIC REGULATIONS 2018
For CBCS Based B.Tech PROGRAMMES

(Effective for the students admitted into FIRST year from the Academic Year **2019-20**)

1. Under-Graduate Degree Programme (B.Tech) in Engineering

Geethanjali College of Engineering and Technology (GCET) offers **four (**4) Year (**eight** (8) Semesters) **Bachelor of Technology** (B.Tech) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2019-20, in the following Branches of Engineering

S. No.	***Branch***
I.	Civil Engineering
II.	Computer Science and Engineering
III.	Electrical and Electron1ics Engineering
IV.	Electronics and Communication Engineering
V.	Information Technology
VI.	Mechanical Engineering

2. Eligibility for Admission

2.1 Admission to the B.Tech Programme shall be made either on the basis of the merit rank obtained by the qualifying candidate at an Entrance Test conducted by the Telangana State Government (EAMCET), OR the JNTUH, OR on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government of Telangana from time to time.

2.2 The medium of instruction for all the B.Tech programmes shall be ENGLISH only.

3. B.Tech Programme Structure

3.1 A student after securing admission shall complete the B.Tech programme in a minimum period of **four (4)** academic years (**eight** (8) semesters), and a maximum period of **eight (8)** academic years (**sixteen** (16) semesters) starting from the date of commencement of first year first semester (soon after securing admission), failing which student shall forfeit seat in B.Tech program. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the undergraduate programme and award of the B.Tech degree.

3.2 UGC / AICTE specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are as listed below.

3.2.1 Semester Scheme:

Each B.Tech program is of **four** (4) academic years (**eight** (8) semesters**)**, with each academic year being divided into two semesters of **20 weeks (minimum of 90 working days)** each. Each semester has - '**Continuous Internal Evaluation (CIE)**' and '**Semester End Examination (SEE)**'. **Choice Based Credit System (CBCS)** and **Credit Based Semester System (CBSS)** as denoted by UGC and curriculum / programme structure as suggested by AICTE are followed.

3.2.2 Credit Courses:

All courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each course in a L: T: P/D: C (Lecture periods: Tutorial periods: Practicals / Drawing periods: Credits) Structure, based on the following general pattern...

- One credit - for one hour / week / semester for Theory / Lecture (L) / Tutorial(T) courses.
- One-half (½) of a credit – for one hour / week / semester for Laboratory / Practical (P) Courses or Drawing Periods (D).
- No Credits for mandatory courses.
- Other student activities (co-curricular and extra-curricular), namely, NCC, NSS, NSO, Study Tour, Guest Lecture etc. and identified Mandatory Courses, if any, shall not carry credits.

3.2.3 Course Classification:

All courses offered for the B.Tech programme are broadly classified as: (a) Foundation
Courses (FnC), (b) Core Courses (CoC), and (c) Elective Courses (Eℓ C).

- Foundation Courses (FnC) are further categorized as : (i) HSMC (Humanities and Social Sciences including Management Courses), (ii) BSC (Basic Science Courses), and (iii) ESC (Engineering Science Courses);
- Core Courses (CoC) and Elective Courses (Eℓ C) are categorized as PS (Professional Courses), which are further subdivided as – (i) PCC (Professional/ Departmental Core) Courses, (ii) PE (Professional/ Departmental Electives), (iii) OE (Open Electives); (iv) Technical Seminar, (v) Mini project and (vi) Project Work (PW) and (vii) Internship;
- Mandatory course(s) (MC – Non credit oriented)

S.No	Broad Course Classification	Course Group/Category	Course Description
1	Foundation Courses (FnC)	BSC-Basic Science Courses	Includes Mathematics, Physics and Chemistry courses
2		ESC-Engineering Science Courses	Includes Fundamental Engineering Courses
3		HSMC-Humanities and Social sciences including Management Courses	Includes courses related to humanities, Social Sciences and Management
4	Core Courses (CoC)	PCC-Professional Core Courses	Includes core courses related to parent discipline/department/ branch of Engineering
5	Elective Courses (EℓC)	PEC-Professional Elective Courses	Includes elective courses related to parent discipline / related department / branch of Engineering
6		OEC-Open Elective Courses	Elective Courses which include interdisciplinary courses or courses in an area outside the parent discipline/department /branch of engineering
7	Core Courses	Project Work	B.Tech Project
8		Internship/Mini-Project/ Technical Seminar	Internship/Mini- Project/Technical Seminar

4. Course Registration

4.1 A 'Faculty Advisor or Counselor' shall be assigned to a group of 20 students, who shall advise him about the B.Tech programme, its structure along with curriculum, choice / option for course(s), based on his competence, progress, pre-requisites and interest.

4.2 A Student may be permitted to Register for Course(s) of his CHOICE with a typical total of 20 Credits per Semester (Minimum being 16 C and Maximum being 24 C, permitted deviation being ± 20%), based on his PROGRESS and SGPA/ CGPA, and study of the 'PRE-REQUISITES' as indicated for various Course(s), in the Department Course Structure and Syllabus contents. However, a MINIMUM of 16 Credits per Semester must be registered to ensure the 'STUDENTSHIP' in any Semester.

4.3 A student must register for all the course(s) in a semester as specified in the program structure, before registering for any extra course(s), from the program structure, subject to **a maximum of four** (4) **more credits** with the approval of the faculty advisor.

4.4 If any theory course(s) has an associated laboratory / practical course, while registering for such course(s), the student shall register for laboratory / practical course(s) along with the corresponding theory course(s) in the same semester**.**

4.5 Student's choice for 'extra course(s)' to reach the Maximum Permissible Limit of 24 Credits (above the typical 20 Credit norm) must be clearly indicated, which

needs the specific approval and signature of the Faculty Advisor/ Counselor**.**

4.6 Academic section of the college invites 'Registration Forms' from students a priori (before the beginning of the semester). Registration requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

4.7 A student can apply for registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his faculty advisor, which should be submitted to the College Academic Committee through Head of the Department concerned (a copy of the same being retained with Head of the Department, Faculty Advisor and the student).

4.8 If the student submits ambiguous choices or multiple options or erroneous entries - during registration for the course(s) under a given / specified course(s) Group/ Category, namely, core elective with laboratory, professional elective and open elective as listed in the programme structure, Faculty Advisor shall rectify such errors and advise the student accordingly.

4.9 Course(s) options exercised by the student and approved by Faculty Advisor are final and CANNOT be changed, or inter-changed. Further, alternate choices shall also not be considered. However, if the course(s) that has (have) already been listed for registration (by the department) in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice: either for new course(s) (subject to offering of such course(s)), or for another existing course(s) offered, which may be considered. Such alternate arrangements shall be made by the department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of class-work for that semester.

4.10 Dropping of course(s) may be permitted, only after obtaining prior approval from the faculty advisor / counselor 'within a period of 15 days' from the beginning of the current semester.

4.11 Open electives: The students have to choose open electives from the list of open electives given. However, the student cannot opt for an open elective course(s) offered by his own (parent) department.

4.12 Professional electives: The students have to choose the required professional electives from the list given.

5. Courses to be offered

5.1 A typical section (or class) strength for each semester shall be 60.

5.2 A Course may be offered to the students, ONLY IF a Minimum of 20 students (1/3 of the Section Strength) opts for the same. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

5.3 More than **one Instructor** may offer the **same course(s)** (laboratory / practical may be included with the corresponding theory course(s) in the same semester) in any

semester. However, selection of choice for students **shall be based on - 'first come first serve basis and CGPA criterion'**.

5.4 If more entries for registration of a course(s) come into picture then the Head of the Department concerned shall decide whether or not to offer such a course(s) for two or more sections.

5.5 In case of options coming from students of other departments / branches / disciplines (not considering OPEN
ELECTIVES), PRIORITY shall be given to the student of the 'Parent Department'.

6. Attendance Requirements

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% attendance in aggregate of all the courses (excluding attendance in mandatory course(s) such as Environmental Science, Constitution of India, Intellectual Property Rights, Professional Ethics and Gender Sensitization lab) registered for in that semester.

6.2 A student shall acquire a minimum of 75% attendance in each mandatory course. If he fails to acquire a minimum of 75% attendance in mandatory course(s), such student is deemed to have failed in that mandatory course(s) and shall re-register for such course(s) as and when offered next. Condonation of attendance is not allowed in mandatory course(s).

6.3 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on valid medical grounds, or participation in sports, games, NCC, NSS, other co-curricular and extra-curricular activities, recognized for the purpose, and the participation having prior approval of the competent authority. Such condonation shall be based on the student's representation with supporting evidence.

6.4 A stipulated fee shall be payable towards condoning of shortage of attendance.

6.5 Shortage of attendance below 65% in aggregate shall in "**NO"** case be condoned.

6.6 Students, whose shortage of attendance is not condoned in any semester, are not eligible to take their Semester End Examinations. They get detained and their registration for that semester shall stand cancelled. They shall not be promoted to the next semester. They may seek re-registration for all those course(s) registered in that semester in which they were detained, by seeking re-admission into that semester as and when offered. In the case of elective course(s), namely, professional elective(s) and / or open elective(s), the same may also be re-registered, if offered. However, if those elective(s) are not offered in later semesters, then alternate elective(s) may be chosen from the SAME set of elective course(s) offered under that specific category.

6.7 A student fulfilling the attendance requirements in the present semester shall not be eligible for readmission into the same class.

7. Academic Requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in section 6.

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course, if the student secures not less than 35% marks (e.g. 25 out of 70 marks in theory/laboratory/practical/drawing course(s)) in the Semester End Examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing Pass (C) Grade or above in that course(s).

7.2 Academic requirements in respect of Internship, Mini-Project, Technical Seminar, Project and mandatory non- credit course(s) are as follows:

7.2.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Internship, if the student secures not less than 40% of the total marks allocated for the course. The student is deemed to have failed, if he does not submit a report on his Internship or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Internship evaluation.

7.2.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Mini Project, if the student secures not less than 40% of the total marks allocated for the course(s). The student is deemed to have failed, if he does not submit a report on his Mini Project or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Mini Project evaluation.

7.2.3 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Technical Seminar, if the student secures not less than 40% of the total marks allocated for the course(s). The student is deemed to have failed, if he does not submit a report on his Technical Seminar or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Technical Seminar evaluation.

7.2.4 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Project, if the student secures not less than 40% of the total marks allocated for the course(s). The student is deemed to have failed, if he does not submit a report on his Project or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Project evaluation.

Note: He may reappear once for each of the above evaluations (mentioned in 7.2.1 to 7.2.4), when they are scheduled again; if he fails in such 'one reappearance evaluation also', he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.2.4.1 For mandatory / non-credit course(s), a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation

for passing the course(s) in addition to satisfying the attendance requirements mentioned in section 6.2.

7.2.4.2 No marks / letter grades shall be allotted for mandatory/non-credit course(s). Only Pass / Fail shall be indicated in Grade Card.

7.2.4.3 If a student fails in mandatory / non-credit course(s), he shall re-register for that course(s) as and when offered next.

7.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year First semester to First year Second semester	Regular course of study of First year First semester.
2	First year Second semester to Second year First semester	(i) Regular course of study of First year Second semester. (ii) Must have secured at least 50% (20 out of 40 credits) of the credits specified in the program structure of first year (up to and including first year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers for less than 40 credits, student must still secure a minimum of 20 credits).
3.	Second year First semester to Second year Second semester	Regular course of study of Second year First semester.
4	Second year Second semester to Third year First semester	(i) Regular course of study of Second year Second semester. (ii) Must have secured at least 60% (48 out of 80 credits) of the credits specified in the program structure of second year (up to and including second year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers for less than 80 credits, student must still secure a minimum of 48 credits).
5	Third year first semester to Third year second semester	Regular course of study of Third year First semester.
6	Third year second semester to Fourth year first semester	(i) Regular course of study of Third year Second semester. (ii) Must have secured at least 60% (72 out of 120 credits) of the credits specified in the program structure of third year (up to and including third year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers for less than 120 credits, student must still secure a minimum of 72 credits).
7	Fourth year First semester to Fourth year Second semester	Regular course of study of Fourth year First semester.

7.4 A Student shall register for all course(s) covering 160 credits as specified and listed in the Programme Structure, fulfills the Attendance and Academic requirements for 160 Credits securing a minimum of C Grade (Pass Grade) or above in each course(s), and ‘earns ALL 160 Credits securing an SGPA 5.0 (in each Semester), and CGPA (at the end of each successive Semester) 5.0, in addition to fulfilling the academic requirements of mandatory course(s)s, to successfully complete the B.Tech Programme. The performance of the student in these 160 credits shall be taken into account for the calculation of ‘the final CGPA (at the end of undergraduate programme), and shall be indicated in the grade card of IV year II semester.

7.5 Students who fail to earn 160 credits as per the Programme Structure, and as indicated above, within 8 academic years from the date of commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled.

7.6 A student detained due to shortage of attendance in any semester, may be re-admitted into that semester, as and when offered, with the Academic Regulations of the batch into which he gets readmitted. However, no grade allotments or SGPA/ CGPA calculations shall be done for the corresponding semester in which he got detained.

7.7 A student detained due to lack of credits in any year, may be readmitted in the next year, after fulfillment of the Academic Requirements, with the Academic Regulations of the batch into which he gets readmitted.

7.8 A student eligible to appear in the Semester End Examination in any course(s), but absent at it or failed (thereby failing to secure C Grade or above), may reappear for that course(s) at the supplementary examination as and when conducted. In such cases, his Internal Marks (CIE) assessed earlier for that course(s) shall be carried over, and added to the marks he obtains in the supplementary examination, for evaluating his performance in that course(s).

8. Evaluation - Distribution and Weightage of Marks

8.1 The performance of a student in each semester shall be evaluated course-wise (irrespective of credits assigned) with a maximum of 100 marks for all types of course(s), namely, theory, drawing, practicals, Technical seminar, Project, Mini-Project, Internship etc. and their evaluation is as follows:

8.1.1 Theory, practical, drawing and Project course(s) shall be evaluated based on 30% CIE (Continuous Internal
Evaluation) and 70% SEE (Semester End Examination),

8.1.2 Internship/Technical seminar shall be evaluated based on 100% CIE (Continuous Internal Evaluation)

8.1.3 Mini-project shall be evaluated based on 100% SEE (Semester End Examination)
Note: A letter grade corresponding to the % marks obtained shall be given for all course(s) as mentioned in section 9.2.

8.2 For theory course(s), during the semester, there shall be TWO (2) mid-term examinations for 25 marks each.
Each mid-term examination consists of one objective paper for TEN (10) marks, plus one subjective paper for FIFTEEN (15) marks, with duration of 120 minutes (20 minutes for objective and 100 minutes for subjective papers). Further, there shall be an allocation of five (5) marks for assignment. The objective paper is set with multiple choice questions, and / or True / False, and /or fill-in the blanks, and / or matching type questions. Subjective paper shall contain 3 questions, one from each unit or part thereof, with internal choice, each for 5 marks. All three questions are to be answered.

8.2.1 The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

8.2.2 The first set of assignments should be submitted before the conduct of the first mid-term examinations, and the second set of assignments should be submitted before the conduct of the second mid-term examinations. The assignments shall be as specified by the course instructor concerned.

8.2.3 The first mid-term examination marks and average of the marks of the first set of assignment shall make one set of CIE marks, and the second mid-term examination marks and the average of the marks of the second set of assignment shall make second set of CIE Marks; and the average of these two sets of marks shall be taken as
the final marks secured by the student in the Continuous Internal Evaluation in that theory course(s).

8.2.4 The details of the question paper pattern for Semester End Examination (SEE) shall be as follows:

➢ The examination shall be conducted for 70 marks. The question paper consists of two
parts:
- Part – A for 20 marks (Compulsory);
- Part – B for 50 marks (Questions with Internal Choice);

➢ Part – A: Part A shall consist of ten questions, two from each unit of the prescribed
syllabus of the course(s). Each question carries 2 marks. All questions are compulsory.
➢ Part – B: Part B shall consist of five questions, one each from the five units of the
prescribed syllabus of the course(s). Each question carries 10 marks and may contain
sub-questions. For each question, there shall be an internal choice (it means, there shall be two questions from each unit, and the student shall answer either of the questions). The student shall answer all the questions of Part B.

8.2.5 Absence in mid-term examination(s):

➢ If any student is absent in one mid-term examination for any course(s) on any valid
reasons certified by the Head of the Department concerned, one written test shall be
conducted on all units by the college in each course(s) at the end of the semester.
➢ If any student is absent in both mid-term examinations for any course(s) on any valid reasons certified by
the Head of the Department concerned, only one written test for 25 marks shall be conducted on all units
by the college in each course at the end of the semester, and the marks secured out of 25 shall be divided by two, shall be awarded against the said mid-term examination(s).
➢ A prescribed fee shall be payable by the student for appearing in the above mentioned written test.

8.2.6 For laboratory / practicals / drawing course(s), there shall be a Continuous Internal Evaluation (CIE) during the
semester for 30 marks, and 70 marks are assigned for laboratory / practical Semester End Examination (SEE). Out of the 30 marks for CIE, day-to-day work in the laboratory / practical shall be evaluated for 15 marks; and for the remaining 15 marks - two internal practical tests (each of 15 marks) shall be conducted by the concerned laboratory instructor, one at the end of 8 weeks and the other in the last week of the semester. The average of these two tests is taken into account. The SEE for practicals shall be conducted at the end of the semester by two examiners, namely, an external examiner and laboratory faculty as internal examiner. The external examiner shall be appointed by the Chief Superintendent of Examinations of the college as per the recommendation of the Chairperson, Board of Studies of the department concerned. The panel of the external examiners shall be provided by the Chairperson, BoS at the commencement of the semester during the meeting of the BoS

Absence in laboratory/practical internal examinations:

➢ If any student is absent in one laboratory internal examination for any laboratory course for any valid reasons certified by the Head of the Department concerned, one test shall be conducted for 15 marks covering all experiments of that laboratory course, by the college at the end of the semester.
➢ If any student is absent in both the laboratory internal examinations for any valid reasons certified by the Head of the Department concerned, only one test shall be conducted covering all experiments and the marks secured out of 15 marks shall be divided by two, which shall be awarded against the said lab internal examinations.

8.2.7 For the course having design and / or drawing (such as Engineering Graphics), the distribution shall be 30 marks for CIE (15 marks for day-to-day work, and 15 marks for internal tests) and 70 marks for SEE (question paper pattern shall be same as for theory examinations). There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations.

8.2.7.1 If any student is absent in the internal examination in design and / or drawing (such as Engineering Graphics) for any valid reasons certified by the Head of the Department concerned, one internal examination shall be conducted for 15 marks on

all experiments of that laboratory / practical course(s), by the college at the end of the semester.

8.2.8 Internship, Mini-Project, Technical Seminar and Project

8.2.8.1 There shall be an internship, which the student shall carryout immediately after Second year second semester examinations and pursue it during summer vacation for duration of four weeks. Internship carried out shall be submitted in a report form, and a presentation of the same shall be made before a committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department, the supervisor allocated for the internship, and two Professors / Assoc-Professors of the department. There shall be only CIE for 100 marks for internship and shall be evaluated during third year first semester. There shall be no SEE for Internship.

8.2.8.2 There shall be a Mini Project, which the student shall carryout immediately after Third year second semester examinations and pursue it during summer vacation. Mini Project shall be submitted in a report form, duly approved by the departmental internal evaluation committee, and presented before the examination committee in Fourth year first semester. It shall be evaluated for 100 marks as SEE. The examination committee consists of an external examiner, Head of the Department, supervisor of the mini project and a senior faculty member of the department. There shall be no internal marks (CIE) for Mini Project.

8.2.8.3 There shall be a technical seminar presentation in Fourth year second semester, for which, the student shall
collect the information on a specialized topic, prepare a technical report, submit it and present the same before a departmental committee. It shall be evaluated by the departmental committee, consisting of Head of the Department, seminar supervisor and a senior professor. The technical seminar report shall be evaluated for 100 marks as CIE. There shall be no SEE for the technical seminar.

8.2.8.4 There shall be a project, which the student shall carryout in final year second semester. There shall be three reviews, one at the end of the fourth week, another at the end of the ninth week and third at the end of the fourteenth week. The reviews shall be conducted and evaluated by an internal project review committee. The committee shall consist of Head of the Department, the supervisor allocated for the project, and two Professors,Assoc-Professors of the department. Each review shall be evaluated for thirty (30) marks and average of all three reviews shall constitute CIE of thirty (30) marks. Project carried out shall be submitted in a dissertation form, and a presentation of the same shall be made before a final examination committee consisting of Head of the Department, the supervisor and an external examiner, appointed by the chief superintendent of examinations, selected from a panel of examiners suggested by the chairperson, BoS, which evaluates it for seventy (70) marks.

9. Grading procedure

9.1 Grades shall be awarded to indicate the performance of students in each theory course, laboratory / practicals / Engineering Graphics / Drawing, Technical

Seminar, Internship, Mini-Project, Project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in section 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3 A student who has obtained an '**F'** grade in any course(s) shall be deemed to have '**failed'** and is required to reappear as a 'supplementary candidate' in the semester end examination, as and when conducted. However, the internal marks secured earlier in those course(s) shall remain the same.

9.4 A student, who has not appeared for an examination in any course(s), shall be awarded '**Ab'** grade in that course(s), and shall be deemed to have '**failed'** in that course(s). Such a student shall be required to reappear as a 'supplementary candidate' in the semester end examination, as and when conducted. However, the internal marks secured earlier in those course(s) shall remain the same.

9.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6 A student earns a grade point (GP) in each course, on the basis of the letter grade secured in that course. The corresponding 'credit points (CP)' for a course are computed by multiplying the grade point with credits for that particular course.

Credit points (CP) = grade point (GP) x credits …. For a course

9.7 A student passes a course, only when the student secures a **GP ≥ 5 ('C' grade or above)** in that course.

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) secured from all course(s) registered for in a semester, by the total number of credits registered for in that semester. SGPA is rounded off to **two decimal places**. SGPA is thus computed as

$$\text{SGPA} = \{ \sum_{i=1}^{N} C_i G_i \} / \{ \sum_{i=1}^{N} C_i \} \text{ .... For each Semester,}$$

where 'i' is the course indicator index (takes into account all course(s) in a semester),

'N' is the number of courses '**registered'** for in that semester (as specifically required and listed under the program structure of the parent department), C is the number of credits allotted to the i^{th} course, and G represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} course.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the cumulative performance of a student in all the courses registered from all the semesters. The CGPA is the ratio of the total credit points secured by a student in **all the** registered courses in **all** the semesters, and
the total number of credits registered for in **all** the semesters. CGPA is rounded off to **two decimal places**. CGPA is thus computed from the First year second semester onwards at the end of each semester as per the formula

$$\text{CGPA} = \{ \sum_{j=1}^{M} C_j G_j \} / \{ \sum_{j=1}^{M} C_j \} \text{ ... for all S Semesters registered}$$
$$\text{(ie., upto and inclusive of S Semesters, } S \geq 2 \text{)},$$

where '**M'** is the **total** number of courses (as specifically required and listed under the program structure of the parent department) the student has '**registered'** for i.e. from the first semester onwards up to and inclusive of the eighth semester, 'j' is the course indicator index (takes into account, all course(s) from first semester to eighth semester), C is the number of credits allotted to the j^{th} course, and G represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} course. After registration and completion of First year first semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course	Credits	Letter Grade	Grade Point	Credit Points
Course1	4	A	8	4 x 8=32
Course 2	4	O	10	4 x 10=40
Course 3	4	C	5	4 x 5=20
Course 4	3	B	6	3 x 6=18
Course 5	3	A+	9	3 x 9=27
Course 6	3	C	5	3 x 5=15
Total	**21**	**Total Credit Points**		**152**

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point	Credit Points(CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
Total Credits		**69**	**Total Credit Points**		518

CGPA = 518/69 = 7.51

The above illustrated calculation process of CGPA shall be followed for each subsequent semester until eighth semester. The CGPA obtained at the end of eighth semester will become the final CGPA secured for entire B.Tech Programme.

9.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of the CGPAs shall be used.

9.11 SGPA and CGPA of a semester shall be mentioned in the semester Memorandum of Grades if all courses of that semester are passed in the first attempt. Otherwise, the SGPA and CGPA shall be mentioned only on the Memorandum of Grades generated after the student has passed his last examination in that semester. However, mandatory course(s) will not be taken into consideration.

10. Passing Standards:

10.1 A student shall be declared **'SUCCESSFUL'** or **'PASSED'** in a semester, only when he gets a SGPA 5.00 (at the end of that particular Semester); and a student shall be declared **'SUCCESSFUL'** or **'PASSED'** in the entire B.Tech

programme, only when he gets a CGPA □ 5.00, subject to the condition that he secures a GP □ 5 (C Grade or above) in every registered course(s) in each semester (during the entire B.Tech Programme) for award of the degree.

10.2 After the completion of each semester, a Grade Card or Grade Sheet (Memorandum of Grades) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It shall show the details of the course(s) registered (course(s) code, title, number of credits, grade earned etc.), credits earned, SGPA, and CGPA.

11. Declaration of Results

11.1 Computation of SGPA and CGPA are done using the procedure listed in sections 9.6 through 9.9.
11.2 For final % of marks equivalent to the computed final CGPA, the following formula shall be used:

% of Marks = (final CGPA – 0.5) x 10

12. Award of Degree

12.1 A student who registers for all the specified course(s) as listed in the programme structure, satisfies all the programme requirements, and passes all the examinations prescribed in the entire B.Tech programme, and secures the required number of 160 credits (with CGPA 5.0), within eight (8) academic years from the date of commencement of the first academic year, shall be declared to have **'QUALIFIED'** for the award of the B.Tech degree in branch of Engineering studied.

12.2 A student who qualifies for the award of the degree as listed in section 12.1, shall be placed in the following classes based on evaluation as per section 7.4:

12.2.1 Students with final CGPA (at the end of the B. Tech Programme) □ 8.00 and fulfilling the following conditions shall be placed in 'FIRST CLASS with DISTINCTION'-

i. Should have passed all the courses in 'FIRST APPEARANCE' within the first four (4) academic years (or eight (8) sequential semesters) from the date of commencement of his first academic year,
ii. Should have secured a CGPA □ 8.00, at the end of each of the eight (8) sequential semesters, starting from the FIRST year FIRST semester onwards,
iii. Should not have been detained or prevented from writing the Semester End Examinations in any semester due to shortage of attendance or any other reason.

12.2.2 Students having final CGPA (at the end of B.Tech Programme) □ 8.00, but not fulfilling the above conditions shall be placed in 'FIRST CLASS'.

12.2.3 Students with final CGPA (at the end of the B.TECH Programme) □ 6.50 but < 8.00, shall be placed in 'FIRST CLASS'.

12.2.4 Students with final CGPA (at the end of the B.TECH Programme) □ 5.50 but < 6.50, shall be placed in 'SECOND CLASS'.

12.2.5 All other Students who qualify for the award of the degree (as per Section 12.1), with final CGPA (at the end of the B.Tech Programme) □ 5.00 but < 5.50, shall be placed in 'PASS CLASS'.

12.3 A student with final CGPA (at the end of the B.Tech Programme) < 5.00 shall not be eligible for the award of the degree.

12.4 Students fulfilling the conditions listed under section (iii) of 12.2.1 alone shall be eligible for the award of 'college rank' and / or 'gold / silver / bronze medal'.

13. Withholding of Results

13.1 If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he shall not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases

14. Transitory Regulations

14.1 General

14.1.1 A Student who has discontinued for any reason, or has been detained for want of attendance as specified in section 6 or NOT promoted due to lack of required credits as specified in section 7, may be considered eligible for readmission to the same semester in which he got detained for want of attendance or promotion to the next year of study after securing the required number of credits, as detailed in sections 14.2 through 14.4 as the case may be.

14.2 For students detained due to shortage of attendance:

14.2.1. A Student who has been detained in FIRST year of R13/R15 Regulations of JNTUH due to lack of attendance, shall be permitted to join FIRST year FIRST Semester of AR18 Regulations of GCET and is required to complete the study of B.Tech programme within the stipulated period of eight academic years from the date of first admission in FIRST Year. The AR18 Academic Regulations of GCET are applicable to the student from the year and semester of readmission onwards.

14.2.2. A student who has been detained in any semester of SECOND, THIRD and FOURTH years of R13/R15 regulations of JNTUH for want of attendance shall be permitted to join the corresponding semester of AR18 regulations of GCET and is required to complete the study of B.Tech within the stipulated period of eight academic years from the date of first admission in FIRST Year. The AR18 Academic Regulations of GCET are applicable to the student from the year and semester of readmission onwards.

14.2.3. A student who has been detained in any semester of FIRST, SECOND, THIRD or FOURTH years of AR16 regulations of GCET for want of attendance shall be permitted to join the corresponding semester of AR18 regulations of GCET and is required to complete the study of B.Tech within the stipulated period of eight

academic years from the date of first admission in FIRST Year. The AR18 Academic Regulations of GCET are applicable to the student from the year and semester of readmission onwards.

14.3 For students NOT promoted due to shortage of credits:

14.3.1. A student of R13/R15 Regulations of JNTUH who has been detained due to lack of credits shall be promoted to the next semester under AR18 Regulations of GCET only after acquiring the required credits as per the corresponding regulations of his first admission. For subsequent promotions, the rule specified in section 14.4.4 shall be applicable. The student is required to complete the study of B.Tech within the stipulated period of eight academic years from the year of first admission in FIRST year. The AR18 Academic Regulations of GCET are applicable to a student from the year of readmission onwards.

14.3.2. A student of AR16 Regulations of GCET who has been detained due to lack of credits shall be promoted to the next semester under AR18 Regulations of GCET only after acquiring the required credits as per AR16 regulations. For subsequent promotions, the rule specified in section 14.4.4 shall be applicable. The student is required to complete the study of B.Tech within the stipulated period of eight academic years from the year of first admission in FIRST year. The AR18 Academic Regulations of GCET are applicable to the student from the year of readmission onwards.

14.4. For all students readmitted under AR18 Regulations of GCET:

14.4.1 A student who has failed in any course(s) under any regulation has to pass those course(s) in the same regulations.

14.4.2 If a student readmitted into AR18 Regulations has any course(s) to be studied in the semester of his re-admission or succeeding semesters with about 80% of the syllabus in common with course(s) he has studied under his previous regulations, that particular course(s) shall be substituted for by another course(s) by the college (see also section 14.4.3).

14.4.3 If a student taking readmission as per the provisions of section 14.1.1 had not studied in his previous semesters, any course(s) which is/are prescribed for study under AR18 Regulations (in any of the semester(s) preceding the semester of re-admission), he shall pass all such course(s) to meet the academic requirements of AR18 Regulations. One or more of these course(s) may be offered as substitute course(s), as per section 14.4.2. Other course(s) not offered as substitute course(s) shall constitute **Additional Course(s)**, which the student must pass to meet the academic requirements for the award of the degree. *Method of evaluation of additional courses shall be the same as the one detailed in section 8.* The college may conduct remedial classes and internal examinations for the benefit of the student. The Academic Regulations of GCET, AR18, under which a student has been readmitted, shall be applicable to the student from that semester.

14.4.4 Promotion Rule for students initially admitted into R13/R15 Regulations of JNTUH or AR16 Regulations of GCET and re-admitted into AR18

Regulations of GCET

➢ To be eligible for promotion from FIRST year to SECOND year, a student must secure a minimum of 50% of the total credits assigned to all the courses he had studied, including substitute courses but excluding Additional Courses, from all the examinations conducted, whether the student takes the examinations or not.

➢ To be eligible for promotion from SECOND year to THIRD year and THIRD year to FOURTH year, a student must secure a minimum of 60% of the total credits assigned to all the courses he had studied, including substitute courses but excluding Additional Courses, from all the examinations conducted, whether the student takes the examinations or not.

➢ For this purpose, if the number of credits secured so arrived at is not an integer, the fractional component shall be ignored if it is less than 0.5; else, it shall be rounded off to the next higher integer (e.g. 50.4 is taken as 50 and 50.5 is taken as 51).

14.4.5 The total number of credits that a student acquires for the award of degree, shall be the sum of all credits secured in all the regulations of his study including AR18 Regulations. Credits earned by the student in additional course(s), shall be considered only for award of B.Tech degree, but shall not be considered for calculating SGPA/CGPA.

15. Student transfers

15.1 There shall be no branch transfers after the completion of admission process.

15.2 The student seeking transfer from various other universities/institutions, if failed in any course(s) in his earlier regulations, has to pass equivalent courses as prescribed by JNTUH and also pass the courses of GCET which the student has not studied at the earlier institution. Further, even if the student had passed some of the courses at the earlier institutions, if the same courses are prescribed in different semesters of AR18 regulations of GCET, the student has to study and pass those courses in GCET in spite of the fact that those courses are repeated.

15.3 The transferred students from other universities/institutions shall be provided one chance to write the internal examinations in the failed courses and/or courses not studied as per the clearance (equivalence) letter issued by JNTUH.

16. Scope

i. Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”, “hers”.
ii. The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iii. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.
iv. The college may change or amend the Academic Regulations, Program Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the College Authorities.
v. B.Tech (Regular) program is B.Tech 4 year degree program to which students are admitted to FIRST year

vi. B.Tech LE Scheme refers to the system under which students are admitted to SECOND year of the B.Tech FOUR (4) year degree program.

vii. The terms "mid-term" and "internal" are used interchangeably.

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PUNISHMENT FOR MALPRACTICE

	Nature of Malpractices	**Punishment**
	If the candidate:	
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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 candidate 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.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he shall be handed over to the police and a case is registered against him.
2	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 candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic

		regulations in connection with forfeiture of seat. If the impostor is an outsider, he shall be handed over to the police and a case is registered against
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination 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 the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.

7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester / year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College shall be handed over to police and, a police case shall be registered against them.

ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME) FROM THE AY 2019-20

1. **Eligibility for award of B. Tech. Degree (LES)**
The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 120 credits and secure 120 credits with CGPA $\geq$ 5 from SECOND year through FOURTH year B.Tech programme (LES) for the award of B.Tech degree.

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech (LES).

5. **Promotion rule**

S. No.	Promotion	Conditions to be fulfilled
i.	Second year first semester to Second year second semester	Regular course of study of Second year first semester.
ii.	Second year second semester to Third year first semester	(i) Regular course of study of Second year second semester. (ii) Must have secured at least 60% (24 out of 40 credits) of the credits specified in the program structure of second year (up to and including second year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers less than 40 credits student must still secure a minimum of 24 credits).
iii.	Third year first semester to Third year second semester	Regular course of study of Third year first semester.
iv.	Third year second semester to Fourth year first semester	(i) Regular course of study of Third year second semester. (ii) Must have secured at least 60% (48 out of 80 credits) of the credits specified in the program structure of third year (up to and including third year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers less than 80 credits student must still secure a minimum of 48 credits).
v.	Fourth year first semester to Fourth year second semester	Regular course of study of Fourth year first semester.

6. All the other regulations as applicable to B. Tech. FOUR (4) - year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

PUNISHMENT FOR MALPRACTICE

	Nature of Malpractices	Punishment
	If the candidate:	
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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 candidate 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.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he shall be handed over to the police and a case is registered against him.
2	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 candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic

		regulations in connection with forfeiture of seat. If the impostor is an outsider, he shall be handed over to the police and a case is registered against him.
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Superintendent / Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination 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 the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.

7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is course to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College shall be handed over to police and, a police case shall be registered against them.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Cheeryal (V), Keesara (M), R. R. Dist., - 501 301

Department of Information Technology

B.Tech. Program in Information Technology

VISION OF THE INSTITUTE

Geethanjali visualizes dissemination of knowledge and skills to students, who would eventually contribute to well being of the people of the nation and global community.

MISSION OF THE INSTITUTE

1. To impart adequate fundamental knowledge in all basic sciences and engineering, technical and Inter-personal skills to students.
2. To bring out creativity in students that would promote innovation, research and entrepreneurship.
3. To Preserve and promote cultural heritage, humanistic and spiritual values promoting peace and harmony in society.

VISION OF THE DEPARTMENT

The department of Information Technology endeavors to bring out technically competent, socially responsible technocrats through continuous improvement in teaching learning processes and innovative research practices.

MISSION OF THE DEPARTMENT

1. Inculcate into the students, the technical and problem solving skills to ensure their success in their chosen profession.
2. Impart the essential skills like teamwork, lifelong learning etc. to the students which make them globally acceptable technocrats.
3. Facilitate the students with strong fundamentals in basic sciences, mathematics and Information Technology areas to keep pace with the growing challenges in field.
4. Enrich the faculty with knowledge in the frontiers of the Information Technology area.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs) OF B.Tech.(IT) PROGRAM:

Program Educational Objectives (PEOs) are broad statements that describe what graduates are expected to attain within a few years of graduation. The PEOs for Information Technology graduates are:

PEO-I: Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO-II: To inculcate professional behavior with strong ethical values, leadership qualities, innovative thinking and analytical abilities into the student.

PEO-III: To empower the student with the qualities of effective communication, team work, continuous learning attitude, leadership and proficiency in cutting edge technologies needed for a successful Information Technology professional.

PEO-IV: Imbibe sound knowledge in mathematics, basic sciences, first principles to form a strong base for the student to keep up with the growing challenges in the field of Information Technology.

PROGRAM OUTCOMES (POs) OF B.Tech.(IT) PROGRAM:

Program Outcomes (POs) describe what students are expected to know and be able to do by the time of graduation to accomplish Program Educational Objectives (PEOs). The Program Outcomes for Information Technology graduates are:

Engineering Graduates would be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: To inculcate algorithmic thinking and problem solving skills, applying different programming paradigms.

PSO2: Develop an ability to design and implement various processes/methodologies/practices employed in design, validation, testing and maintenance of software products.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)
B.Tech. INFORMATION TECHNOLOGY

AR 18 STRUCTURE FOR UNDERGRADUATE PROGRAM

S.No	Category/ Semester	I	II	III	IV	V	VI	VII	VIII	Credits as per AR 18	Credits as per Model Curriculum
1	**Humanities and Social Sciences including Management**	4.5	-	-	3	-	1	-	3	**11.5**	**12**
2	**Basic Sciences**	7	14	4	-	-	-	-	-	**25**	**24**
3	**Engineering Sciences** including workshop, drawing, basics of electrical/mechanical/computer etc.	7.5	7	4	-	-	-	-	-	**18.5**	**29**
4	**Program Core Courses**	-	-	12	17	12	10	12		**63**	**49**
5	**Program Elective Courses** : Subjects relevant to chosen specialization/branch	-	-	-	-	3	6	6	3	**18**	**18**
6	**Open Elective Subjects**: Electives from other technical and/or emerging subjects	-	-	-	-	3	3	-	3	**9**	**12**
7	**Project work, seminar and internship** in industry or elsewhere	-	-	-	-	2	-	2	11	**15**	**15**
8	**Mandatory Courses**: [Induction Program, Environmental Sciences, Indian Constitution, Essence of Indian Traditional Knowledge, Human Values and Professional Ethics]	1 slot	-	-	1 slot	1 slot	1 slot	-	-	**4-slots provided**	
	Total	**19**	**21**	**20**	**20**	**18**	**22**	**23**	**17**	**160**	**159**

Course code and definition

S.No.	Broad Course Classification	Course Group/Category	Course Description
1	Foundation Courses (FnC)	BS-Basic Sciences	Includes Mathematics , Physics and Chemistry courses
2		ES-Engineering Sciences	Includes Fundamental Engineering courses
3		HS-Humanities and Social sciences	Includes courses related to humanities, Social Sciences and Management
4	Core Courses(CoC)	PC-Professional Core	Includes core courses related to parent discipline/department/branch of Engineering
5	Elective Courses ((EℓC)	PE-Professional Electives	Includes elective courses related to parent discipline / department/ branch of Engineering
6		OE-Open Electives	Elective Courses Which include interdisciplinary course or courses in an area outside the parent discipline/department /branch of engineering
7	Core Courses	Project Work	B.Tech Project
8		Internship/Mini-Project/Technical Seminar	Internship/Mini- Project/Technical Seminar

Definition of credit

S.No.	Abbreviation	Credits	Description
1.	L	1	1 Hr. Lecture (L) per week
2.	T	1	1 Hr. Tutorial (T) per week
3.	P	0.5 1	1 Hr. Practical (P) per week 2 Hours Practical(Lab)/week

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
Cheeryal (V), Keesara (M), 501 301, Telangana State

SCHEME OF INSTRUCTION AND EXAMINATION

B.TECH. INFORMATION TECHNOLOGY

Academic Regulation: AR18 **Academic Year 2019-20**

PROGRAM STRUCTURE

FIRST YEAR SEMESTER-I										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18EN1101	English	HSMC	3	-	-	30	70	100	3
2	18MA1101	Mathematics – I	BSC	3	1	-	30	70	100	4
3	18PH1102	Applied Physics	BSC	3	-	-	30	70	100	3
4	18CS1101	Programming for Problem Solving	ESC	2	-	-	30	70	100	2
5	18ME1102	Engineering Graphics	ESC	1	-	4	30	70	100	3
6	18EN11L1	English Language Communication Skills Lab	HSMC	-	-	3	30	70	100	1.5
7	18CS11L1	Programming for Problem Solving Lab	ESC	-	-	2	30	70	100	1
8	18ME11L1	Engineering Workshop	ESC	-	-	3	30	70	100	1.5
9	-	Induction Program	MC	-	-	-	-	-	-	-
		Total		**12**	**1**	**12**	**240**	**560**	**800**	**19**
		Total Periods Per Week		**25**						

FIRST YEAR SEMESTER-II										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18MA1201	Mathematics – II	BSC	3	1	-	30	70	100	4
2	18PH1201	Semiconductor Devices	BSC	3	-	-	30	70	100	3
3	18CH1201	Engineering Chemistry	BSC	3	1	-	30	70	100	4
4	18CS1201	Data Structures	ESC	2	-	-	30	70	100	2
5	18EE1201	Basic Electrical Engineering	ESC	3	-	-	30	70	100	3
6	18PH12L1	Semiconductor Devices Lab	BSC	-	-	3	30	70	100	1.5
7	18CH12L1	Engineering Chemistry Lab	BSC	-	-	3	30	70	100	1.5
8	18CS12L1	Data Structures Lab	ESC	-	-	2	30	70	100	1
9	18EE12L1	Basic Electrical Engineering Lab	ESC	-	-	2	30	70	100	1
		Total		**14**	**2**	**10**	**270**	**630**	**900**	**21**
		Total Periods Per Week		**26**						

SECOND YEAR SEMESTER-I										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18CS2101	Advanced Data Structures	PCC	3	-	-	30	70	100	3
2	18EC2102	Digital Design	ESC	3	-	-	30	70	100	3
3	18CS2102	Object Oriented Programming using Java	PCC	3	-	-	30	70	100	3
4	18CS2103	Discrete Mathematics	PCC	3	1	-	30	70	100	4
5	18MA2102	Probability and Statistics	BSC	3	1	-	30	70	100	4
6	18CS21L1	Advanced Data Structures Lab	PCC	-	-	2	30	70	100	1
7	18IT21L1	Computing Lab *	ESC	-	-	2	30	70	100	1
8	18CS21L3	Object Oriented Programming Java Lab	PCC	-	-	2	30	70	100	1
		Total		**15**	**2**	**6**	**240**	**560**	**800**	**20**
		Total Periods Per Week		**23**						

*Six exercises on Discrete Mathematics using Scilab and six Exercises on Statistics using R Tool

SECOND YEAR SEMESTER-II										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18CS2201	Design and Analysis of Algorithms	PCC	3	1	-	30	70	100	4
2	18IT2201	Computer Architecture and Assembly Language Programming	PCC	3	-	-	30	70	100	3
3	18CS2203	Database Management Systems	PCC	3	-	-	30	70	100	3
4	18CS2205	Operating Systems	PCC	3	1	-	30	70	100	4
5	18MB2202	Engineering Economics and Accounting	HSMC	3	-	-	30	70	100	3
6	18CS22L1	Design and Analysis of Algorithms Lab	PCC	-	-	2	30	70	100	1
7	18IT22L1	Operating Systems and Assembly Language Programming Lab	PCC	-	-	2	30	70	100	1
8	18CS22L3	Database Management Systems Lab	PCC	-	-	2	30	70	100	1
9	18CH2201	Environmental Science	MC	3	-	-	-	-	-	-
		Total		**18**	**2**	**6**	**240**	**560**	**800**	**20**
		Total Periods Per Week		**26**						

Note: Students have to undergo internship program during the summer vacation which shall be evaluated internally during third year first semester. There is no Semester End Examination for the internship.

THIRD YEAR SEMESTER-I										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18CS3111	Web Technologies	PCC	3	-	-	30	70	100	3
2	18CS3102	Computer Networks	PCC	3	-	-	30	70	100	3
3	18CS3103	Artificial Intelligence	PCC	3	-	-	30	70	100	3
4	**Professional Elective – I**		PEC	3	-	-	30	70	100	3
	18IT3101	Data Mining								
	18CS3112	Information Retrieval Systems								
	18CS3113	Digital Image Processing								
	18CS3114	Theory of Computation								
5	**Open Elective - I**		OEC	3	-	-	30	70	100	3
	18CE3121	Global Warming and Climate Change								
	18EE3122	Industrial Safety and Hazards								
	18ME3123	Nano Materials and Technology								
	18EC3124	Electronic Measuring Instruments								
	18MB3126	Intellectual Property Rights								
6	18CS31L4	Web Technologies Lab	PCC	-	-	2	30	70	100	1
7	18CS31L2	Computer Networks Lab	PCC	-	-	2	30	70	100	1
8	18CS31L3	Artificial Intelligence Lab	PCC	-	-	2	30	70	100	1
9	18IT3102	Internship	PROJ-I	-	-	4	100	-	100	2
10	18MC3102	Indian Constitution	MC	3	-	-	-	-	-	-
		Total		**18**	**0**	**10**	**340**	**560**	**900**	**20**
		Total Periods Per Week		**28**						

THIRD YEAR SEMESTER-II										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18CS3213	Internet of Things	PCC	3	1	-	30	70	100	4
2	18CS3202	Software Engineering	PCC	3	1	-	30	70	100	4
3	**Professional Elective - II**		PEC	3	-	-	30	70	100	3
	18CS3214	Scripting Languages								
	18IT3201	Distributed Computing								
	18IT3202	Cryptography and Network Security								
	18CS3215	Natural Language Processing								
4	**Professional Elective - III**		PEC	3	-	-	30	70	100	3
	18EC3209	Speech and Video Processing								
	18CS3216	Mobile Application Development								
	18IT3203	Design Patterns								
	18CS3219	Optimization Techniques								
5	**Open Elective II**		OEC	3	-	-	30	70	100	3
	18CE3231	Building Technology								
	18EE3232	Energy Conservation and Management								
	18ME3233	Digital Fabrication								
	18EC3234	Principles of Communication Systems								
	18MB3236	Supply Chain Management								
6	18CS32L4	Internet of Things Lab	PCC	-	-	2	30	70	100	1
7	18CS32L2	Software Engineering Lab	PCC	-	-	2	30	70	100	1
8	18EN32L1	Advanced English Communication Skills Lab	HSMC	-	-	2	30	70	100	1
9	18MB3203	Professional Ethics	MC	3	-	-	-	-	-	-
10	18IT3204	Design Thinking	MC	3	-	-	-	-	-	-
		Total		**18**	**2**	**6**	**240**	**560**	**800**	**20**
		Total Periods Per Week		**26**						

Note: Students have to do Mini Project during the summer vacation which shall be evaluated internally during fourth year first semester. There is no Semester End Examination for the Mini Project.

FOURTH YEAR SEMESTER-I										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	18CS4101	Data Analytics	PCC	3	-	-	30	70	100	3
2	18CS4102	Machine Learning	PCC	3	-	-	30	70	100	3
3	18IT4101	Block Chain Technologies	PCC	3	-	-	30	70	100	3
4	**Professional Elective - IV**		PEC	3	-	-	30	70	100	3
	18CS4104	Web Services								
	18CS4113	Parallel Algorithms								
	18CS4114	Neural Networks								
	18CS4115	Distributed Databases								
5	**Professional Elective – V**		PEC	3	-	-	30	70	100	3
	18CS4116	Cloud Computing								
	18CS4108	Simulation and Modeling								
	18IT4102	Digital Forensics								
	18CS4105	Human Computer Interaction								
6	18CS41L1	Data Analytics Lab	PCC	-	-	2	30	70	100	1
7	18CS41L2	Machine Learning Lab	PCC	-	-	2	30	70	100	1
8	18IT41L1	Block Chain Technologies Lab	PCC	-	-	2	30	70	100	1
9	18IT4103	Mini Project	PROJ-M	-	-	-		100	100	2
		Total		**15**	**0**	**6**	**240**	**660**	**900**	**20**
		Total Periods Per Week		**21**						

FOURTH YEAR SEMESTER-II										
S No	**Course Code**	**Course Title**	**Category**	**Number of Periods per Week**			**Scheme of Examination with Maximum Marks**			**No. of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Tot**	
1	**Professional Elective - VI**		PEC	3	-	-	30	70	100	3
	18IT4201	Semantic Web and Social Networks								
	18IT4202	Cyber Security								
	18CS4201	Software Practices and Testing								
	18CS4208	Deep Learning								
2	**Open Elective - III**		OEC	3	-	-	30	70	100	3
	18CE4241	Disaster Management								
	18EE4242	Micro-electro-mechanical Systems								
	18ME4243	Principles of Automobile Engineering								
	18EC4244	Biomedical Instrumentation								
	18MB4246	Entrepreneurship								
3	18MB4204	Project Management and Finance	HSMC	3	-	-	30	70	100	3
4	18IT4203	Project	PROJ	-	-	20	30	70	100	**10**
5	18IT4204	Technical Seminar	PROJ	-	-	2	100		100	**1**
		Total		**9**	**0**	**22**	**220**	**280**	**500**	**20**
		Total Periods Per Week		**31**						

OPEN ELECTIVES

OPEN ELECTIVES offered by a Department SHOULD NOT be taken by the students of the same department

Open Elective I

S. No.	Course Title	Course Code
21	Global Warming and Climate Change (CE)	18CE2221/18CE3121/18CE3221
22	Industrial Safety and Hazards (EEE)	18EE2222/18EE3122/18EE3222
23	Nano Materials and Technology (ME)	18ME2223/18ME3123/18ME3223
24	Electronic Measuring Instruments (ECE)	18EC2224/18EC3124/18EC3224
25	JAVA Programming (CSE)	18CS2225/18CS3125/18CS3225
26	Intellectual Property Rights (MBA)	18MB2226/18MB3126/18MB3226

Open Elective II

S. No.	Course Title	Course Code
31	Building Technology (CE)	18CE3231/18CE4131
32	Energy Conservation and Management (EEE)	18EE3232/18EE4132
33	Digital Fabrication (ME)	18ME3233/18ME4133
34	Principles of Communication Systems (ECE)	18EC3234/18EC4134
35	Knowledge Management (CSE)	18CS3235/18CS4135
36	Supply Chain Management (MBA)	18MB3236/18MB4136

Open Elective III

S. No.	Course Title	Course Code
41	Disaster Management (CE)	18CE4241
42	Micro-electro-mechanical Systems (EEE)	18EE4242
43	Principles of Automobile Engineering (ME)	18ME4243
44	Biomedical Instrumentation (ECE)	18EC4244
45	Database Systems (CSE)	18CS4245
46	Entrepreneurship (MBA)	18MB4246

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EN1101 - ENGLISH

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
3	-	-	3

Prerequisite(s): None.

Course Objectives:
Develop ability to

1. Improve the language proficiency in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip themselves to study the academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop Study Skills and Communication Skills in formal and informal situations.
4. Speak proficiently and listen effectively.

Course Outcomes (COs):
At the end of course, the student would be able to

CO1. Infer /use the vocabulary appropriately in any situation
CO2. Construct meaningful and explicit sentences in written form.
CO3. Acquire basic proficiency in English including reading comprehension and writing skills.
CO4. Communicate confidently in various contexts and different cultures
CO5. Comprehend the given text and respond appropriately. CO6. Speak proficiently and listen effectively.

UNIT I
The Raman Effect' from the prescribed text book 'English for Engineers' published by Cambridge University Press.
Vocabulary Building: The Concept of Word Formation - The use of Prefixes and Suffixes, One- word Substitutes.
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance - Techniques for Effective Reading.
Basic Writing Skills: Sentence Structures - Use of Phrases and Clause in Sentences- Importance of Proper Punctuation-Techniques for writing precisely–Paragraph writing– Types, Structures and Features of a Paragraph-Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT II
'Ancient Architecture in India' from the prescribed text book 'English for Engineers' Published by Cambridge University Press.
Vocabulary Building: Synonyms and Antonyms.
Grammar: Identifying Common Errors in Writing with Reference to Noun-Pronoun Agreement and Subject - Verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension.
Writing: Format of a Formal Letter - Writing Formal Letters, Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT III

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-skills of Reading-Skimming and Scanning.
Writing: Nature and Style of Sensible Writing -Abstract writing..

UNIT IV

'What Should You Be Eating' from the prescribed text book 'English for Engineers' Published by Cambridge University Press.

Vocabulary Building: Standard Abbreviations in English.
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension-Intensive Reading and Extensive Reading.
Writing: Writing Practices—Writing- Introduction and Conclusion, Blog-Writing and
Responding to a Blog, Essay Writing, Précis Writing.

UNIT V

How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: Technical Vocabulary and their usage.
Grammar: Active and Passive voice.
Reading: Reading Comprehension-Exercises for Practice.
Writing: Technical Reports-Introduction–Characteristics of Report– Categories of Reports- Formats-Structure of Reports (Manuscript Format)-Types of Reports- Writing a Report.

TEXT BOOK(S):

1. English for Engineers, Sudarshana, N.P.and Savitha, C. Cambridge University Press.

REFERENCE BOOKS:

1. Practical English Usage, Swan, M. Oxford University Press.
2. Communication Skills, Kumar, S and Lata, P. Oxford University Press.
3. Remedial English Grammar, Wood, F.T. Macmillan.
4. On Writing Well Zinsser, William Harper, Resource Book.
5. Study Writing, Hamp-Lyons, Cambridge University Press.
6. Exercises in Spoken English. Parts I–III . CIEFL, Hyderabad. Oxford University.

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18MA1101 - MATHEMATICS-I

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): None.

Course Objectives:
Develop ability to
1. Understand various types of matrices, properties and rank of the matrix to find the solution for system of equations, if it exists.
2. Apply the knowledge of eigenvalues and eigenvectors of a matrix from quadratic form into a canonical form through linear and orthogonal transformations.
3. Identify the methods of solving the differential equations of first order and applications in engineering problems namely, Newton's law of cooling, Natural growth and decay.
4. Solve second and higher order differential equations of various types.
5. Analyze properties of Laplace Transform, Inverse Laplace Transform, convolution theorem and their applications to ordinary differential equations.

Course Outcomes (COs):
At the end of course, the student would be able to
- CO1. Write the matrix representation of a set of linear equations and analyse solution of a system of equations.
- CO2. Deduce eigenvalues and eigenvectors of a matrix and apply the same to reduce quadratic form into a canonical form through linear and orthogonal transformations
- CO3. Identify the type of differential equation and use the appropriate method to solve the same.
- CO4. Apply higher order differential equations to solve engineering problems.
- CO5. Solve Ordinary differential equations of second and higher order using Laplace Transform techniques.

UNIT I
Matrices
Matrices: Types of Matrices, Symmetric; Hermitian; Skew - symmetric; Skew - Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method.

UNIT II
Eigenvalues and Eigenvectors
Linear Transformation and Orthogonal Transformation: Eigenvalues and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III

First Order Ordinary Differential Equations

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of Natural Growth and Decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT IV

Ordinary Differential Equations of Higher Order

Second and higher order linear differential equations with constant coefficients, Non homogeneous of the type e^{ax}, sin ax, cos ax , x^n, $e^{ax}V(x)$, and $xV(x)$; Method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT V

Laplace Transforms

Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms. Existence of Laplace transforms. Laplace transform of standard functions, first shifting theorem, Laplace transform of functions when they are multiplied or divided by "t". Laplace transforms of derivatives and integrals of functions-Unit step function-second shifting theorem-Dirac's delta function, Periodic function-Inverse Laplace transform by Partial fractions (Heaviside method), Inverse Laplace transforms of functions when they are multiplied or divided by "s". Inverse Laplace transforms of derivatives and integrals of functions, Convolution theorem-Applications to ordinary differential equations.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44^{th} Edition, 2017.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 10^{th} Edition, 2011.

REFERENCE BOOKS:

1. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications.
2. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill, New Delhi.
3. Engineering Mathematics, Paras Ram, 2^{nd} Edition, CBS Publishers.

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18PH1102 - APPLIED PHYSICS

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand the concept of matter waves and application of Schrodinger wave equation.
2. Discuss the formation of energy bands in solids, classification of solids.
3. Understand the concept of Fermi level in intrinsic and extrinsic semiconductors and Hall Effect
4. Understand the concepts of light amplification, working of various types of lasers, optical fibers and their applications.
5. Understand different types of dielectric polarization mechanisms and classification of magnetic materials.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1. Explain fundamental concepts on quantum behavior of matter in its micro state.
- CO2. Distinguish conductors, semiconductors and insulators.
- CO3. Identify the type of extrinsic semiconductors through Hall Effect.
- CO4. Explain phenomena of light amplification process, construction and working of different types of Lasers, Fiber optics and their applications in different fields.
- CO5. Explain different types of dielectric polarization mechanisms, properties of different dielectric materials and their applications. Distinguish different types of magnetic materials.

UNIT I
Quantum Mechanics
Introduction to quantum physics, Black body radiation, Planck's law (qualitative), Photoelectric effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT II
Introduction to theory of solids
Electron in a periodic potential-Bloch theorem, Kronig-Penney Model (Qualitative Treatment), Brillouin Zones (E-K curve), origin of energy band formation in solids, concept of effective mass of an electron, classification of materials into conductors, semiconductors and insulators.

UNIT III

Semiconductors

Classification of semiconductors, n-type, p-type, carrier concentration in Intrinsic and Extrinsic Semiconductors, Fermi level in Intrinsic and Extrinsic Semiconductors, variation of Fermi level with temperature and concentration of dopants in extrinsic semiconductors, direct and indirect band gap semiconductors, Hall effect and its applications.

UNIT IV

Lasers and Fiber Optics

Lasers: Interaction of radiation with matter: Absorption, Spontaneous emission and Stimulated emission. Characteristics of Lasers, Resonating cavity, active medium, Pumping methods and mechanisms, population inversion, Construction and working of Lasers: Nd:YAG Laser, He-Ne Laser, Carbon dioxide (CO_2) Laser, Applications of Lasers.

Fiber Optics: Introduction, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index optical fibers, Losses associated with optical fibers, Applications of optical fibers.

UNIT V

Dielectric and Magnetic Properties of Materials

Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, Displacement vector, electronic and ionic polarizations (Quantitative), orientation and space charge polarizations (qualitative). Internal fields in solids, Clausius - Mosotti equation, Ferroelectric, Piezoelectric and their applications.

Origin of magnetic moment, Bohr magneton, classification of Dia, Para, Ferro, Antiferro and Ferri magnetic materials; domain theory of Ferro magnetism- Hysteresis curve, soft and hard magnetic materials and their applications.

TEXT BOOKS:

1. Physics, Halliday, Resnick and Krane, Wiley publishers, 5^{th} edition, 2018.
2. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learning.

REFERENCE BOOKS:

1. Semiconductor Optoelectronics: Physics and Technology, J. Singh, Mc Graw - Hill inc. 1995.
2. A Textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand publications, revised edition.
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL.
4. Introduction to Solid State Physics, C Kittel, Wiley Publications, 8th edition.

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18CS1101 - PROGRAMMING FOR PROBLEM SOLVING

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
2	-	-/-	2

Pre-requisite(s): None.

Course Objectives:
Develop ability to
1. Solve problems by developing algorithms to solve problems using Raptor tool.
2. Understand the concepts of variables, constants, basic data types and input and output statement in a C programming language.
3. Understand the use of sequential, selection and repetition control statements into the algorithms implemented using C programming language.
4. Understand of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
5. Understand the concepts related to arrays, strings and pointers and also with dynamic memory allocation in the context of C programming language.

Course Outcomes (COs):
After completion of the course, student would be able to
- CO1: Demonstrate problem solving skills by developing algorithms to solve problems using Raptor tool.
- CO2: Incorporate the concept of variables, constants, basic data types and input and output statement in a C language program.
- CO3: Incorporate the use of sequential, selection and repetition control statements into the algorithms implemented as computer programs using C language.
- CO4: Demonstrate an understanding of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
- CO5: Write C programs using arrays, strings and pointers and also with dynamic memory allocation.

UNIT I
Basics of Computers
Logic Building: Flow chart, Algorithm, Pseudo code. Introduction to Raptor Programming Tool

Introduction to Programming – Computer Languages, Creating and running programs, Program Development.

Introduction to the C Language – Background, C Programs, Identifiers, Data Types, Variables, Constants, Input/output functions.

Operators - Arithmetic, relational, logical, bitwise, conditional, increment/decrement, assignment etc.., C program examples. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.

UNIT II

Statements- Selection Statements (decision making) – if and switch statements with Raptor Tool, and C program examples.

Repetition statements (loops) - while, for, do-while statements with Raptor Tool, and C Program examples

Statements related to looping – break, continue, goto, Simple C Program examples.

UNIT III

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes - auto, register, static, extern, scope rules, type qualifiers, C program examples.

Recursion- recursive functions, Limitations of recursion, example C programs

UNIT IV

Arrays – Concepts, using arrays in C, arrays and functions, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

Strings – Concepts, C Strings, String Input / Output functions, string manipulation functions, arrays of strings, string / data conversion, C program examples.

UNIT V

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, void pointer, null pointer.

Pointer Applications - Arrays and Pointers, Pointer Arithmetic and arrays, passing an array to a function.

Memory allocation functions – malloc(), calloc(), realloc(), free(). Array of pointers, pointers to functions, C program examples.

TEXT BOOK(S):

1. Computer Science: A Structured Programming Approach Using C, B.A. Forouzan and R.F. Gilberg, 3rd Edition, Thompson Learning, 2007 Reprint.

REFERENCE BOOKS:

1. Raptor-A flow charting Tool http://raptor.martincarlisle.com
2. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, PHI.
3. Programming in C. P. Dey and M Ghosh , Oxford University Press.
4. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, TMH.
5. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.

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18ME1102 - ENGINEERING GRAPHICS

B Tech. IT - I Year, I Sem.

L	T	P/D	C
1	-	4/-	3

Pre-requisite(s): None.

Course objectives:
Develop ability to
1. Understand basic concepts in engineering drawing.
2. Understand the principle of orthographic projection and isometric projection for planes and solids.
3. Draw sectional views and development of surfaces.
4. Draw isometric views and pictorial views of solids.
5. Learn basic concepts and commands in AutoCAD.

Course Outcomes (COs):
At the end of the course, the student will be able to
CO1: Draw various curves and scales in engineering drawing practice. CO2. Draw orthographic projections of points, lines and planes.
CO2: Draw orthographic projections of solids and sections.
CO3: Draw Isometric Views to Orthographic Views and Vice-versa and development of surfaces of objects.
CO4: Apply basic AutoCAD commands for engineered drawings.

UNIT I
Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain and Diagonal.

UNIT II
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.

UNIT III
Projections of Regular Solids, Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone, Sphere.

UNIT IV
Development of Surfaces of Right Regular Solids: Prism, Cylinder, Pyramid and Cone.
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

UNIT V

Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

Introduction to CAD: (For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar, 53rd Edition, 2016.
2. Engineering Drawing / Basant Agrawal and McAgrawal/ McGrawHill, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford, 1st Edition, 2015.
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson, 2nd Edition, 2013
3. Computer Aided Engineering Drawing – K Balaveera Reddy, CBS Publishers, 2nd Edition 2015.

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18EN11L1 - ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
-	-	3/-	1.5

Prerequisite(s): None.

Course Objectives:
Develop ability to

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. Sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. Improve the fluency of students in spoken English and neutralize their Mother Tongue Influence.
5. Train students to use language appropriately for public speaking and interviews.

Course Outcomes (COs):

At the end of course, the student would be able to

CO1: Listen actively, speak fluently and write accurately.
CO2: Speak with clarity and confidence reducing MTI and enhance Employability skills.
CO3: Demonstrate better understanding of nuances of English Language.
CO4: Communicate intelligibly at work place.
CO5: Perform effectively in Interviews.
CO6: Plan and present ideas explicitly.

English Language and Communication Skills Lab (ELCS) shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Module I CALL Lab:
Understand: Listening Skill-Its importance–Purpose-Process-Types-Barriers to Listening. Practice: Introduction to Phonetics –Speech Sounds –Vowels and Consonants.
ICS Lab:
Understand: Communication at Work Place-Spoken vs. Written language. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues Greetings– Taking Leave–making request and seeking permission. Introducing oneself and others.

Module II CALL Lab:
Understand: Structure of Syllables–Word Stress and Rhythm–Weak Forms and Strong Forms in Context.
Practice: Basic Rules of Word Accent-Stress Shift-Weak Forms and Strong forms in context.

ICS Lab:
Understand: Features of Good Conversation–Non-verbal Communication. Practice: Telephone Etiquette.
Descriptions- Places, Objects, Events and Process.

Module III CALL Lab:
Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI), Examples from different parts of the country.
Practice: Common Indian Variants in Pronunciation–Differences in British and American Pronunciation.
ICS Lab:
Understand: How to make Formal Presentations. Practice: Formal Presentations.

Module IV CALL Lab:
Understand: Listening for General Details. (2 practice exercises) Practice: Listening Comprehension Tests (2 practice exercises).
ICS Lab:
Understand: Public Speaking-Debate– Exposure to Structured Talks (2 practice exercises). Practice: Making a Short Speech– Extempore (2 practice exercises).

Module V CALL Lab:
Understand: Listening for Specific Details (2 practice exercises). Practice: Listening Comprehension Tests (2 practice exercises).
ICS Lab:
Understand: General Interview Skills. Practice: Mock Interview Skills.

TEXT BOOKS:
1. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P Singh, Mac Millan Publishers, 2011.
2. ELCS Lab Manual by Faculty, Department of English, GCET.

REFERENCE BOOKS:
1. How to Prepare for Interviews by Shashi Kumar. V and Daija P. V.
2. English Pronunciation in Use, Hancock. M, Cambridge University Press.
3. English Language Communication Skills Lab Manual Cum Workbook by Cengage Learning India, 2013.
4. Creative Writing Skills by Ashraf Rizvi.

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18CS11L1 - PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s): None.

Course Outcomes:
Develop ability to

1. Solve problems by developing algorithms to solve problems using Raptor tool.
2. Understand the concepts of variables, constants, basic data types and input and output statement in a C programming language.
3. Understand the use of sequential, selection and repetition control statements into the algorithms implemented using C programming language.
4. Understand of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
5. Understand the concepts related to arrays, strings and pointers and also with dynamic memory allocation in the context of C programming language.

Course Outcomes (COs):
After completion of the course, student would be able to

CO1. Demonstrate problem solving skills by developing algorithms to solve problems using Raptor tool.
CO2. Incorporate the concept of variables, constants, basic data types and input and output statement in a C language program.
CO3. Incorporate the use of sequential, selection and repetition control statements into the algorithms implemented as computer programs using C language.
CO4. Demonstrate an understanding of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
CO5. Write C programs using arrays, strings and pointers and also with dynamic memory allocation.

LIST OF EXPERIMENTS	
1	Introduction to RAPTOR Tool Draw Flow chart using RAPTOR for, Read a number and Display the same number Read and Display the student details Read two numbers from user and calculate addition and subtraction of those numbers Read two numbers from user at the time of execution and calculate multiplication and division of those numbers Find the square of a given number (take the number from the user) Calculate the value of Y from the equation $y = x^2 + 2x + 3$ (read the value of X from user)

2	Draw Flow chart using RAPTOR for, Calculate the area of a Circle Calculate the area of a Square Calculate the area of a Rectangle Interchange two numbers Find the sum of square of two numbers Convert Centigrade to Fahrenheit Convert Radius to Degrees Display the roots of Quadratic Equation
3	Draw Flow chart using RAPTOR for, Check the given number is Positive or Negative Check the given number is even or odd Display whether a person is eligible for vote or not Calculate the Largest of two numbers Check the given year is leap year or not Check whether two numbers are equal or not Find the largest value among three given numbers
4	Draw Flow chart using RAPTOR for, Calculate and display the grade of a student < 30 % - Fail Between 31 and 50 – C grade Between 51 to 60 – B grade Between 61 to 75 – A grade Greater than 75 - distinction Find the quadratic roots of an equation (real or imaginary) Check the given number is multiple of 2, 4 and 8
5	Draw Flow chart using RAPTOR for, Display n numbers using looping Calculate the sum of n natural numbers Display the even numbers below n Calculate sum of even numbers and odd numbers from 1 to n (n value supplied by the user)
6	Write a C program to display student details Write a C program to perform arithmetic operations Write a C program to implement increment and decrement operators Write a C program to implement conditional operator Write a C program to implement bit wise operator
7	Write a C program to calculate the biggest of given two numbers Write a C Program to print the result depending on the following < 30 % - Fail Between 31 and 50 – C grade Between 51 to 60 – B grade Between 61 to 75 – A grade Write a C Program to implement arithmetic calculator using switch case
8	Write a C program to find sum of n natural numbers Write a C program to find individual digits of the given number Write a C program to find factorial of a given number

9	Write a C program to display the prime numbers below n (where n value is given by user) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence. Write a C program to find the quadratic roots of an equations Write a c program to calculate sum of the following geometric equation Sum=$1+x+x^2+x^3+\ldots+x^n$
10	Write a C program to find the given number is palindrome or not Write a C program to find GCD and LCM of two given numbers using functions Write a C program to find the factorial of a given number using recursive function Write a C program to generate the Fibonacci series using recursive function
11	Write a C program to find largest and smallest numbers in a list of array elements using functions Write a C program to sort the given list of elements in ascending order using functions. Write a C program to search for a given element in the list of array and display the "location" if the number is found else print "the number is not found". Using fixed length array Using variable length array.
12	Find the duplicate elements in the list of sorted array Write a C program that uses functions to perform the Addition of Two Matrices Write a C program that uses functions to perform the Multiplication of Two Matrices
13	Write a C program to find weather a given string is palindrome or not. Write a C program to insert characters at a given location in a given string. Write a C program to delete characters from a given string and position Write a C program to print the number of vowels and consonants using Strings.
14	Write a C program to convert Roman number to Decimal Number. Write a C program to find the 2's Compliment of a given string Write a C program to Reverse a String by Passing it to function C Program to Input a String with at least one Number, Print the Square of all the Numbers in a String
15	Write a C program to swap two integers using following methods call by value call by reference Write a C program to find sum of even and odd numbers using functions and pointers
16	Write a C program to find Largest Number Using Dynamic Memory Allocation. Write a C program to return multiples values from a function using pointers

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18ME11L1 - ENGINEERING WORKSHOP

B.Tech. IT - I Year, I Sem.

L	T	P/D	C
-	-	3/-	1.5

Prerequisite(s): None.

Course Objective:
Develop ability to

1. Develop a right attitude, team working, precision and safety at work place.
2. Gain a good basic working knowledge required for the production of various engineering products.
3. Provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. Know the labor involved required tools, machinery or equipment with necessary time required in actual working in different trades.
5. Identify and use of marking tools, hand tools, measuring equipment and to work with prescribed tolerances.

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

CO1. Recognize dignity of labor and workshop regulations.
CO2. Study and practice on hand, power tools and their operations.
CO3. Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, and welding.
CO4. Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiseling.
CO5. Perform various basic house wiring techniques.

A) Trades for Exercises:
At least two exercises from each trade:

a. **Carpentry**: T-lap joint, cross lap joint, mortise and tenon joint, Bridle joint, Corner lap joint.
b. **Fitting**: Square joint, V joint, half round joint, dovetail joint, L-Fitting.
c. **Tin-Smithy**: Tray, cylinder, hopper, funnel, Open scoop.
d. **Black Smithy**: Simple exercises such as upsetting, drawing down, punching, bending, swaging and fullering.
e. **House-wiring**: Wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
f. **Foundry**: Preparation of sand mould using Single Piece pattern, Preparation of sand mould using Split pattern.
g. **Welding Practice**- Single butt joint, Corner Joint, T-filled Joint, Lap Joint.

B) Trades for Demonstration:

a. Plumbing
b. Machine Shop

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage.
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Engineering Workshop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd.
2. Workshop Manual / P. Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, Vikas publishers.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

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18MA1201 - MATHEMATICS-II

B.Tech. IT - I Year, II Sem.

Prerequisite(s):

- **18MA1101 - Mathematics - I**

L	T	P/D	C
3	1	-/-	4

Course Objectives:

Develop ability to

1. Understand Geometrical approach to the mean value theorems, their application to the mathematical problems and evaluate improper integrals using Beta and Gamma functions.
2. Identify the methods of differential calculus to optimize single and multivariable functions.
3. Evaluate multiple integrals and apply the same to solve engineering problems.
4. Explain properties of vector operators. Use vector calculus to determine the length of a curve, area between the surfaces and volume of solids.
5. Apply partial differential equations to solve problems in one dimensional heat and wave equations.

Course Outcomes (COs):

At the end of course, the student would be able to

CO1. Apply mean value theorem on mathematical problems, evaluate improper integrals, surface areas and volumes of revolutions of curves.

CO2. Apply the methods of differential calculus to optimize single and multivariable functions.

CO3. Evaluate multiple integrals and apply the concepts of same to find the areas and volumes.

CO4. Apply vector operators on scalar and vector point functions to compute length of a curve, area between the surfaces and volume of solids, using vector calculus.

CO5. Apply partial differential equations to solve problems like one dimensional wave equation and one dimensional heat equation that arise in engineering branches.

UNIT I

Mean value Theorems and Improper Integrals

Mean value theorems: Rolle's Theorem, Lagrange's mean value theorem and Cauchy's mean value theorem with their Geometrical Interpretation and applications, Taylor's Series.
Definition of Improper Integral: Beta and Gamma functions and their applications.
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates).

UNIT II

Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity: Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence and independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT III

Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form);

Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical to polar coordinates) triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

UNIT IV

Vector Calculus

Vector Differentiation: Vector point functions and Scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

UNIT V

Partial Differential Equations

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation, Method of separation of variables for second order equations –Applications of Partial differential equations- one dimensional wave equation, one dimensional Heat equation.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 10th Edition, 2011.

REFERENCE BOOKS:

1. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications.
2. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi.
3. Engineering Mathematics, Paras Ram, 2nd Edition, CBS Publishers.

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18PH1201 - SEMICONDUCTOR DEVICES

B.Tech. IT - I Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisite(s):

- **18PH1102 - Applied Physics**

Course Objectives:

Develop ability to

1. Analyze p-n junction diode and its characteristics; understand breakdown mechanisms in semiconductor diodes and operation of photo and varactor diodes.
2. Understand the working of optoelectronic materials and devices
3. Understand the functioning of rectifiers and filters; working of Zener diode as a voltage regulating device.
4. Understand the operation of BJT, its various configurations and applications.
5. Discuss various methods of transistor biasing; understand the basic concepts of BJT and JFET.

Course Outcomes (COs):

At the end of the course, student would be able to

CO1. Explain V-I characteristics of p-n junction diode, photo diode and varactor diode.
CO2. Analyze the working of various optoelectronic devices.
CO3. Explain working of half wave and full wave rectifiers, filters and their applications.
CO4. Explain the functioning of BJT, distinguish various configurations of BJT and their applications.
CO5. Analyze various transistor biasing methods and functioning of FET, summarize the differences between BJT and FET.

UNIT I

p-n junction diode

Qualitative theory of p-n junction, Energy level diagram of p-n junction in forward and reverse bias condition, p-n junction as a diode, volt-ampere characteristics, temperature dependence of V-I characteristic, Transition and Diffusion capacitances (qualitative), breakdown mechanisms in semiconductor diodes, Zener diode characteristics, Photo diode, Varactor diode characteristics.

UNIT II

Optoelectronics

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT III

Rectifiers and Filters

p-n junction as a rectifier, half wave rectifier, full wave rectifier, bridge rectifier, harmonic components in a rectifier circuit, inductor filters, capacitor filters, L- section filters, π-Section filters, comparison of filters, voltage regulation using Zener diode.

UNIT IV

Bipolar Junction Transistor

Junction transistor, BJT symbol, transistor construction, BJT operation, common base, common emitter and common collector configurations. Transistor current components, limits of operation, transistor as an amplifier, comparison of CB, CE, CC amplifier configurations.

UNIT V

Transistor biasing-stabilization and Field Effect Transistor

The DC and AC load lines, Operating point, need for biasing , fixed bias, collector feedback bias, Emitter feedback bias, Collector-Emitter feedback bias, Voltage divider bias - bias stability and stabilization factors, stabilization against variations in V_{BE} and β.

Field Effect Transistor: The Junction field effect Transistor (Construction, Principle of operation, symbol) Pinch – off voltage, V-I characteristics, The JFET small signal model, comparison of BJT and FET (Qualitative treatment).

TEXT BOOKS:

1. Electronic Devices and Circuits, Millman's Halkias, Mc Graw Hill Book Publishers, 4th edition, 2017.
2. Engineering Physics, H.K. Malik, A. K. Singh, Tata Mc Graw Hill Book Publishers, 2nd edition, 2017.

REFERENCE BOOKS:

1. Electronic devices and Circuits, S Salivahanan, N Srushkumar, A Vallava Raj, Tata Mc Graw Hill Book Publishers, 2nd edition.
2. Fundamentals of Physics, Halliday Resnick and Krane, John Weily Publishers, 5th edition.
3. Online course: "Optoelectronic materials and devices" by Monica Katiyar and Deepak Gupta on NPTEL.

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18CH1201 - ENGINEERING CHEMISTRY

B. Tech. IT - I Year, II Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): None.

Course Objectives:
Develop ability to
1. Bring adaptability to the concepts of chemistry and to impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
2. Solve the problem of hardness and acquire the knowledge of various water treatment methods.
3. Acquire the knowledge of electrochemistry and corrosion which are essential for engineers to understand the problem of corrosion in industry.
4. Impart the knowledge of reaction mechanisms and synthetic aspects useful for understanding reaction pathways.
5. Acquire the knowledge on various spectroscopic techniques and apply them for medical and other fields.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Explain atomic, molecular and electronic changes.
CO2. Explain hardness of water and its treatment methods.
CO3. Explain the principles and concepts of electrochemistry. Understand the problem of corrosion in industry.
CO4. Explain various reaction mechanisms and apply them in synthesis of organic compounds.
CO5. Apply required skills of various spectroscopic techniques in medical and other fields.

UNIT I
Molecular structure and Theories of Bonding
Atomic and Molecular orbitals, Linear Combination of Atomic Orbitals (LCAO), Molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and F_2 molecules. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral and Octahedral geometries, Crystal Field Stabilization Energies (CFSE).
Applications of CFT- Magnetic Properties of the Octahedral and Tetrahedral Complexes.

UNIT II
Water and its treatment
Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water - Reverse osmosis.

Numerical problems.

UNIT III

Electrochemistry and corrosion

Electro chemical cells– electrode potential, standard electrode potential, types of electrodes– calomel, quinhydrone and glass electrode. Nernst equation, determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries– Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings– methods of application. Electroless plating of Nickel.

UNIT IV

Reaction Mechanisms and molecules of industrial importance

Reaction Mechanisms

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff's and anti Markownikoff'sadditions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid.

Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ and $NaBH_4$. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Polymers

Classification of polymers, Types of Polymerization–addition and condensation, differences between addition and condensation polymers, Mechanism of free radical addition polymerization. Preparation, properties and engineering applications of PVC, Teflon and Nylon- 6, 6.

UNIT V

Spectroscopic techniques and applications

Principles of spectroscopy, selection rules and applications of electronic spectroscopy. vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Text book of Engineering Chemistry by Dr.A. Jayashree, Wiley publication, New-Delhi, 2018.
2. Engineering Chemistry by Dr. Thirumala Chary and Dr. E. Laxminarayana, Scitech publications, 2018.

REFERENCE BOOKS:

1. Selected topics in Inorganic Chemistry by Wahid U. Malik, G.D. Tuli and R.D Madan, S.Chand publications, 17th Edition.
2. Elements of Physical Chemistry, by P.W. Atkins 4th Edition.
3. Fundamentals of Molecular Spectroscopy, by C.N. Ban well, 4th Edition.
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E. Schore, 5th Edition.

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18CS1201 - DATA STRUCTURES

B.Tech. IT - I Year, II Sem.

L	T	P/D	C
2	-	-/-	2

Prerequisite(s):

- **18CS1101 - Programming for Problem Solving**

Course Objectives:
Develop ability to

1. Introduce the structure, union, and enumerated types
2. Introduce to linear lists, implementation using arrays and linked list.
3. Understand the classical approaches to sorting arrays: selection sort, bubble sort, insertion sort; sequential and binary searching algorithms.
4. Concepts and principles of stacks and queues and their applications.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams. Introduction to Non-linear data structures.

Course Outcomes (COs):
After completion of the course, student would be able to

CO1. Use the type definition, enumerated types, define and use structures, unions in programs using C language.
CO2. Understand the time and space complexity. Ability to implement linear lists.
CO3. Write programs that sort data using selection, bubble, insertion sort techniques and perform search mechanisms either by sequential or binary search techniques using C language program.
CO4. Demonstrate the basic operations of stacks and queues using C program.
CO5. Write programs that read and write text, binary files using the formatting and character I/O functions. Define basic non-linear list terminologies.

UNIT I
Enumerated Types– The Type Definition (typedef), Enumerated types

Structure and Union Types – Declaration, initialization, accessing structures, operations on structures, Complex structures, Structures and functions, passing structures through pointers, self referential structures, unions, bit fields.
Command line arguments, Preprocessor commands.

UNIT II
Basic concept of order of complexity through the example programs

Linear list - Singly linked list implementation, insertion, deletion and searching operations on linear list.

UNIT III
Sorting - Selection sort, bubble sort, insertion sort techniques (Using Arrays)
Searching - Linear search, binary search techniques (Using Arrays)

UNIT IV

Stacks – Introduction, Principle, Operations: Push and Pop, In-fix to Post-Fix Conversion and Post- Fix evaluation. (Array implementation.)

Queues - Introduction, Principle, Operations: Enqueue and Dequeue. (Array implementation.)

UNIT V

File Input and Output – Concept of a file, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions.

Program Development – Multi-source files, Separate Compilation of functions

Basic Non-Linear Data Structures: Introduction, Definition and terminology of Trees, Graphs.

TEXT BOOK(S):

1. Computer Science: A Structured Programming Approach Using C, B.A. Forouzan and R.F. Gilberg, Thompson Learning, 3rd Edition, 2007 Reprint.

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.
3. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
4. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
5. C and Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.

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18EE1201 - BASIC ELECTRICAL ENGINEERING

B.Tech. IT - I Year, II Sem.

Pre requisite(s): None

L	T	P/D	C
3	-	-/-	3

Course Objectives:
Develop ability to
1. Introduce the concepts of electrical circuits and its components
2. Understand magnetic circuits, DC circuits and AC single phase and three phase circuits
3. Study and understand the different types of DC/AC machines and Transformers.
4. Import the knowledge of various electrical installations.
5. Introduce the concept of power, power factor and its improvement.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Analyze and solve DC electrical circuits using network laws and theorems.
CO2. Analyze and solve AC electrical circuits using network laws and theorems
CO3. Analyze basic Electric and Magnetic circuits
CO4. Study the working principles of Electrical Machines
CO5. Introduce components of Low Voltage Electrical Installations

UNIT I
D.C. Circuits
Electrical circuit elements (R, L and C), voltage and current sources, KVLandKCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT II
A.C. Circuits
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 in series R- L-C circuit. Three- phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III
Transformers
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT IV
Electrical Machines
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, working, torque-speed characteristic and speed control of separately excited dc motor.

Construction and working of synchronous generators.

UNIT V

Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS:

1. Basic Electrical Engineering, D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. Basic Electrical Engineering, D.C. Kulshreshtha, McGraw Hill, 2009.

REFERENCE BOOKS:

1. Fundamentals of Electrical Engineering, L.S. Bobrow, Oxford University Press, 2011.
2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010.
3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

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18PH12L1 - SEMICONDUCTOR DEVICES LAB

B.Tech. IT - I Year, II Sem.

L	T	P/D	C
-	-	3/-	1.5

Pre-requisite(s):

- **18PH1102 - Applied Physics**

Course Objectives:

Develop ability to

1. Determine magnetic induction at several points on the axis of coil carrying current and the wavelength of LASER.
2. Determine time constant of a RC circuit, energy gap of a given semiconductor, Hall coefficient, work function of a given material and resonant frequency of LCR circuit.
3. Plot V-I characteristics of LED, p-n junction and Zener diode, understand rectification process and working of rectifier, understand the conversion of light into electrical energy.
4. Plot the characteristics of transistor in different configurations.
5. Plot drain and transfer characteristics of a Field Effect Transistor (FET).

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Summarize working principle of electromagnetic induction and compute the wavelength of a laser.
CO2. Compute time constant of RC circuit, energy gap of semiconductor, identify type of semiconductor, compute work function of a given material and resonant frequency of LCR circuit.
CO3. Demonstrate the V-I characteristics of LED, p-n junction diode, the application of Zener diode as voltage regulator and conversion of ac to dc with and without filters, exhibits knowledge in developing various applications of solar cells.
CO4. Evaluate current gain of a given n-p-n transistor.
CO5. Analyze the drain and transfer characteristics of FET in common source configuration.

Any ten of the following fourteen experiments are mandatory to perform by each student

1. Draw the V-I characteristics of LED.
2. Determination of the wavelength of a given source of LASER-Diffraction grating.
3. Determination of time constant of a given RC combination.
4. Determination of energy gap of a given semiconductor.
5. V-I Characteristics of p - n junction diode and Zener diode.
6. Input and Output characteristics of n-p-n transistor - CE and CB configurations.
7. Conversion of ac to dc by using half wave rectifier with and without filters.
8. Conversion of ac to dc by using full wave rectifier with and without filters.
9. FET characteristics.
10. V-I characteristics of a Solar cell.
11. Determination of resonant frequency and quality factor of series LCR circuit.

12. Hall Effect: To determine Hall coefficient of a given semiconductor.
13. Photo electric effect: To determine work function of a given material.
14. Stewart-Gee's experiment. Determination of magnetic field along the axis of a current carrying coil.

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18CH12L1 - ENGINEERING CHEMISTRY LAB

B. Tech. IT - I Year, II Sem.

L	T	P/D	C
-	-	3/-	1.5

Prerequisite(s): None.

Course objectives:
Develop ability to
1. Estimate the hardness content in water to check its suitability for drinking purpose.
2. Use instrumental methods namely, Potentiometry and Conductometry to find the concentration of a given solution.
3. Measure physical properties like surface tension, adsorption and viscosity.
4. Know the synthesis of most effective drug molecules.
5. Determine the rate constant of reactions from concentrations as a function of time.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Determine parameters like hardness content in water.
CO2. Use instrumental methods like Potentiometry and Conductometry.
CO3. Determine physical properties like surface tension, adsorption, acid value and viscosity.
CO4. Use techniques which are fundamental in the synthesis of Aspirin, Paracetamol etc.
CO5. Estimate rate constant of a reaction from concentration – time relationships.

List of Experiments
I. Titrimetry
1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of acid value of coconut oil.

II Instrumental Methods
A. Potentiometry
3. Estimation of HCl by Potentiometric titrations
4. Estimation of Fe^{2+} by Potentiometry using KMnO4

B. Conductometry
5. Estimation of an HCl by Conductometric titrations
6. Estimation of Acetic acid by Conductometric titrations

III. Physical Constants
7. Determination of viscosity of a given liquid by using Ostwald's viscometer.
8. Determination of surface tension of a given liquid using stalagmometer.

IV. Synthesis

9. Synthesis of Aspirin and Paracetamol.

V. Kinetics

10. Determination of rate constant of acid catalysed hydrolysis of methyl acetate

VI. Additional Experiments

11. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of partition coefficient of acetic acid between n-butanol and water.

REFERENCE BOOKS:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand and Co., Delhi).
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi).
3. Vogel's text book of practical organic chemistry 5^{th} edition.
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara.

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18CS12L1 - DATA STRUCTURES LAB

B.Tech. IT - I Year, II Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s): None.

Course Objectives:
Develop ability to

1. Introduce the structure, union, and enumerated types
2. Introduce to linear lists, implementation using arrays and linked list.
3. Understand the classical approaches to sorting arrays: selection sort, bubble sort, insertion sort; sequential and binary searching algorithms.
4. Concepts and principles of stacks and queues and their applications.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams. Introduction to Non-linear data structures.

Course Outcomes (COs):
After completion of the course, student would be able to

CO1. Use the type definition, enumerated types, define and use structures, unions in programs using C language.
CO2. Understand the time and space complexity. Ability to implement linear lists.
CO3. Write programs that sort data using selection, bubble, insertion sort techniques and perform search mechanisms either by sequential or binary search techniques using C language program.
CO4. Demonstrate the basic operations of stacks and queues using C program.
CO5. Write programs that read and write text, binary files using the formatting and character I/O functions. Define basic non-linear list terminologies.

Week No	Name of the program
1	Write a C program to implement complex structures for the following operations. i) Addition of two Complex numbers ii) Multiplication of two Complex Numbers
2	a) Write a C program to implement arrays of structures? b) Write a C program to implement bit fields in C?
3	a) Write a C Program to store the information (name, roll no, and branch) of a student using unions. b) Write a C program to implement inter function communication by passing pointers to a structure.
4	Write a C program to implement singly linked list for the following operations. a) Insertion b)Deletion c)Search
5	a) Write a C program to sort the elements using Selection sort b) Write a C program to sort the elements using Bubble sort.

6	a) Write a C program to sort the elements using Insertion sort b) Write a C program to search an element in a list of elements using linear search. If the element found display the position, otherwise print "element not present".
7	Write a C program to search an element in a list of elements using Binary search. If the element found display the position, otherwise print "element not
8	Write a C program convert infix to postfix notation and postfix evaluation using
9	Write a C program implement Queue using arrays for the following operations. i) Enqueue ii) Dequeue iii) Peek iv) Display
10	Write a C program open a new file and implement the following I/O functions. i) fprintf(), fscanf() ii) getw(), putw() iii) getc(), putc()
11	a) Write a C program to copy data from one file to another. b) Write a C program to merge two files, using command line arguments.
12	Write a C program to implement multi file programming for basic arithmetic operations

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18EE12L1 - BASIC ELECTRICAL ENGINEERING LAB

B. Tech. IT - I Year, II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None.

Course Objectives:
Develop ability to
1. Analyze a given network by applying various electrical laws and network theorems
2. Know the response of electrical circuits for different excitations
3. Calculate measure and know the relation between basic electrical parameters.
4. Analyze the performance characteristics of DC
5. Analyze the performance characteristics AC electrical machines

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Get an exposure to basic electrical laws.
CO2. Obtain the response of different types of electrical circuits to different excitations.
CO3. Measure, calculate and relate the basic electrical parameters
CO4. Obtain the basic characteristics of DC machines
CO5. Obtain the basic characteristics of transformers and other AC electrical machines.

List of experiments/demonstrations: Any 12 experiments from the following are to be conducted)
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator.

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18CS2101 - ADVANCED DATA STRUCTURES

B.Tech.IT - II Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisite(s):

- **18CS1101 – Programming for problem solving**
- **18CS1201 – Data structures**

Course Objectives:

Develop ability to

1. Understand the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
2. Identify the notations used to represent the Performance of algorithms.
3. Understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
4. Familiarize with various data structures for various applications.
5. Understand various searching and sorting algorithms.
6. Write programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Explain the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
CO2. Calculate the performance of the different algorithms in terms of time and space.
CO3. Write programs in C for different data structures like stacks, queues, linked lists (singly and doubly).
CO4. Select appropriate data structure for a given problem.
CO5. Write C programs for various searching algorithms, sorting algorithms and non-linear data structures such as trees and graphs.

UNIT I

Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations.

Introduction to Linear and Non Linear data structures: Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion. Representations of array-row major and column major, Sparse matrices-array and linked representations.

UNIT II

Stack ADT, definition, operations, linked list implementation, Application of stack – Tower of Hanoi, Parenthesis Checker iterative and recursion implementation.

Queue ADT, definition and operations, linked list implementation, Circular queues-Insertion and deletion operations, Deque (Double ended queue) ADT, array and linked implementations.

UNIT III

Trees– Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees.

Max Priority Queue ADT - implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.
Sorting- Quick Sort, Merge sort, Heap Sort, Radix Sort, Comparison of Sorting methods.

UNIT IV

Search Trees - Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees- Definition and Examples, Insertion into an AVL Tree

B-Trees - Definition, B-Tree of order m, operations-Insertion and Searching, Introduction to Red- Black and Splay Trees, Comparison of Search Trees.

UNIT V

Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations-Adjacency matrix, Adjacency lists, Adjacency multi lists, Graph traversals- DFS and BFS.
Static Hashing-Introduction, hash tables, hash functions, Overflow Handling.

Pattern matching algorithm- The Knuth-Morris-Pratt algorithm.

TEXT BOOK(S)

1. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson-Freed, Universities Press.

REFERENCE BOOK(S)

1. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
2. Data Structures using C, R.Thareja, Oxford University Press.
3. Data structures: A Pseudocode Approach with C, 2nd edition, R.F.Gilberg And B.A.Forouzan, Cengage Learning.
4. Data Structures using C, A.M.Tanenbaum,Y. Langsam, M.J.Augenstein, Pearson.
5. Data structures and Program Design in C, 2nd edition, R.Kruse, C.L.Tondo and B.Leung,Pearson.
6. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI

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18EC2102 - DIGITAL DESIGN

B.Tech.IT II Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand basic concepts of various number systems used in digital systems.
2. Understand Boolean algebra and various Boolean simplification theorems.
3. Understand simplification of Boolean functions using k-map and tabular method.
4. Understand design and analysis of combinational and sequential logic circuits.
5. Understand symmetric functions and design the same using relay contacts.
6. Understand Threshold logic and design switching functions using threshold elements.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Perform conversions from one number system to another.
CO2. Simplify switching functions using Boolean minimization theorems, map method and tabulation method.
CO3. Analyze and design combinational logic circuits and the effect of Static Hazards on these circuits.
CO4. Synthesize symmetric functions using relay contact networks.
CO5. Design switching circuits using threshold elements.
CO6. Analyze and Design Sequential logic Circuits.

UNIT I
NUMBER SYSTEMS
Number Systems, Base Conversion Methods, Binary arithmetic, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal (BCD) Code and its Properties, Unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.

Boolean Algebra and Switching Functions: Switching algebra, Basic Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates. Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT II
MINIMIZATION OF SWITCHING FUNCTIONS
Introduction, Minimization with theorems, The Karnaugh Map Method – Three, Four, Five and Six Variable maps. Prime Implicants and essential Prime Implicants. Don't care map entries, using the map for simplifying Boolean expressions, Tabular method, partially specified expressions, Multi- output minimizations.

UNIT III
DESIGN OF COMBINATIONAL CIRCUITS
Adders, Subtractors, Multiplexers, Realization of Switching Functions using Multiplexers, De- multiplexers, Decoders, Encoders, Priority Encoder, Comparators, Parity Generators, Code Converters, Static Hazards and Hazard Free Realizations.

UNIT IV
SYNTHESIS OF SYMMETRIC NETWORKS
Relay Contacts, Analysis and Synthesis of Contact Networks, Symmetric Networks, Identification of Symmetric Functions and realization of the same.

Threshold Logic: Threshold Element, Capabilities and Limitations of Threshold logic, Elementary Properties, Synthesis of threshold networks (Unate function, Linear seperability, Identification and realization of threshold functions, Map based synthesis of two-level Threshold networks).

UNIT V
SEQUENTIAL MACHINES FUNDAMENTALS
Introduction, NAND/NOR latches, SR, JK, JK Master slave, D and T Flip-flops, Excitation functions of SR, JK, JK Master Slave, D and T Flip-flops, State table, State Diagram, State Assignment, Finite State Model - Basic Definitions. Synthesis of Synchronous Sequential circuits - Sequence Detector, Serial Binary adder, Binary counter and Parity bit generator.

Counters and Shift Registers: Ripple Counter, Shift Registers and their types, Ring Counters, Twisted Ring Counters.

TEXT BOOKS:

1. Switching and Finite Automata Theory, Zvi Kohavi and Niraj K. Jha, 2nd Edition, 2009, Cambridge University Press.
2. Digital Design, Morris Mano, PHl, 3rd Edition.

REFERENCE BOOKS:

1. Digital Fundamentals - A Systems Approach, Thomas L. Floyd, Pearson, 2013.
2. Fundamentals of Logic Design, Charles H. Roth, Cengage Learning, 5th Edition, 2004.

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18CS2102 - OBJECT ORIENTED PROGRAMMING USING JAVA

B.Tech.IT - II Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS1101 – Programming For Problem Solving**
- **18CS1201 – Data Structures**

Course Objectives:

Develop ability to

1. Understand basic concepts of object oriented programming.
2. Understand the primitive data types built into the Java language and features of strongly typed language.
3. Learn scope, lifetime, and the initialization mechanism of variables and parameter passing mechanisms.
4. Write simple graphics programs involving drawing of basic shapes.
5. Create Graphical User Interfaces by means of Java Programming Language.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Use concepts of OOPs such as data abstraction, inheritance, polymorphism, encapsulation and method overloading principles in structuring computer applications for solving problems.

CO2. Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO3. Use Java Collection of Application Programming Interface (API) as well as the Java standard class library with necessary exception handling mechanisms in constructing computer applications.

CO4. Develop java programs using multi-threading, files and database concepts and their connectivity.

CO5. Design and develop Graphical User Interface applications using Abstract Window Toolkit (AWT), Swings and Applets.

UNIT I

OOP concepts - Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, procedural and Object oriented programming paradigms

Java Programming - History of Java, comments, datatypes, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow block scope, conditional statements, loops break and continue statements. simple java program, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this keyword, overloading methods and constructors recursion, garbage collection, building strings, exploring string class.

UNIT II

Inheritance - Definition, hierarchies, super and subclasses, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods.

Polymorphism - Dynamic binding, method overriding, abstract classes and methods.

Interfaces - Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Inner classes - Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

Packages - Definition, Creating and Accessing a package, understanding CLASSPATH, importing packages.

UNIT III

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multi-Threading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication, producer consumer pattern.

UNIT IV

GUI Programming with java - The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, containers- JFrame, JApplet, JDialog, JPanel, Overview of some swing components - JButton, Jlabel, JtextField, JTextArea, simple Swing Applications, Layout Management- Layout Manager types- border , grid and flow

Event handling - Events, event sources, event classes, event Listeners, Relationship between event sources and Listeners Delegation event model, Examples: handling a button click, handling mouse events, Adapter classes.

Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters, applet security issues.

UNIT V

Connecting to Database - JDBC type 1 to 4 drivers, connecting to a data base, querying a data base and processing the results, updating data with JDBC.

Files: streams – byte streams, character streams, text input/ Output binary input/ output Random access file operations, file management using File class

Collection Frame work in java - Introduction to java Collections, overview of java collection frame work, Generics, commonly used collection classes- ArrayList, Vector, Hash table, Stack, Enumeration, Iterator, String tokenizer, Random, Scanner, Calendar and Properties

TEXT BOOK(S):

1. Java fundamentals- A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH, 1st Edition, 2013.

REFERENCE BOOK(S):

1. Core Java 2–Volume1, Cay S. Horstmann and Gary Cornell
2. Java for Programmers, PJ. Dietel and H.M Deitel Pearson education.
3. Object Oriented Programming through Java. P.Radha Krishna. Universities Press.
4. Thinking in Java, Bruce Eckel, Pearson Education.

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18CS2103 - DISCRETE MATHEMATICS

B.Tech.IT - II Year, I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): None

Course Objectives:
Enable student to
1. Understand concepts of Mathematical Logic and its applications.
2. Understand mechanisms of inference rules for propositional and predicate logic and their applications.
3. Understand principles of Mathematical Induction and Contradiction.
4. Understand the concepts of relations, functions, sets, algebraic structures and counting and their applications.
5. Understand the fundamental notions of statistics, such as sample space, mean and distributions.
6. Understand basic definitions and properties of graphs and their applications in computer science and engineering.

Course Outcomes (COs):
After completion of the course, student would be able to
CO1. Distinguish between Propositional Logic and Predicate Logic and check the proposition satisfiability.
CO2. 1llustrate by examples the basic terminology of functions, relations, sets and algebraic structures along with their associated operations.
CO3. Demonstrate basics of counting, principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.
CO4. Apply induction proof techniques towards solving recurrences and other problems in elementary algebra.
CO5. Represent a problem as a graph in solving Information Technology problems.

UNIT I
Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers.

Predicates: Predicative logic, Free and Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT II
Relations: Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

Functions: Inverse Function Composition of functions, recursive Functions, Lattice and its Properties.

UNIT III

Algebraic structures: Algebraic systems Examples and general properties, Semi groups and
monads, groups sub groups' homomorphism, Isomorphism.

Elementary Combinatorics: Basis of counting, Combinations and Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principles and its application.

UNIT IV

Recurrence Relation: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions. Characteristic roots solution of In-homogeneous Recurrence Relations.

UNIT V

Graph Theory: Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs. Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

TEXT BOOK(S)

1. Discrete Mathematical Structures with Applications to Computer Science, J.P.Tremblay, R.Manohar, 1st Edition, Tata McGraw Hill, 2001.
2. Discrete Mathematics for Computer Scientists and Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, 2nd Edition, PHI, 2009.

REFERENCE BOOK(S)

1. Elements of Discrete Mathematics- A computer Oriented Approach-C L Liu, D P Mohapatra. Third Edition, Tata McGraw Hill.
2. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
3. Discrete Mathematical structures Theory and application-Malik and Sen, Cengage.
4. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
5. Logic and Discrete Mathematics, Grass Man and Trembley, Pearson Education.

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18MA2102 - PROBABILITY AND STATISTICS

B.Tech.IT II Year, I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisites(s): None

Course Objectives:
Develop ability to
1. Understand different types of random variables and their distributions.
2. Estimate population parameters statistically from a sample of population.
3. Estimate correlation coefficient and coefficient of regression of the given data.
4. Examine statistical hypothesis for large samples.
5. Examine statistical hypothesis for small samples.

Course Outcomes (COs):
At the end of the course, student would be able to:
- CO1. Distinguish between random variables pertaining to discrete/ continuous distribution systems and apply the discrete distributions like Binomial, Poisson and continuous distribution like Normal and their properties.
- CO2. Calculate sample statistics from the given population and estimate the population parameters.
- CO3. Identify the relation between the two variables using coefficient of correlation and regression.
- CO4. Apply the hypothesis procedure to test means and proportions using z-test for large samples.
- CO5. Apply the hypothesis procedure to test means and proportions using t-test, F-test, chi- square test for small samples.

UNIT I
Single Random variables and probability distributions
Random variables – Discrete and continuous. Probability distributions, mass function/ density function of a probability distribution, Mathematical Expectation, Moment about origin, Central moments Moment generating function of probability distribution, Binomial, Poisson and normal distributions and their properties.

UNIT II
Sampling Distributions and Estimations
Definitions of population, sampling, statistic, parameter, Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, interval estimations.

UNIT III
Correlation and Regression
Correlation, coefficient of correlation, rank correlation (Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation), regression, regression coefficient, lines of regression.

UNIT IV

Testing of hypothesis (Large Samples)

Null hypothesis, Alternate hypothesis, type I, and type II errors – critical region, confidence interval, Level of significance. One sided test, two sided test, Large sample tests: (i) Test of Equality of means of two samples equality of sample mean and population mean (cases of known variance and unknown variance, equal and unequal variances) (ii) Tests of significance of difference between sample S.D and population S.D. (iii) Tests of significance difference between sample proportion and population proportion and difference between two sample proportions.

UNIT V

Testing of hypothesis (Small Samples)

Small sample tests: Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples Snedecor's F- distribution and it's properties. Test of equality of two population variances Chi-square distribution, it's properties, Chi-square test of goodness of fit.

TEXT BOOKS:

1. Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Academic Press, fifth edition, 2014.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017

REFERENCE BOOKS:

1. Operations Research by S.D. Sharma,Kedar Nath Ram Nath and Co,Meerut.
2. Probability and Statistics by John J. Schiller, Murray R Spiegel, A. V. Srinivasan, Tata McGraw - Hill Education.
3. Probability and Statistics by T. K. V. Iyengar and B. Krishna Gandhi Et, S.Chand.
4. Fundamentals of Mathematical Statistics by S C Gupta and V. K. Kapoor S.Chand and Sons, New Delhi.

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18CS21L1 - ADVANCED DATA STRUCTURES LAB

B.Tech.IT - II Year, I Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s):

- **18CS11L1 – Programming For Problem Solving Lab**
- **18CS12L1 – Data Structures Lab**

Course Objectives:

Develop ability to

1. Understand the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
2. Identify the notations used to represent the Performance of algorithms.
3. Understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
4. Familiarize with various data structures for various applications.
5. Understand various searching and sorting algorithms.
6. Write programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Explain the basic concepts of Abstract Data Types, Linear and Non Linear Data structures.
CO2. Calculate the performance of the different algorithms in terms of time and space.
CO3. Write programs in C for different data structures like stacks, queues, linked lists (singly and doubly).
CO4. Select appropriate data structure for a given problem.
CO5. Write C programs for various searching algorithms, sorting algorithms and non-linear data structures such as trees and graphs.

S.No.	Name of the Program
1	Write a C program for polynomial addition using linked lists
2	Write a C program that uses functions to perform the following: a) Create circularly linked lists b) Delete a given integer from the above linked list. c) Display the contents of the above list after deletion.
3	Write a C program that uses functions to perform the following: a) Create a doubly linked list of integers. b) Delete a given integer from the above doubly linked list. c) Display the contents of the above list after deletion
4	Write C programs to implement a Stack and Queue ADT using singly linked list.
5	Write a C program to implement the following by using stack a) Towers of Hanoi.
	b) Parenthesis Checker
6	Write a C program to implement Circular Queue
7	Write C programs to implement a double ended queue ADT using linked list.

8	Write a C program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree in in-order, pre-order, post-order.
9	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Quick sort b) Merge Sort
10	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Heap Sort b) Radix Sort
11	Write a C program to perform the following operation: a) Insertion into a B-tree. b) Searching a B-Tree
12	Write C programs for implementing the following graph traversal algorithms: a) Depth first traversal b) Breadth first traversal
13	Write a C program to implement all the functions of a dictionary (ADT) using hashing
14	Write a C program for pattern matching algorithm (KMP).

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18IT21L1 - COMPUTING LAB

B.Tech.IT - II Year, I Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s): None

Course Objectives:
Develop ability to
1. Understand the terminology and operations of propositional calculus.
2. Understand the process of checking the truth value of compound propositions.
3. Understand terminology, properties and operations of sets, relations and functions.
4. Understand importing, reviewing, manipulating and summarizing various types of data using R tool.
5. Understand the process of analyzing data sets using R tool to gain insights.

Course Outcomes (COs):
After completion of the course, student would be able to
CO1. Compute truth value of propositions and demonstrate logical connectives of propositional calculus using Scilab tool.
CO2. Use Scilab tool to check the truth value of the compound propositions.
CO3. Use Scilab tool to define and demonstrate operations on sets, relations.
CO4. Import, review, manipulate and summarize various types data using R tool.
CO5. Gain insights by analyzing data sets using R tool.

PART A
Discrete Mathematics Exercises using Scilab:
1. Write a program to find the truth value of propositions.
2. Write a program to demonstrate the logical connectives.
3. Write a program to check whether the given compound proposition is the tautology.
4. Write a program to demonstrate the power set.
5. Write a program to demonstrate the properties of relations.
6. Write a program to demonstrate the sum rule principle and product rule principle.

PART B
Statistics Exercises using R Tool:
1. Create a vector called x that contains the numbers 1 to 50.
2. Create a logical vector y that takes the value TRUE if x is smaller than 25
3. Create a character vector "my_name" - that contains the words: My name is [yourname]
4. How do you display all variable names for the in-built data-set cars?
5. Create a data frame with a sequence from 1 to 12 of 3 by 4. Name the rows as follows: Conservative; Labour; LibDem Name columns as follows: Party; Leader Name; Leader Resigned; Voteshare; Number of MP
6. Using the data frame oddbooks, use graphs to investigate the relationships between: a)weight and volume; (b) density and volume; (c) density and page area
7. Create a for loop that, given a numeric vector, prints out one number per line, with its square and cube alongside

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18CS21L3 - OBJECT ORIENTED PROGRAMMING JAVA LAB

B.Tech.IT II Year, I Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s):

- **18CS11L1 – Programming For Problem Solving Lab**
- **18CS12L1 – Data Structures Lab**

Course Objectives:

Develop ability to

1. Understand basic concepts of object oriented programming.
2. Understand the primitive data types built into the Java language and features of strongly typed language.
3. Learn scope, lifetime, and the initialization mechanism of variables and parameter passing mechanisms.
4. Write simple graphics programs involving drawing of basic shapes.
5. Create Graphical User Interfaces by means of Java Programming Language.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Use concepts of OOPs such as data abstraction, inheritance, polymorphism, encapsulation and method overloading principles in structuring computer applications for solving problems.

CO2. Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO3. Use Java Collection of Application Programming Interface (API) as well as the Java standard class library with necessary exception handling mechanisms in constructing computer applications.

CO4. Develop java programs using multi-threading, files and database concepts and their connectivity.

CO5. Design and develop Graphical User Interface applications using Abstract Window Toolkit (AWT), Swings and Applets.

Week 1

(Basic programs to get used to Java syntax) Write a Java program to

a. print the Fibonacci series upto the given number.
b. write a Java program to print the reverse of the given number
c. write a Java program to find factorial of the given number at command line.
d. write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer

Week 2

Write a Java program to

a. check whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
b. sort a given list of names in ascending order.
c. find frequency count of words in a given text.

Week 3

Write a java program to

a. illustrate creation of classes and objects
b. illustrate constructor and method overloading
c. create a stack ADT

Week 4

a. implement diiferent types of inheritance
b. illustrate method overriding and Dynamic method dispatch
c. illustrate static keyword with variables and methods

Week 5

a. Create an interface for stack of integers with abstract methods push, pop and display. Write an implementation of the above mentioned abstract methods for a fixed size stack and a dynamic size stack.
b. illustrate inner classes
c. illustrate creation and importing the packages

Week 6

Write a java program to

a. illustrate usage of try, catch, finally with multiple exceptions
b. create user defined exceptions.

Week 7

a. Write a java program that implements a multi-thread applications that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the thread will print the value of the number.
b. create a thread by implementing Runnable interface.
c. implement producer consumer problem using the concept of inter thread communication.

Week 8

a. Develop an applet that displays a simple message.
b. Develop an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named “Compute” is clicked.
c. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the+, -,*, % operations. Add a text field to display the result.

Week 9

a. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired .
b. Applet handle a keyboard event for a name textbox to accept only alphabets (skip off any other characters)

Week 10

a. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException Display the exception in a message dialog box.
b. Applet that depicts a login page.

Week 11

a. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.
b. Write a Java program that allows the user to draw lines, rectangles and ovals.
c. Applet which displays current date and time every second using Thread and Calendar class

Week 12

a. Write a java program to create an abstract class named Shape that contains an empty method named numberOfSides( ). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides( ) that shows the number of sides in the given geometrical figures.
b. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Jtable component.

Week 13

a. Write a java Program that loads names and phone numbers from a text file where the data is organized as one line per record and each filed in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
b. Implement the above program with database instead of a text file.

Week 14

a. Write a java Program that takes tab separated data (one record per line) from a text file and inserts them into a database.
b. Write a java program that prints the meta-data of a given table.

Week 15

a. Write a java program that connects to a database using JDBC and does add,delete, modify and retrieve operations.
b. An applet to check for a valid user id and password using the data in table users(user_id, password)

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18CS2201 - DESIGN AND ANALYSIS OF ALGORITHMS

B.Tech.IT II Year, II Sem.

L	T	P/D	C
3	1	-/-	4

Pre-requisite(s):

- **18CS2103 – Discrete Mathematics**
- **18CS2101 – Advanced Data Structures**

Course Objectives:

Develop ability to

1. Realize the asymptotic performance of algorithms.
2. Understand the behavior of Greedy strategy, Divide and Conquer approach, Dynamic
3. Programming and branch and bound theory for several problem solving techniques.
4. Understand how the choice of data structures and algorithm design methods impact the performance of programs.
5. Distinguish deterministic and non-deterministic algorithms and their computational complexities.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Analyze algorithms and estimate their best-case, worst-case and average-case behavior in terms of time and space and execute the same through programming.
CO2. Identify suitable problem solving technique for a given problem and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, and branch and bound theory accordingly and execute the same through programming.
CO3. Implement algorithm using appropriate data structures using programming.
CO4. Design deterministic and non-deterministic algorithms for tractable and intractable problems
CO5. Categorize the given problems as P Class/ NP Class/ NP-Hard/ NP-complete problems accordingly.

UNIT I

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance analysis - Time complexity and space complexity, Asymptotic Notations: O notation, Omega notation, Theta notation, and little oh notation, probabilistic analysis and amortized complexity.

Divide And Conquer: General method, applications – binary search, merge sort, quick sort, Strassen's matrix multiplication.

UNIT II

Searching And Traversal Techniques : Efficient non-recursive binary tree traversal algorithms, spanning trees, graph traversals- BFS and DFS, Connected components, bi-Connected components, AND/OR graphs, game tree.

Disjoint sets: operations, union and find algorithms.

UNIT III

Greedy-Method: General method, Applications-Job sequencing with deadlines, 0/1 knapsack problem, minimum cost spanning tree, single source shortest path problem.

Dynamic Programming: General method**,** applications-multistage graphs, matrix chain multiplication, optimal binary search trees, 0 /1 knapsack problem, travelling sales person problem, reliability design problem.

UNIT IV

Back Tracking: General method, applications: n-queens problem, sum of sub set problem, graph colouring problem, Hamiltonian cycles.

Branch And Bound: General method, applications: Job Sequencing with deadlines, travelling sales person problem, 0 /1 knapsack problem, LC branch and bound, FIFO branch and bound solution

UNIT V

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

TEXT BOOK(S)

1. Fundamentals of Computer Algorithms Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekharan, 2nd Edition, Universities Press, 2009 Reprint.
2. Design and Analysis of Algorithms, Aho, Ullman and Hopcroft, Pearson education, Reprint 2004.

REFERENCE BOOK(S)

1. Introduction to Algorithms, secondediton, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt.Ltd/Person Education
2. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc.Graw Hill
3. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Perason education
4. Algorithms-Richard Johnson baugh and Marcus Schaefer, Pearson Education
5. Design and Analysis Algorithms-Parag Himanshu Dave, Himanshu Bhalachndra Dave Publisher: Person
6. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John wiley and sons

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18IT2201-COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE PROGRAMMING

B.Tech.IT - II Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18EC2102 – Digital Design**

Course Objectives:

1. To introduce principles of computer organization and the basic architectural concepts.
2. Recommend instruction formats, addressing modes, micro instructions for design of control unit
3. Write assembly level programs using 8086 microprocessor.
4. Understand the I/O and memory organizations of a Computer system
5. Recognize different parallel processing architectures

Course Outcomes:

At the end of the course, student would be able to

CO1. Demonstrate an understanding of the design of the functional units of a digital computer system.
CO2. Design micro instructions for different kinds of CPU organizations with proper understanding of instruction formats and addressing modes
CO3. Write assembly language programs using 8086 microprocessor with the knowledge of pin diagram, registers and instruction formats of 8086 microprocessor.
CO4. Identify different hardware components associated with the memory and I/O organization of a computer
CO5. Differentiate different parallel processing architectures

UNIT I

Introduction: Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

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.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Instruction cycle.

UNIT II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Program Control, CISC Characteristics, RISC Characteristics.

UNIT III

8086 Architecture: Register Organization of 8086, 8086 Architecture, Signal Description of 8086, Physical Memory Organization, Pipelining in 8086, 8086 Flag Registers.

8086 Instruction Set and Assembler Directives: Instruction Formats and Addressing Modes of 8086, Instruction Set, Assembler Directives, Assembly Language Programs

UNIT IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT IV

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

TEXT BOOK(S)

1. Computer System Architecture, M. Morris Mano, 3/e, Pearson Education.
2. Advanced Micro Processor and Peripherals, Hall/A K Ray, McGraw Hill Education, 2006.

REFERENCE BOOK(S)

1. Computer Organization and Architecture, William Stallings, Sixth Edition, Pearson/PHI.
2. Structured Computer Organization-Andrew S Tanenbaum, 4th Edition, PHI/Pearson.
3. Fundamentals of Computer Organization and Design, Sivaraama Dandamudi, Springer Int. Edition.
4. Computer Architecture a Quantitative Approach, John L. Hennessy and David A. Patterson, 4th Edition, Elsevier.
5. Computer Architecture: Fundamentals and Principles of Computer Design, SJoseph D. Dumas II, BS Publication.

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18CS2203-DATABASE MANAGEMENT SYSTEMS

B.Tech.IT II Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS1201 – Data Structures**

Course Objectives:

Develop ability to

1. Learn and practice data modeling using entity-relationship and develop database design.
2. Understand the features of database management systems and Relational database.
3. Understand Structured Query Language (SQL) and learn SQL syntax.
4. Understand normalization process of a logical data model and correct any anomalies.
5. Understand needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Differentiate DBMS from traditional data storage mechanisms.
CO2. Design and describe data models and schemas in DBMS.
CO3. Use SQL- the standard language of relational databases, for database processing.
CO4. Design a normalized database resolving various problems like redundant and functional dependencies.
CO5. Implement Transaction and Query processing techniques for data storage and retrieval.

UNIT I

Introduction- Data base System Applications, Purpose of Database Systems, View of Data – Data Abstraction , Instances and Schemas , Data Models ,Introduction to Data base design , ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets , Relationships and Relationship sets , Additional features of ER Model , Conceptual Design with the ER Model , Conceptual Design for Large enterprises, database Access for applications Programs ,Data Storage and Querying,– data base Users and Administrator ,data base System Structure ,History of Data base Systems. Database Languages–DDL, DML, DCL.

Relational Model: Introduction to the Relational Model - Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

UNIT II

Relational Algebra and Calculus : Relational Algebra – Selection and projection ,set operations , renaming , Joins , Division , Examples of Algebra overviews , Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Form of Basic SQL Query – Examples of Basic SQL Queries , Introduction to Nested Queries, Correlated Nested Queries Set – Comparison Operators – Aggregative Operators ,

NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs ,Outer Joins ,Disallowing NULL values , Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT III

Introduction to Schema refinement – Problems Caused by redundancy, Decompositions –
Problem related to decomposition, Function dependencies- reasoning about FDS,

Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF – properties of Decompositions Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form, Join Dependencies, FIFTH Normal Form, Inclusive Dependencies.

UNIT IV

Transaction Management- Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability.

Concurrency Control - Lock –Based Protocols – Timestamp Based Protocols- Validation-Based
Protocols – Multiple Granularity.

Recovery system – Failure Classification- Storage Structure- Recovery – Atomicity – Log – Based Recovery- Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage - Advance Recovery systems- Remote Backup systems.

UNIT V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing,Tree base Indexing, Comparison of File Organizations.

Tree Structured Indexing - Intuitions for tree Indexes – Indexed Sequential Access Methods
(ISAM) – B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.
Hash Based indexing: Static Hashing, Extendable Hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOK(S)

1. Fundamentals of Database Systems, Elmasri, Navathe, 7^{th} Edition, Pearson Education, 2016.

REFERENCE BOOK(S)

1. Data base System Concepts, Silberschatz, Korth, McGraw hill, VI edition.
2. Data base Systems design, Implementation, and Management, Peter Rob and Carlos Coronel 7th Edition.
3. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
4. Introduction to Database Systems, C.J.Date Pearson Education

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18CS2205-OPERATING SYSTEMS

B.Tech.IT II Year, II Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s):

- **18CS1101-Programming For Problem Solving**

Course Objectives:

Develop ability to

1. Analyze the main components of Operating System (OS) and their working.
2. Introduce the different scheduling policies of OS.
3. State and compare the different memory management techniques.
4. Understand the concepts of input/output, storage and file management.
5. Provide the Understanding of the concepts of Deadlocks and access control methods.

Course Outcomes (COs):

At the end of the course, student would be able to

CO1. Compare synchronous and asynchronous communication mechanisms in their respective Operating Systems.
CO2. Implement CPU Scheduling algorithms and explain turnaround time, waiting time, response time, throughput for a given set of processes.
CO3. Apply optimization techniques in memory management techniques and analyze them.
CO4. Explain the concepts of input/output, storage and file management
CO5. Demonstrate the concepts of Deadlocks and access control methods.

UNIT I

Operating System Introduction: Operating Systems Objectives and functions, Computer System Architecture, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, OS Structure.

UNIT II

Process and CPU Scheduling - Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling, Case studies: Linux, Windows.

Process Coordination - Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

UNIT III

Memory Management and Virtual Memory- Logical and physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table. Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demanding Paging, Page Replacement Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT IV

File System Interface - The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

Mass Storage Structure - Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap space Management.

UNIT V

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

Protection - System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

TEXT BOOK(S)

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.

REFERENCES BOOK(S)

1. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.
2. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
3. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.

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18MB2202-ENGINEERING ECONOMICS AND ACCOUNTING

B.Tech.IT II Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisite(s): None

Course Objectives:
Develop the ability to
1. Learn the basic Business types
2. Understand the impact of the Economy on Business and Firms specifically.
3. Analyze the Business from the Financial Perspective.
4. Understand the importance of handling Capital.
5. Learn fundamental concepts of accounting.

Course Outcomes (COs):
The students will able to
CO1. Understand Business and the impact of economic variables on them.
CO2. Understand the Demand, Supply concepts.
CO3. Analyze the Production, Cost, Market Structure, Pricing aspects.
CO4. Understand capital structure.
CO5. Study the Financial Statements of a Company.

UNIT I
Introduction to Business and Economics: Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non- Conventional Sources of Finance. Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT II
Demand and Supply Analysis: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function and Law of Supply.

UNIT III
Production, Cost, Market Structures and Pricing: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.
Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT IV
Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital – Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (AR A) and Net Present Value Method (simple problems).

UNIT V
Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

TEXT BOOKS:
1. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
2. S.N.Maheswari and S.K. Maheswari, Financial Management, Vikas, 2012.

REFERENCE BOOKS:
1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

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18CS22L1-DESIGN AND ANALYSIS OF ALGORITHMS LAB

B.Tech.IT II Year, II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):

- **18CS11L1 - Programming For Problem Solving Lab**
- **18CS12L1 - Data Structures Lab**
- **18CS21L1 - Advanced Data Structures Lab**

Course Objectives:

Develop ability to

1. Realize the asymptotic performance of algorithms.
2. Understand the behavior of Greedy strategy, Divide and Conquer approach, Dynamic
3. Programming and branch and bound theory for several problem solving techniques.
4. Understand how the choice of data structures and algorithm design methods impact the performance of programs.
5. Distinguish deterministic and non-deterministic algorithms and their computational complexities.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1. Analyze algorithms and estimate their best-case, worst-case and average-case behavior in terms of time and space and execute the same through programming.
CO2. Identify suitable problem solving technique for a given problem and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, and branch and bound theory accordingly and execute the same through programming.
CO3. Implement algorithm using appropriate data structures using programming.
CO4. Design deterministic and non-deterministic algorithms for tractable and intractable problems
CO5. Categorize the given problems as P Class/ NP Class/ NP-Hard/ NP-complete problems accordingly.

List of Experiments

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

2. Using Open MPI, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

3. Implement Binary tree traversal techniques using recursion and without recursion. Identify the best method, Justify your answer.

4. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
   b. Check whether a given graph is connected or not using DFS method.

5. Write and implement an algorithm determining articulation points and the biconnected components in the given graph.

6. Implement an algorithm to find the minimum cost spanning tree using
   i) Prims algorithm ii) Kruskals Algorithm

7. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra‟s algorithm.

8. Implement Job Sequencing with Deadlines algorithm and Fast Job Sequencing with Deadlines.

9. Implement Marix Chain multiplication algorithm. Parallelize this algorithm, implement it using
10. Open and determine the speed-up achieved.

11. Implement 0/1 Knapsack problem using Dynamic Programming.

12. Implement an algorithm to find the optimal binary search tree for the given list of identifiers.

13. Find a subset of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

14. Implement N Queen's problem using Back Tracking.

15. Write a program for Hamiltonian Cycle Problem

16. Implement the solution for TSP problem using Branch and Bound technique

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18IT22L1 - OPERATING SYSTEMS AND ASSEMBLY LANGUAGE PROGRAMMING LAB

B.Tech.IT II Year, II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Operating Systems Lab

Course Objectives:
Develop ability to
1. Analyze the main components of Operating System (OS) and their working.
2. Introduce the different scheduling policies of OS.
3. State and compare the different memory management techniques.
4. Understand the concepts of input/output, storage and file management.
5. Understand the concepts of Deadlocks and access control methods.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Compare synchronous and asynchronous communication mechanisms in their respective Operating Systems.
CO2. Implement CPU Scheduling algorithms and explain turnaround time, waiting time, response time, and throughput for a given set of processes.
CO3. Apply optimization techniques in memory management techniques and analyze them.
CO4. Explain the concepts of input/output, storage and file management
CO5. Demonstrate the concepts of Deadlocks and access control methods.

List of Programs:

Week 1

Simulate the following CPU scheduling algorithms
a. First Come First Serve (FCFS)
b. Shortest Job First (SJF)
c. Priority
d. Round Robin

Week 2

a. Simulate Multiprogramming with Variable number of Tasks (MVT)
b. Simulate Multiprogramming with Fixed number of Tasks (MFT)

Week 3

Simulate all page replacement algorithms
a. First In First Out (FIFO)
b. Optimal
c. Least Recently Used (LRU)

Week 4

Simulate all File Organization Techniques

a. Single level directory
b. Two level directory
c. Hierarchical directory

Week 5

Simulate all File allocation strategies

a. Sequential
b. Indexed
c. Linked

Week 6

Simulate Bankers Algorithm for Dead Lock Avoidance

Assembly Language Programming Lab

Course Objectives:

Develop ability to

1. Introduce principles of computer organization and the basic architectural concepts.
2. Recommend instruction formats, addressing modes, micro instructions for design of control unit
3. Write assembly level programs using 8086 microprocessor.
4. Understand the I/O and memory organizations of a Computer system
5. Recognize different parallel processing architectures

Course Outcomes (COs):

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

CO1. Demonstrate an understanding of the design of the functional units of a digital computer system.
CO2. Design micro instructions for different kinds of CPU organizations with proper understanding of instruction formats and addressing modes
CO3. Write assembly language programs using 8086 microprocessor with the knowledge of pin diagram, registers and instruction formats of 8086 microprocessor.
CO4. Identify different hardware components associated with the memory and I/O organization of a computer
CO5. Differentiate different parallel processing architectures

List of Experiments

Week 1

1. Architecture of 8086 microprocessor
2. Instruction Set of 8086 microprocessor

Week 2

1. Write a program to display string "Computer Science and Engineering".
2. Write an Assembly Language Program (ALP) to display multiple strings line by line.
3. Write an Assembly Language Program (ALP) to find the maximum of three numbers.

Week 3

1. Write an Assembly Language Program (ALP) to print numbers from 0 to 9
2. Write an Assembly Language Program (ALP) to check whether a given number is even or odd.

Week 4

1. Write an Assembly Language Program (ALP) to find the factorial of a number.
2. Write an Assembly Language Program (ALP) to print fibo series up to 5 numbers.

Week 5

1. Write an Assembly Language Program (ALP) to take n values from user and calculate their sum.(BL contains the result)
2. Write an Assembly Language Program (ALP) to take n values from user and calculate maximum and minimum values.

Week 6

1. Write 8086 Assembly Language Program (ALP) to transfer a block of data from one location to another.
2. Write an Assembly Language Program (ALP) to reverse the given string.
3. Write an Assembly Language Program (ALP) to perform addition of two 2X2 matrices.

Week 7

1. Write an Assembly Language Program (ALP) for linear search.
2. Write an Assembly Language Program (ALP) to take n values from user and sort them in ascending order.

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18CS22L3 - DATABASE MANAGEMENT SYSTEMS LAB

B.Tech.IT II Year, II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Learn and practice data modeling using entity-relationship and develop database design.
2. Understand the features of database management systems and Relational database.
3. Understand Structured Query Language (SQL) and learn SQL syntax.
4. Understand normalization process of a logical data model and correct any anomalies.
5. Understand needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcomes (COs):
After completion of the course, student would be able to
CO1. Differentiate DBMS from traditional data storage mechanisms.
CO2. Design and describe data models and schemas in DBMS.
CO3. Use SQL- the standard language of relational databases, for database processing.
CO4. Design a normalized database resolving various problems like redundant and functional dependencies.
CO5. Implement Transaction and Query processing techniques for data storage and retrieval.

List of Experiments

1. E-R Model: Analyze the problem with the entities which identify data persisted in the database which contains entities, attributes.

2. Concept design with E-R Model: Apply cardinalities for each relationship, identify strong entities and weak entities for relationships like generalization, aggregation, specialization.

3. Relation Model: Represent attributes as columns in tables and different types of attributes like Composite, Multi-valued, and Derived. Apply Normalization.

4. Installation of Mysql and Queries using DATA DEFINITION LANGUAGE (DDL) COMMANDS - Create, Alter, Drop, Truncate

5. Data Manipulation Language (DML) COMMANDS:- SELECT, INSERT, UPDATE, DELETE

6. Data Control Language (DCL):- GRANT, REVOKE Transaction Control Language (TCL) COMMANDS: - COMMIT, ROLL BACK SAVE POINT

7. In Built Functions: - DATE FUNCTION, NUMERICAL FUNCTIONS, CHARACTER FUNCTIONS, CONVERSION FUNCTION

8. Querying: Queries using ANY, ALL, IN, INTERSECT, UNION

9. Querying: Using aggregate functions COUNT, SUM using GROUPBY and HAVING
    a. Using aggregate functions AVERAGE using GROUPBY and HAVING

10. Querying: NESTED QUERIES AND JOIN QUERIES: Nested Queries , Correlated sub queries , Simple Join, a) Equi-join b) Non Equi-join , Self join , Outer Join

11. Set Operators: Union, Union all, Intersect, Minus

12. Views: Creating and dropping view

13. Triggers: Creation of INSERT TRIGGER, DELETE TRIGGER, UPDATE TRIGGER

14. Procedures: Creation, Execution and Modification of stored Procedure

15. Database Design and Implementation: MINI DATABASE PROJECT

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18CH2201-ENVIRONMENTAL SCIENCE

B.Tech.IT II Year, II Sem.

L	T	P/D	C
3	-	-/-	-

Pre-requisite(s): None

Course Objectives:
Develop ability to
1. Identify the importance of ecosystem and its functions.
2. Understand the natural resources and their usage in day to day life.
3. Understand the concept of bio-diversity, its values and conservation.
4. Be aware of the causes of different types of pollution and its control.
5. Understand various environmental impacts, requirement of various policies, and legislations towards environmental sustainability.

Course Outcomes (COs):
After the completion of the course, the student would be able to -
CO1. Explain ecosystem and its functions namely, food chain, ecological pyramids etc.
CO2. Acquire knowledge about different types of natural resources such as land, water, minerals, non-renewable energy and their excessive usage leading to detrimental effects on environment.
CO3. Comprehend ecosystem diversity, its values and importance of hot spots to preserve the same.
CO4. Explain different types of pollution, its control and impact on global environment.
CO5. Recognize various environmental impacts and the importance of various acts and policies towards environmental sustainability.

UNIT I
Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, Field visits.

UNIT II
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy Resources-renewable and non-renewable .

UNIT III
Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies.

Global Environmental Issues and Global Efforts: Green House Gases And its effect, Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC- GoI Initiatives.

UNIT V

Environmental Policy, Legislation and EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economic aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission.
2. R. Rajagopalan , Environmental Studies, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008
3. PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin and Edward A. Keller, Wiley INDIA edition.
5. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
6. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
7. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

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18CS3111-WEB TECHNOLOGIES

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	1	-/-	4

Prerequisites:

- **18CS2102: Object Oriented Programming using Java**

Course Objectives:

Develop ability to

1. Understand the basic web concepts and internet protocols.
2. Acquire knowledge in XML and processing of XML data.
3. Introduce client side scripting with JavaScript and DHTML
4. Understand Server-side programming with Java Servlets and JSP.
5. Implement Server side scripting with PHP.

Course Outcomes (COs):

After Completion of this course Students will be able to

CO1: Create dynamic and interactive web sites.
CO2: Write and execute client side scripts using JavaScript and DHTML.
CO3: Write parse, execute XML schemas.
CO4: Implement, deploy and execute server side programs and components using java servlets and JSPs.
CO5: Implement, deploy and execute server side programs and components using PHP.

UNIT I

HTML: Common Tags- List, Tables, images, forms, frames, types of Cascading Style Sheets.

Client-side Scripting: Introduction to JavaScript, declaring variables, scope of variables, functions, event handlers (onclick, submit etc.), Document Object Model, Form validation, JQuery.

UNIT II

XML: introduction to XML, defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML.

Parsing XML Data: DOM and XML parsers in java, Json.

UNIT III

Introduction to Servlets: Common gateway interface (CGI), Lifecycle of a Servlet, Deploying a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request and Responses, Using Cookies and Sessions connecting to database using JDBC.

UNIT IV

Introduction to JSP: The Anatomy of a JSP page, JSP Processing. Declarations, Directives, Expressions, Code Snippets, implicit objects, using beans in JSP pages, using cookies in Session for Session tracking, connecting to databases in jsp.

UNIT V

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control statements, functions, Reading data from web, form controls like text boxes, radio buttons, lists etc. Handling file uploads, connecting to database (Mysql as reference), executing simple queries, handling results, handling sessions and cookies

File handling in PHP: file operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

TEXT BOOK(S)

1. Web Technologies, Uttam K Roy, Oxford University Press, 2010.
2. The Complete Reference PHP, Steven Holzer, Tata McGraw-Hill Edition, 2008.

REFERENCES BOOK(S)

1. Web Programming, building internet applications, Second Edition, Chris Bates, WILEY Dreamtech, 2008.
2. The Complete Reference Java 2, Fifth Edition, Patrick Naughton and Herbert Schildt. Tata McGraw-Hill Edition, 2002.
3. Java Server Pages, First Edition, Hans Bergsten, SPD O'Reilly, 2001.
4. Internet and World Wide Web – How to program, Harvey M. Dietel, Paul J. Dietel andTem R. Nieto Prentice Hall, 1999.
5. Jakarta Struts Cookbook, First Edition ,Bill Siggelkow, O'Reilly,Media, 2005.

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18CS3102 – COMPUTER NETWORKS

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18IT2201 – Computer Architecture and Assembly Language Programming**

Course Objectives:

Develop ability to

1. Develop an understanding of modern network architectures from a design and performance perspective.
2. Understand the protocols of data link layer and MAC sub layer and apply different techniques of error detection and error correction.
3. Distinguish and explain different network layer protocols and routing algorithms.
4. Describe the functions of TCP and UDP protocols.
5. Illustrate the application layer protocols such as HTTP, FTP, SMTP, DNS and TELNET.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1: Identify the different types of network topologies, protocols and explain the layers of the OSI and TCP/IP model.

CO2: Design a wide-area networks (WANs), local area networks (LANs) and wireless LANs (WLANs) for a given requirement (small scale) based on the market available components and describe the protocols of data link layer and MAC Sub layer.

CO3: Classify and compare the major routing protocols and congestion control algorithms.

CO4: Develop a program for a given problem related to TCP/IP and UDP protocols using network programming.

CO5: Analyze the application layer protocols using open source available software and tools.

UNIT I

Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, TCP/IP Protocol Suite, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks and Virtual Circuit Networks; LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT II

Data Link Layer: Design Issues, Services provided to Network Layer, Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding

Window, Piggybacking. Medium Access Control Sub Layer: Random Access, Multiple Access protocols-Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT III

Network Layer: Network Layer Design Issues, Logical addressing – IPV4, IPV6 Protocols; Address mapping – CIDR, ARP, RARP, BOOTP and DHCP–Delivery, Forwarding, Uni-Cast Routing protocols, Multicast Routing Protocols.

UNIT IV

Transport Layer: Process to Process Communication, Client/Server Paradigm, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT V

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography.

TEXT BOOK(S)

1. Data Communication and Networking, Fifth Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Computer Networks, Fifth Edition, Andrew S. Tanenbaum, Pearson New International Edition.

REFERENCES BOOK(S)

1. Data and Computer Communication, Ninth Edition, William Stallings, Pearson Prentice Hall India.
2. Internetworking with TCP/IP, Volume 1, sixth Edition Douglas E. Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, Second Edition, Kevin R. Fall, W. Richard Stevens, Pearson Education.
4. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kursoe, K.W.Ross, Fifth Edition, Pearson Education.

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18CS3103 – ARTIFICIAL INTELLIGENCE

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS1101: Programming for Problem Solving**
- **18CS1201: Data Structures**

Course Objectives:

Develop ability to

1. Differentiate between optimal reasoning and human like reasoning.
2. Infer basic concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
3. Gain knowledge of various knowledge representation techniques.
4. Understand various reasoning techniques.
5. Interpret various applications of AI, namely game playing, theorem proving, expert systems, machine learning and natural language processing

Course Outcomes (COs):

At the end of the course, student would be able to

CO1: Formulate an efficient problem space for a given problem.
CO2: Identify a suitable search algorithm to search the solution of a problem in view of its characteristics namely time and space complexities.
CO3: Represent the knowledge of the given problem domain using rules and appropriate knowledge representation technique.
CO4: Explore AI techniques for solving problems with Reasoning and Uncertain models.
CO5: Apply AI techniques to solve problems of Game playing, Expert systems, Machine learning and natural language processing.

UNIT I

Introduction: AI problems, The Underlying Assumption, AI Techniques, The Level of the Model, Criteria for Success.

Problems, Problem Spaces and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Heuristic Search Techniques: Generate –and –Test, Hill Climbing, Best –First Search, Problem Reduction, Constraint Satisfaction, and Means -Ends Analysis.

UNIT II

Knowledge Representation:

Issues in Knowledge Representation, Representing Simple Facts in Predicate Logic, Representing Instance and ISA Relations, Computable Functions and Predicates, Resolution, Natural Deduction.

Representing Knowledge Using Rules: Procedural Vs Declarative Knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge.

Weak Slot –and –Filler Structures: Semantic nets, frames, **Strong Slot –and –Filler Structures:** Conceptual dependency, scripts, CYC.

UNIT III

Reasoning Techniques: Introduction to Non Monotonic Reasoning, Logics for Non Monotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation of Depth First Search and Breadth First Search, Probability and Bayes Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks.

UNIT IV

Game Playing: Overview, Minimax Search, Alpha –Beta Cutoffs.

Planning System: Overview, the Blocks World, Components of a Planning System, Goal Stack Planning, Hierarchical Planning.

Understanding: Understanding as constraint satisfaction, Waltz Algorithm.

Natural Language Processing: Introduction, Syntactic Processing, Augmented Transition Networks, Semantic Analysis.

UNIT V

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOK(S)

1. Artificial Intelligence, Third Edition, Elaine.Rich, Kevin.Knight and Shivashankar B Nair, Tata McGraw-Hill Publishing Company Limited, 2009.

REFERENCE BOOK(S)

1. Artificial Intelligence A Modern Approach, Second Edition, Stuart Russell, Peter Norvig, Pearson Education, 2009.
2. Artificial Intelligence and Expert systems, Dan W Patterson, PHI Publication ,1990.

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18IT3101 - DATA MINING
(Professional Elective – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- **18CS2203: Database Management Systems**

Course Objectives
Develop ability to
1. Understand and implement classical models and algorithms in data warehousing and data mining.
2. Design and build data warehouse from heterogeneous data sources using data integration tools.
3. Identify the problems and analyze given data and choose the relevant models and algorithms.
4. Apply models and algorithms for mining the data and to discover knowledge and generate reports accordingly.
5. Assess the strengths and weaknesses of various methods and algorithms and analyze their behavior.

Course Outcomes (COs)
At the end of the course, student would be able to
- CO1. Explain methodology used in legacy databases for data warehousing and data mining to derive business rules for decision support systems.
- CO2. Apply the knowledge gained from different patterns evaluated during data mining process.
- CO3. Apply the principles in web mining, text mining, and ethical aspects of data mining.
- CO4. Use data warehousing tools for building the data warehouse or data mart and perform ETL operations.
- CO5. Design multi-dimensional data models for data preprocessing and OLAP analysis.
- CO6. Use data mining tool(s) to build reliable products for end users.

UNIT I
Data Warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses. Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction – Transformation – Loading, Logical (Multi – Dimensional), Data Modeling, Schema Design, Star and Snow – Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi – Addictive, Non Addictive Measures; Fact Consultation, Fact Table, Fully Addictive, Semi – Addictive, Non Addictive Measures; Fact – Less – Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture – ROLAP, MOLAP and HOLAP.

UNIT II

Introducing to Data Mining: Introduction, what is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity – Basics.

UNIT III

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP - Growth Algorithms, Compact Representation of Frequent Item set- Maximal Frequent Item Set, Closed Frequent Item Sets.

UNIT IV

Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of classifiers, Classification Techniques, Decision Tree – Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naive Bayes Classifier, Bayesaian Belief Networks; K – Nearest neighbor classification – Algorithm and Characteristics.

UNIT V

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering - K-Means Algorithm, PAM Algorithm; Hierarchical Clustering – Agglomerative Methods and divisive methods, Outlier Detection.

TEXT BOOK(S)

1. Data Mining – Concepts and Techniques – Jiawei Han, Michelinen Kamber, Morgan Kaufmann Publishers, Elsevier, 3rd Edition, 2012.
2. Introduction to Data Mining, Pang – Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.

REFERENCE BOOK(S)

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Warehouse Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

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18CS3112 - INFORMATION RETRIEVAL SYSTEMS
(Professional Elective – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:
- **18CS2101: Advanced Data Structures**
- **18MA2102: Probability and Statistics**

Course Objectives:
Develop ability to
1. Study the different models for information storage and retrieval.
2. Learn about the various retrieval utilities.
3. Understand indexing and querying in information retrieval systems.
4. Interpret the various notions of structured and semi structured data.
5. Learn about web search and its retrieval methods.

Course Outcomes (COs):
After completion of the course, student would be able to
CO1. Design Information Retrieval system and its capabilities.
CO2. Organize different documents using cataloging and indexing algorithms.
CO3. Use the various indexing techniques to perform document retrieval.
CO4. Rank user search using relevance feedback methods.
CO5. Develop a multimedia Information Retrieval System for web document.

UNIT I
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

UNIT II
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT III
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

UNIT IV
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of

Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

UNIT V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.

TEXT BOOK(S)

1. Information Storage and Retrieval Systems – Theory and Implementation, Gerald J. Kowalski, Mark T.Maybury, 2nd Edition, Springer.

REFERENCE BOOK(S)

1. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza-Yates, Prentice Hall, 1992.
2. Information Storage and Retrieval, Robert Korfhage, John Wiley and Sons.
3. Modern Information Retrieval, Yates and Neto, Pearson Education
4. Introduction to Information Retrieval, Manning Christopher D, Raghavan Prabhakar, Hinrich Schutze, Cambridge University,2008.

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18CS3113 - DIGITAL IMAGE PROCESSING
(Professional Elective – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:
- **18MA2102 - Probability and Statistics**

Course Objectives:
Develop ability to
1. Understand the image fundamentals necessary for image processing.
2. Gain knowledge about image filtering techniques used in digital image processing.
3. Learn Image Segmentation process used in digital image processing.
4. Study the image compression procedures.
5. Differentiate various image transform technologies.

Course Outcomes (COs):
At the end of the course, the student would be able to
CO1. Review the fundamental concepts of a digital image processing system.
CO2. Analyze images in the spatial and frequency domain.
CO3. Interpret image segmentation techniques.
CO4. Categorize various compression techniques.
CO5. Identity and evaluate various image transform technologies.

UNIT I
Fundamental steps of image processing, components of an image processing of system, the image model and image acquisition, sampling and quantization, station ship between pixels, distance functions, scanner.

UNIT II
Statistical and spatial operations, Grey level transformations, histogram equalization, smoothing and sharpening-spatial filters, frequency domain filters, homomorphic filtering, image filtering and restoration. Inverse and wiener filtering, FIR wiener filter. Filtering using image transforms, smoothing splines and interpolation.

UNIT III
Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images. Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and laplace operators, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.

UNIT IV
Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel

coding, transfer coding theory, lossy and lossless predictive type coding. Basics of color image processing, pseudo color image processing, color transformation, color smoothing and sharpening, color segmentation, color image compression, compression standards.

UNIT V

Image Transforms - Fourier, DFT, DCT, DST, Haar, Hotelling, Karhunen -Loeve, Walsh, Hadamard, Slant. Representation and Description - Chain codes, Polygonal approximation, Signatures Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, PCA.

TEXT BOOK(S)

1. Digital Image Processing, Third Edition, Rafael.C.Gonzalez and Richard E.Woods, Pearson Education, 2008.
2. Fundamentals of Digital Image Processing, Anil.K. Jain, Pearson Education,2005.

REFERENCE BOOK(S)

1. Introduction to Digital Image Processing, William K.Pratt, CRC Press, 2014.
2. Digital Image Processing using MATLAB , Rafael.C.Gonzalez, Richard E.Woods, and Steven L.Eddins, Pearson Education, 2006.
3. Digital Image Processing, Kenneth R. Castleman, Pearson Education, 2007.

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18CS3114 - THEORY OF COMPUTATION
(Professional Elective – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:
- **18MA1101 - Mathematics-I**
- **18CS2103 - Discrete Mathematics**

Course Objectives:
Develop ability to
1. Understand mathematical methods of computing devices called abstract machines namely finite automata, pushdown automata and Turing machines.
2. Explain deterministic and non-deterministic machines.
3. Identify different formal language classes and their relationships.
4. Design grammars and recognizers for different formal languages.
5. Determine the decidability and intractability of computational problems and comprehend the hierarchy of problems arising in computer science.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1. Acquire a fundamental understanding of the core concepts in automata theory and formal languages and design abstract models of computing.
- CO2. Recognize grammars and automata for different language classes.
- CO3. Design Push down automata for solving computational problems and Turing Machines for arithmetic operations, illustrate various phases of compilation.
- CO4. Develop parsers and semantic analyzers without the aid of automatic generators.
- CO5. Illustrate techniques for code optimization and object code generation processes.

UNIT I
Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton (DFA) and non deterministic finite automaton (NFA), transition diagrams and Language recognizers.

Finite Automata: NFA to DFA conversion, minimization of FSM, equivalence between two FSM‟s, Finite Automata with output- Moore and Mealy machines.

UNIT II
Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions.
Context Free Grammars: Definition, Ambiguity in context free grammars, Simplification of Context Free Grammars. Chomsky normal form, Greibach normal form, Enumeration of properties of CFLs (proofs omitted), Chomsky's hierarchy of languages.

UNIT III

Push Down Automata: Push down automata, definition, model, acceptance of CFL, by final state and by empty store. Turing Machine : Turing Machine, definition, model, design of TM, counter machine, types of Turing machines (proofs not required).

Overview of Compilation: Phases of compilation-lexical analysis, regular grammar and regular expression for common programming language features, Pass and phases of translation, interpretation, bootstrapping, data structures in compilation.

UNIT IV

Top Down Parsing: Back Tracking, LL(1), Recursive Descent Parsing, Predictive Parsing, Pre-processing steps required for predictive parsing. Bottom Up Parsing: Shift Reduce Parsing, LR and LALR Parsing, Error Recovery in Parsing, Handling Ambiguous grammar.

Semantic Analysis: Intermediate forms of source programs-abstract syntax tree, polish notation and three address codes, conversion of popular programming languages language constructs into intermediate code forms.

UNIT V

Code Optimization: Consideration for optimization, scope of optimization, loop optimization, frequency reduction folding, DAG representation, reduction in strengths. Object Code Generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms.

TEXT BOOK(S)

1. Introduction to Automata Theory Languages and Computation, Third Edition JohnE.Hopcroft , Rajeev Motwani and Jeffery D.Ullman, Pearson Education, 2007.
2. Principles of Compiler Design, Alfred V.Aho, JeffreyD.Ullman, Pearson Education 1998.

REFERENCES BOOK(S)

1. Introduction to Theory of Computation , Second Edition, Michael Sipser, Cengage Learning, Thomson Course technology,2006.
2. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan Rama R, Pearson Education, 2009.
3. Introduction to Computer Theory, Second Edition Daniel I.A. Cohen, John Wiley,1997.
4. Theory of Computation: A Problem Solving Approach, First Edition, Kavi Mahesh, Wiley India Pvt. Ltd, 2012.
5. Theory of Computer Science – Automata languages and computation, Third Edition, K.L.P Mishra, N. Chandrashekaran, PHI,2012.

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18CE3121 – GLOBAL WARMING AND CLIMATE CHANGE
(OPEN ELECTIVE – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None.

Course objectives:
Develop ability to
1. Understand the importance of Ozone layer in the atmosphere.
2. Comprehend composition of atmosphere.
3. Understand impacts of climate change on ecosystem.
4. Understand initiatives taken by different countries to reduce emission of greenhouse gases.
5. Know measures to mitigate greenhouse gases.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1. Define greenhouse gases and their influence on global warming.
CO2. Explain physical and chemical characteristics of atmosphere and structure of atmosphere. .
CO3. Explain impacts of climate change on agriculture, forestry and ecosystem.
CO4. Explain initiatives taken by countries to reduce global warming.
CO5. Suggest mitigation measures taken to reduce global warming and climate change.

UNIT I
Earth's Climate System: Role of ozone in environment - Ozone layer – Ozone depleting gases – Green House Effect – Radioactive effects of Greenhouse gases – The Hydrological cycle – Green House Gases and Global Warming – Carbon Cycle.

UNIT II
Atmosphere and Its Components: Importance of Atmosphere – Physical and chemical characteristics of Atmosphere – Vertical structure of the atmosphere – Composition of the atmosphere – Atmospheric stability – Temperature profile of the atmosphere – Lapse rates – Temperature inversion – Effects of inversion on pollution dispersion.

UNIT III
Impacts of Climate change: Causes of Climate change: Changes of Temperature in the environment – Melting of ice pole – sea level rise – Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for different regions – Uncertainties in the projected impacts of Climate Change – Risk of Irreversible Changes.

UNIT IV

Observed changes and its Causes: Climate change and Carbon credits – CDM – Initiatives in India-Kyoto Protocol – Paris Convention - Intergovernmental Panel on Climate change – Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC – Global Climate Models (GCM) - Evidences of Changes in Climate and Environment- on a Global scale and in India.

UNIT V

Climate change and mitigation measures: Clean Development Mechanism – Carbon Trading – Examples of future clean technology – Biodiesel – Natural Compost – Eco-friendly plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding. Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry – Carbon sequestration – Carbon capture and storage (CCS) – Waste (MSW and Bio-waste, Biomedical, Industrial waste) – International and Regional cooperation.

TEXT BOOK(S)

1. Climate Change: An Indian Perspective (Environment and Development), Dr. Sushil Kumar Dash, Cambridge University Press India Pvt Ltd, 2007.
2. Adaptation and mitigation of climate change – Scientific Technical Analysis, Cambridge University Press, Cambridge, 2006.

REFERENCE BOOK(S)

1. Atmospheric Science, J.M. Wallace and P.V Hobbs, Elsevier/ Academic Press, 2006.
2. Climate Change and Climate Variability on Hydrological Regimes, Jan C. Van Dam, Cambridge University Press, 2003.
3. http://www.ipcc.ch/

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18EE3122 – INDUSTRIAL SAFETY AND HAZARDS
(OPEN ELECTIVE – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Determine responsibility for safety in the workplace.
2. Recognize workplace hazards.
3. Learn procedures to eliminate or lessen those hazards.
4. Apply basic Federal and State Safety Rules to the workplace.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1. Understand the fundamental concepts of accident prevention with a basic knowledge of safe work rules designed to promote an accident free workplace.
- CO2. Understand the relief systems.
- CO3. Understand the electrical hazards and safety handling of equipments.
- CO4. Understand the effects of momentum and buoyancy.
- CO5. Gain knowledge from different case studies.

UNIT I
Fire and explosion: Introduction-Industrial processes and hazards potential, mechanical electrical, thermal and process hazards, Safety and hazards regulations, Industrial hygiene, Factories Act, 1948 and Environment (Protection) Act, 1986 and rules thereof. Shock wave propagation, vapour cloud and boiling liquid expanding vapours explosion (VCE and BLEVE), mechanical and chemical explosion, multiphase reactions, transport effects and global rates.

UNIT II
Relief systems: Preventive and protective management from fires and explosion-inerting, static electricity passivation, ventilation, and sprinkling, proofing, relief systems –relief valves, flares, scrubbers.

UNIT III
Electrical hazards: Primary and secondary hazards-shocks, burns, scalds, falls-human safety in the use of electricity. Energy leakage-clearances and insulation-classes of insulation-voltage classifications excess energy-current surges-Safety in handling of war equipments-over current and short circuit current-heating effects of current-electromagnetic forces-corona effect-static electricity –definition, sources, hazardous conditions, control, electrical causes of fire and explosion-ionization, spark and arc-ignition energy-national electrical safety code ANSI, Lightning, hazards, lightning arrestor, installation– earthing, specifications, earth resistance, earth pit maintenance.

UNIT IV

Leaks and leakages: Spill and leakage of liquids, vapors, gases and their mixture from storage tanks and equipment; Estimation of leakage/spill rate through hole, pipes and vessel burst; Isothermal and adiabatic flows of gases, spillage and leakage of flashing liquids, pool evaporation and boiling; Release of toxics and dispersion, Naturally buoyant and dense gas dispersion models; Effects of momentum and buoyancy; Mitigation measures for leaks and releases.

UNIT V

Case studies: Flixborough, Bhopal, Texas, ONGC offshore, HPCL Vizag and Jaipur IOC oil-storage depot incident; Oil, natural gas, chlorine and ammonia storage and transportation hazards.

TEXT BOOK(S)

1. Electrical Safety Engineering, Fordham Cooper, W., Butterworth and Company, London, 1986.

REFERENCE BOOKS:

1. Chemical Process Safety: Fundamentals with Applications, Crowl D.A. and Louvar J.F., 2nd Ed., Prentice Hall.2001
2. Lee's Loss Prevention in the Process Industries, Mannan S., Vol.I, 3rdEd., Butterworth-Heinemann.2004.
3. Indian Electricity Act and Rules, Government of India.
4. Power Engineers –Handbook of TNEB, Chennai, 1989.
5. Electrostatic Hazards in powder handling, Martin Glov, Research Studies Pvt.LTd., England, 1988.

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18ME3123– NANOMATERIALS AND TECHNOLOGY
(OPEN ELECTIVE - I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites: None

Course Objectives:
Develop ability to
1. Expose the students to a highly interdisciplinary subject
2. Enable the students to understand the basic concepts of Nanotechnology
3. Enhance the knowledge of students in nanomaterials, properties and their applications

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

CO1. Identify nano materials by their superior characteristics
CO2. Demonstrate synthesis of zero dimensional nano structured materials.
CO3. Illustrate conducive methods to synthesize one dimensional nano structures
CO4. Compare and comprehend methods to produce two dimensional nano structures.
CO5. Comprehend synthesis of thin films and special nano materials

UNIT I
INTRODUCTION: Importance of Nano-technology, Emergence of Nano-Technology, Bottom-up and Top-down approaches, challenges in Nano Technology.

UNIT II
ZERO DIMENSIONAL NANO-STRUCTURES: Nano particles through homogenous nucleation; Growth of nuclei, synthesis of metallic Nano particles, Nano particles through heterogeneous nucleation; Fundamentals of heterogeneous nucleation and synthesis of nano particles using micro emulsions and Aerosol.

UNIT III
ONE DIMENSIONAL NANO-STRUCTURES: Nano wires and nano rods, Spontaneous growth: Evaporation and condensation growth, vapor-liquid-solid growth, stress induced re-crystallization.
Template based synthesis: Electrochemical deposition, Electro-phoretic deposition. Electro-spinning and Lithography

UNIT IV
TWO DIMENSIONAL NANO-STRUCTURES: Fundamentals of film growth. Physical vapour Deposition (PVD): Evaporation molecular beam epitaxy (MBE), Sputtering, Comparison of Evaporation and sputtering.
Chemical Vapour Deposition (CVD): Typical chemical reactions, Reaction kinetics, transportant phenomena, CVD methods, diamond films by CVD.

UNIT V

THIN FILMS: Atomic layer deposition (ALD), Electro-chemical deposition (ECD), Sol-Gel films.

Special Nano Materials: Carbon fullerence and nano tubes. Carbon fullerness: formation, properties and applications. Carbon nano tubes: formation and applications.

TEXT BOOK(S)

1. Nano structures and Nano materials: Synthesis, properties and applications, Guozhong Cao, Imperial College press in 2004, 2nd edition.
2. Nanotechnology, Rechard Booker and Earl Boysen, Willey, 2006.

REFERENCE BOOK(S)

1. Nano: The Essentials; T. Pradeep, Tata McGraw-Hill, 2008.
2. Nanotechnology and Nano electronics, W.R. Fahrner, Springer, 2006.

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18EC3124 – ELECTRONIC MEASURING INSTRUMENTS (OPEN ELECTIVE - I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite: None

Note: No detailed mathematical treatment is required for this course.

Course Objectives:
Develop ability to
1. It provides an understanding of various measuring systems functioning and metrics for performance analysis.
2. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes (COs):
At the end of this course, the student would be able to
- CO1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
- CO2: Measure various physical parameters by appropriately selecting the transducers.
- CO3: Use various types of signal generators, signal analyzers for generating and analyzing various real time signals.

UNIT I
Block Schematics of Measuring Systems and Performance Metrics: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag.

UNIT II
Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications.

UNIT III
Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments. CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes.

UNIT IV

Recorders: X-Y Plotter, Curve tracer, Galvanometric Recorders, Servo transducers, pen driving mechanisms, Magnetic Recording, Magnetic recording techniques.

UNIT V

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

TEXT BOOK(S)

1. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.
2. Electronic Instrumentation: H.S.Kalsi – TMH, 2nd Edition 2004.

REFERENCE BOOK(S)

1. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI 5th Edition 2003.
3. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

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18MB3126 - INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE – I)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites: None

Course objectives:
Develop ability to
1. Understand the various concepts, importance and types of intellectual property rights.
2. Discuss the purpose of trademarks.
3. Analyze the fundamental laws of copy rights and patents.
4. Understand trade secret laws, trade secret litigation and unfair completion.
5. Understand the latest developments in IPR.

Course outcomes (COs):
At the end of the course, student would be able to
- CO1: Acquire knowledge on intellectual property rights
- CO2: Track the regulation process of trademark. Discuss the functions of trademark.
- CO3: Identify the importance of copyrights, patents searching process and transfer of Ownership
- CO4: Know about secret laws, unfair competition, false advertising.
- CO5: Reciprocate to new developments of intellectual property rights.

UNIT I
Introduction to Intellectual property: Concepts, types of intellectual property, international organizations, agencies and treaties, and importance of intellectual property rights.

UNIT II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT III
Law of Copy Rights: Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right laws.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT IV
Trade Secrets: Trade secrete law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. Unfair competition- misappropriation right of publicity, false advertising.

UNIT V

Latest development of intellectual property Rights: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOK(S)

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc Graw Hill Publishing Company Ltd.
3. Intellectual property: patents, copyright, trademarks and allied rights, Cornish, William Rodolph and Llewelyn, David. Sweet and Maxwell, 8/e, 2013.

REFERENCE BOOK(S)

1. Cases and materials on intellectual property, Cornish, William Rodolph, Sweet and Maxwell, 5/e, 2006.
2. How to make patent drawings: a patent it yourself companion, Lo, Jack and Pressman, David. Nolo, 5/e 2007.

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18CS31L4 - WEB TECHNOLOGIES LAB

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):

- **18CS11L1: Programming for Problem Solving Lab**
- **18CS21L3: Object Oriented Programming Java Lab**
- **18CS22L3: Database Management Systems Lab**

Course objectives:

Develop ability to

1. Understand the basic web concepts and Internet protocols
2. Acquire knowledge in XML and processing of XML data
3. Introduce client side scripting with JavaScript and DHTML
4. Understand server side programming with Java Servlets and JSP
5. Implement server side programming with PHP

Course outcomes (COs):

At the end of the course, student would be able to

CO1: Create dynamic and interactive web sites
CO2: Write and execute client side scripts using JavaScript and DHTML.
CO3: Write, parse and execute XML schemas.
CO4: Implement, deploy and execute server side programs and components using Java Servlets and JSP.
CO5: Implement, deploy and execute server side programs and components using PHP.

List of Lab Exercises

S.No.	Name of the program
Week 1	Write a HTML page including any required java script that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. if the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.
Week 2	Write a HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
Week 3	Write a HTML page that contains a selection box with a list of 5 countries. When user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of capital (color, bold, and font size).
Week 4	Write a XML file which will display the Book information which includes the following: Title of the book, Author Name, ISBN number, Publisher name, Edition, Price i. Write a Document Type Definition (DTD) to validate the above XML file. ii. Write a XSD to validate the above XML file.
Week 5	Create a XML document that contains 10 users information. Write a java

	Program, which takes User Id as input and returns the user details by taking the user information from XML document using (a) DOM Parser and (b) SAX parser.
Week 6	Create a Book Store Using JSON with JavaScript code all in one html file.
Week 7	Implement Unobtrusive CSS rules in jQuery.
Week 8	a. Write a Servlet for User validation web application, where the user submits a login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user. b. Modify the above Program to an xml file instead of database.
Week 9	a. Write a Servlet for a simple calculator web application that takes two numbers and an operator (+,-,/,*,%) from an HTML page and returns the result page with the operation performed on the operands. b. Write a Servlet for web application that lists all cookies stored in the browser on clicking "List Cookies" button. Ass cookies if necessary.
Week 10	a. Write JSP for User validation web application, where the user submits a login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user. b. Write JSP for a simple calculator web application that takes two numbers and an operator (+,-,/,*,%) from an HTML page and returns the result page with the operation performed on the operands.
Week 11	a. Write JSP for a web application that lists all cookies stored in the browser on clicking "List Cookies" button. Ass cookies if necessary. b. Write JSP for a web application that takes name and age from an HTML page. If the age is less than 18, it should be send a page with "Hello <name >, you are not authorized to visit this site" message, where < name> should be replaced with the entered name. Otherwise it should send "Welcome <name> to this site" message.
Week 12	a. Write PHP code for user validation web application, where the user submits a login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user. b. Write PHP code for a simple calculator web application that takes two numbers and an operator (+,-,/,*,%) from an HTML page and returns the result page with the operation performed on the operands.
Week 13	Write PHP Code Validate the following fields of registration page. i. Name (it should contains alphabets and length at least 6 characters) ii. Password(it should not be less than 6 characters) iii. Email id (it should not contains any invalid character must follow the standard pattern name@domain.com) iv. Phone number (it should contain 10 digits only)
Week 14	A web application for implementation using PHP.

	The user is first served login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions If name and password match serves a welcome page with user's full name If name matches and password doesn't match, then server 'password mismatch' page If name is not found in the full name, it stores, the login name, password and full name in the database.(hint: Use session for storing the submitted login name and password)

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18CS31L2 – COMPUTER NETWORKS LAB

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):

- **18CS11L1 - Programming for Problem Solving Lab**
- **18CS21L3 - Object Oriented Programming JAVA Lab**

Course Objectives:

Develop ability to

1. Develop an understanding of modern network architectures from a design and performance perspective.
2. Understand the protocols of data link layer and MAC sub layer and apply different techniques of error detection and error correction.
3. Distinguish and explain different network layer protocols and routing algorithms.
4. Describe the functions of TCP and UDP protocols.
5. Illustrate the application layer protocols such as HTTP, FTP, SMTP, DNS and TELNET.

Course Outcomes (COs):

After completion of the course, student would be able to

CO1: Identify the different types of network topologies, protocols and explain the layers of the OSI and TCP/IP model.

CO2: Design a wide area networks (WANs), local area networks (LANs) and wireless LANs (WLANs) for a given requirement (small scale) based on the market available components and describe the protocols of data link layer and MAC Sub layer.

CO3: Classify and compare the major routing protocols and congestion control algorithms.

CO4: Develop a program for a given problem related to TCP/IP and UDP protocols using network programming.

CO5: Analyze the application layer protocols using open source available software and tools.

List of Exercises:

Week 1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using Crimping tool.

Week 2. Study of different Network devices, IP in details.

Week 3. Connect the computers in LAN, Study of basic network commands and network configuration commands.

Week 4. Study of Network simulator tool and implement IP Address configuration in Network simulator tool.

Week 5. a. Configure different network topologies using CISCO packet tracer Tool.
b. Analyze the data packets Flow using Wireshark Tool.

Week 6.

a. Write a program to implement the Data link layer framing methods such as character stuffing and bit stuffing.
b. Write a program to simulate Stop and wait protocol and Sliding Window Protocols.

Week 7. Write a program to implement on a data set of characters using the three Cyclic Redundancy Check Polynomials – CRC 12, CRC 16 and CRC-CCIP.

Week 8. Write a program to simulate Carrier Sense Multiple Access/Collision Detection (CSMA/CD) and Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA).

Week 9. Configure a network using Distance Vector Routing protocol and Link State Routing protocol using packet tracer tool.

Week 10. Implement Dijkstra's algorithm to compute the shortest path through a graph.

Week 11.

a. Write a program to implement Client - Server communication for chat using Transmission Control Protocol (TCP).
b. Using TCP/IP sockets, write a client - server program to make client sending the file name and the server to send back the contents of the requested file if present.

Week 12. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client. characterize file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.

Week 13. Install Telnet on one of the systems connected by a switch and telnet to it from the other system. Using Wireshark tool, capture the packets and analyze the TCP 3-way Handshake for connection establishment and tear down.

Week 14. Using RSA Algorithm Encrypt a Text data and Decrypt the same.

Week 15. Develop a program to implement Ceasar/ Substitution/ Hill cipher techniques.

Software's used:

- C/ Java/ Equivalent compiler
- Network Simulator like CISCO Packet tracer tool/Wireshark tool

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18CS31L3 – ARTIFICIAL INTELLIGENCE LAB

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):

- The Student has basic knowledge about Artificial Intelligence and Python programming.
- He/she should be aware about basic terminologies used in AI along with some useful python packages like OpenCV, pandas, OpenAI Gym, etc.

Course Objectives:

Develop ability to

1. Learn the difference between optimal reasoning and human like reasoning.
2. Know about basic concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
3. Obtain a thorough knowledge of various knowledge representation techniques.
4. Study about various reasoning techniques.
5. Know about various applications of AI, namely game playing, theorem proving, expert systems, machine learning and natural language processing

Course Outcomes (COs):

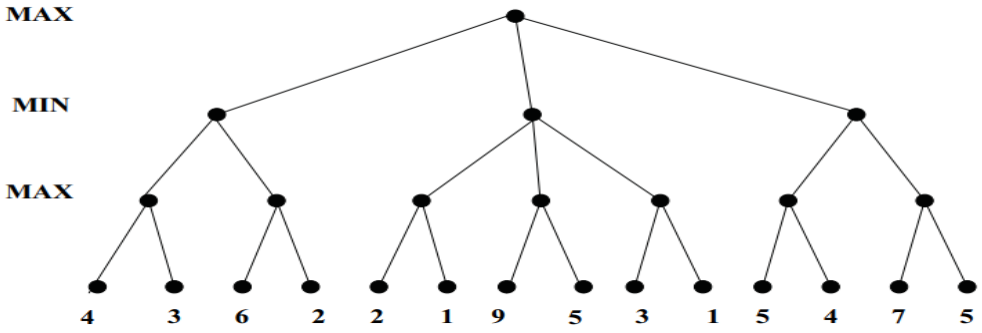
At the end of the course, student would be able to

CO1: Formulate an efficient problem space for a given problem.
CO2: Identify a suitable search algorithm to search the solution of a problem in view of its characteristics namely time and space complexities.
CO3: Represent the knowledge of the given problem domain using rules and appropriate knowledge representation technique.
CO4: Exploring AI techniques for solving problems with Reasoning and Uncertain models.
CO5: Possess the skill to apply AI techniques to solve problems of Game playing, Expert systems, Machine learning and natural language processing.

List of experiments:

Week 1: Introduction about Python
Week 2:
(a). Write a python program to print the multiplication table for the given number.
(b). Write a python program to check whether the given number is prime or not.
(c). Write a python program to find factorial of the given number.
Week 3: Write a python program to implement Breadth First Search Traversal.
Week 4: Write a program to implement Tic-Tac-Toe game using python.
Week 5: Write a python code to implement Water Jug Problem.
Week 6: Solve 8-puzzle problem using best first search.
Week 7: Write a python program to implement depth first search.
Week 8: Solve travelling salesman problem.
Week 9: Write a python program for Text classification of a sentence using NLTK.

Week10: Write a prolog code for min max algorithm using alpha-beta pruning by considering the following example.



Week11: Write a prolog code to find a shortest path using A* algorithm.

REFERENCES BOOK(S)

1. Artificial Intelligence, Elian Rich and Kevin Knight,1991,TMH.
2. Open a Web browser and go to https://www.python.org/downloads/.

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18MC3102– INDIAN CONSTITUTION
(MANDATORY COURSE)

III Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	-

Pre-requisites: None

Course Objectives:
Develop ability to

1. Understand the need for a constitution
2. Appreciate the fundamental duties and rights of the citizens of India
3. Explain the role of constitution in a democratic society
4. Describe the Directive Principles of State Policy and their significance
5. List the key features of the constitution, Union Government, and State Governments.

Course Outcomes (COs):
At the end of the course, the student would be able to

CO1: Create awareness about the constitutional values and objectives written in the Indian Constitution.
CO2: List the fundamental rights and fundamental duties of Indian citizens.
CO3: Identify the division of legislative, executive and financial powers between the union and the state governments.
CO4: Understand the working of Indian democracy, its institutions and processes at the local, state and union levels.
CO5: Explain the functions and responsibilities of Election commission of India and Union Public Service Commission.

UNIT I
INTRODUCTION TO INDIAN CONSTITUTION
Meaning of the term Constitution, Preamble of the Constitution, Constituent Assembly, The Salient Features of Indian Constitution

UNIT II
FUNDAMENTAL RIGHTS OF CITIZEN
Fundamental Rights of citizen, Fundamental Duties of citizen, The Directive Principles of State Policy.

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

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

UNIT V
LOCAL SELF GOVERNMENT
Election Commission of India (with Powers and Functions) , The Union Public Service Commission (with Powers and Functions)

TEXT BOOK(S)
1. The Constitution of India, P.M. Bakshi, Universal Law Publishing Co.,
2. Introduction to the Constitution of India, Dr. Durga Das Basu, LexisNexis Publishers, NCERT, Indian Constitution at work.

REFERENCE BOOK(S)
1. Constitution of India, M. Laxmikanth, Cengage Publications.
2. The Indian Constitution, Granville Austin, Oxford India Paperback Edition.

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18CS3213 – INTERNET OF THINGS

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:

- **18CS1101-Programming for Problem Solving**
- **18CS3102- Computer Networks**

Course Objectives:

Develop ability to

1. Assess the vision and introduction of IoT and understanding how M2M is connected to internet of things
2. Identify the appropriate Hardware and software components of IoT for communication
3. Gain knowledge on Cloud Storage models, web servers and how to integrate device, data and cloud management framework for IoT.
4. Learn the concepts of various data analytics and operational technology security with IoT.
5. Understand advanced and emerging concepts fog computing and Edge computing-IoT

Course Outcomes (COs):

After completion of the course, student would be able to

CO1: Interpret the vision of IoT from a global context, compare and contrast M2M and IoT Technology
CO2: Relate the appropriate Hardware and software components of IoT for providing the communication among the devices
CO3: Implement device, data and cloud management services for IoT applications.
CO4: Explore various data analytical techniques and operational security for IoT applications.
CO5: Comprehend the need of Fog Computing and Edge Computing-IoT

UNIT I

Introduction to Internet of Things: Definition and Characteristics of IoT, Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNIT II

Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces.

Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT III

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT

IoT Application Development : Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices

UNIT IV

Data and Analytics for IoT: Introduction to Big Data Analytical Tools for IoT, Data Analytics for IoT, Edge Streaming Analytics, Network Analytics, Machine Learning for IoT

Securing IoT: Introduction to OT (Operational Technology) security, a brief history and common challenges in OT (Operational Technology) Security.

UNIT V

Introduction To Fog Computing: Fog Computing-Definition-Characteristics-Application Scenarios -Issues -Fog Computing and Internet of Things-Pros and Cons-Myths of Fog Computing -Need and Reasons for Fog Computing Fog Computing and Edge Computing-IoT

TEXT BOOK(S)

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015.

REFERENCES BOOK(S)

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases, Pethuru Raj and Anupama C. Raman, CRC Press
2. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.
3. Getting Started with the Internet of Things, Cuno Pfister, O'Reilly Media.

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18CS3202 – SOFTWARE ENGINEERING

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand the basis of software development process.
2. Design the requirements of the customer.
3. Elaborate the design process of software development.
4. Identify various project and process metrics.
5. Apply software testing and its importance in assuring quality.

Course Outcomes (COs):
At the end of this course, student would be able to
CO1: Identify various software process models and its techniques.
CO2: Analyze the requirements and specifications of the project.
CO3: Design software architecture and its process.
CO4: Evaluate the project using process and project metrics.
CO5: Confirm the quality of the software through testing.

UNIT I
INTRODUCTION
Evolving role of software – Generic view of process-Software engineering a layered technology -Process framework – CMMI - Process models –perspective models, waterfall model, Incremental process models, evolutionary process models, unified process models, specialized process models, Agile modeling. Software engineering ethics.

UNIT II
REQUIREMENTS ANALYSIS
Requirements engineering tasks – Eliciting requirements-Building an analysis model-functional and non functional requirements analysis –Analysis modeling approaches-Data modeling concepts-Flow oriented modeling-class based modeling.

UNIT III
SOFTWARE DESIGN
Design concepts – Design model - Software architecture - Architectural design –mapping data flow in to software architecture – Modeling component level design – performing user interface design – Golden rules of user interface – Interface design steps.

UNIT IV
MANGING THE SOFTWARE PROJECTS
Project management- Process and Project Metrics – Software estimation - Empirical estimation models- Risk analysis – RMMM plan - Software project scheduling, control and monitoring–- Software Configuration Management.

UNIT V

SOFTWARE TESTING AND QUALITY

Strategic issues – Software testing fundamentals – Levels of testing – Art of debugging-Black and White box testing and their techniques – Basis path testing – Control Structures testing – OO testing–SQA-Quality metrics-Software Reliability-Software reliability–Quality models-Software maintenance-CASE tools.

TEXT BOOK(S)

1. Software Engineering, A Practitioner's Approach – Roger S. Pressman, Seventh Edition, McGraw Hill International Edition.

REFERENCE BOOK(S)

1. Software Engineering, Ian Sommerville, 7th edition, Pearson Education.
2. Software Engineering, an Engineering approach-James F Peters,Witeld Pedryez, John Wiely.
3. Software Testing Techniques, Boris Beizer, Second edition, dreamtech Press.
4. Software Engineering, A Practitioner's Approach – Roger S. Pressman, Bruce Maxim,8th Edition, McGraw Hill International Edition.

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18CS3214 - SCRIPTING LANGUAGES
(Professional Elective-II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- **18CS1101: Programming for Problem Solving**

Course Objectives:
Develop ability to
1. Understand the concepts of scripting languages for developing Web Scripting.
2. Illustrates object oriented concepts of PERL.
3. Create database connections using PHP and build the website for the world.
4. Analyze the internet ware application, security issues and frame works for application.
5. Understanding of python especially the object oriented concepts.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Apply the concepts of scripting languages for developing Web Scripting.
CO2: Explain the object oriented concepts of PERL.
CO3: Illustrate the PHP Authentication and Methodologies
CO4: Examine the internet ware application, security issues and frame works for application.
CO5: Explain the python object oriented concepts.

UNIT I
Introduction to Scripting: Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages.

UNIT II
Introduction to PERL - Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines. **Advanced PERL:** Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT III
PHP Basics : PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.
Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, Building Web sites for the World.

UNIT IV

TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files **Advance TCL:** Eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. **Tk** - Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

UNIT V

Python: Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. **Integrated Web Applications in Python**- Building Small, Efficient Python Web Systems, Web Application Framework.

TEXT BOOK(S)

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Beginning PHP and MySQL, Fourth Edition, W Jason Gilmore, Apress Publications (Dream tech.).
3. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.

REFERENCE BOOK(S)

1. Perl Power, John Flynt, Cengage Learning.
2. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
3. PHP and MySQL by Example, E.Quigley, Prentice HalI(Pearson).
4. Tcl and the Tk Tool kit, John K Ousterhout, Ken Jones,Pearson Education,2010.
5. Programming Python, Mark Lutz,4th Edition, O'Reilly Media,2010.

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18IT3201 - DISTRIBUTED COMPUTING
(Professional Elective-II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites(s):
- **18CS2205 : Operating Systems**

Course Objectives
Develop ability to
1. Understand the major tools and techniques that allow programmers to effectively program the parts of the code that require substantial communication and synchronization.
2. To study the core ideas behind modern coordination paradigms and concurrent data structures.
3. To introduce a variety of methodologies and approaches for reasoning about concurrent programs.
4. To realize not only the basic principles but also the best practice engineering techniques of concurrent computing.
5. To understand the architecture and components of the file system.

Course Outcomes:
At the end of the course, the student would be able to
CO1: Identify techniques to formally prove correctness of multiprocessor programs;
CO2: Present techniques to formally study the progress properties of concurrent algorithms
CO3: Analyze the performance of multiprocessor algorithms;
CO4: Identify limitations and impossibility results which express where the effort should not be put in solving a task
CO5: Analyze the File Service Components and various distributed file systems.

UNIT 1
Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Issues in Distributes Operating Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's and vectors logical clocks, Causal ordering of messages, global state, termination detection. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

UNIT II
Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection and resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Agreement Protocols: Introduction, System models, classification of Agreement Problem-Interactive consistency Problem, Applications of Agreement algorithms.

UNIT III

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

UNIT IV

Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Distributed shared memory – Design and Implementation issues, consistency models, CORBA Case Study: CORBA RMI, CORBA services.

UNIT V

File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

TEXT BOOK(S)

1. "Advanced Concepts in Operating Systems", by Mukesh Singhal and Niranjan G Shivaratri, Tata McGraw Hill(2017).
2. “Distributed System: Concepts and Design”, by George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, 5th Edition, Pearson Education,2011.

REFERENCE BOOKS(S)

1. Tanenbaum S , “Distributed Operating Systems”, Pearson Education,2005.
2. P K Sinha, "Distributed System: Concepts and Design”, PHI,2004.

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18IT3202 - CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective-II)

III Year B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- **18MA1101 - Mathematics I**
- **18CS2103 - Discrete Mathematics**
- **18CS3102 - Computer Networks**

Course Objectives:
Develop ability to
1. Describe the importance and applications of information security aspects, namely, confidentiality, integrity, authentication and availability.
2. Understand various cryptographic algorithms.
3. Interpret public-key cryptosystems and its Applications.
4. Discuss enhancements made to Ipv4 by IPSec and key management in PGP,
5. Summarize Web security, Intrusion Detection Techniques and Firewalls.

Course Outcomes (COs):
At the end of the course, the student should be able to:
- CO1: Classify information security aspects, namely, security attacks, services and mechanisms.
- CO2: Apply symmetric and asymmetric key cryptographic algorithms.
- CO3: Estimate the strength and weakness of authentication algorithms and services.
- CO4: Analyze email security and IP Security mechanisms.
- CO5: Evaluate the performance of SSL protocol and functions of Firewalls.

UNIT I
Attacks on Computers and Computer Security: Introduction, The need of Security, Security approaches, Principles of Security, Types of Security Attacks, Security Services, Security Mechanisms, A model for Network Security.
Cryptography: Concepts and Techniques: Introduction, Plain text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Cryptography, Steganography, Key Range and Key Size, Possible types of Attacks.

UNIT II
Symmetric Key Ciphers: Block Cipher Principles and Algorithms (DES, AES), Concepts of Differential and Linear Cryptanalysis, Block Cipher Modes of Operations, Stream Ciphers, RC4, Location and Placement of encryption function, Key Distribution.
Introduction to Number Theory: Prime numbers, Fermat's and Euler's Theorems, Chinese Remainder Theorem, Discrete Logarithms.
Asymmetric Key Ciphers: Principles of Public Key Cryptosystems, Algorithms (RSA, Diffie-Hellman, Concept of ECC), Key Distribution.

UNIT III

Message Authentication Algorithms and Hash Function: Authentication Requirements, Functions, Message Authentication Codes, Hash Functions: SHA-512 Algorithm, Whirlpool, HMAC, CMAC, Digital Signatures: Elgammal, Schnorr, NIST, Knapsack Algorithm.

Authentication Applications: Kerberos, X.509 Authentication Services, Public-Key Infrastructure.

UNIT IV

Email Privacy: Pretty Good Privacy (PGP). **IP Security:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT V

Web Security: Web Security Considerations, Socket Layer (SSL), Secure Electronic Transaction (SET).

Intruders, Malware and Firewalls: Intruders, Intrusion Detection, Password Management, Malware: Viruses, Worms, Trojan Horses, and DDoS Attacks. Firewall Design Principles, Types of Firewalls.

TEXT BOOK(S)

1. Cryptography and Network Security, Third Edition Atul Kahate, McGraw Hill Education Private Limited, 2013,(Unit-I).
2. Cryptography and Network Security Principles and Practice, Seventh Edition, William Stallings, Pearson Education, 2017, (Unit-II, III, IV and V).

REFERENCE BOOK(S)

1. Cryptography and Network Security, First Edition C K Shyamala, N Harini, Dr. T R Padmanabhan, Wiley India, 2011.
2. Information Security, Principles and Practice, Second Edition, Mark Stamp, Wiley India,2011 .
3. Principles of Computer Security, Fifth Edition, WM. Arthur Conklin, Greg White, TMH, 2018.
4. Introduction to Network Security, First Edition, Neal Krawetz, CENGAGE Learning, 2007.
5. Network Security and Cryptography, First Edition, Bernard Menezes, CENGAGE Learning, 2010.

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Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

18CS3215 - NATURAL LANGUAGE PROCESSING (PROFESSIONAL ELECTIVE-II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Pre-requisite(s):
- **18CS1201 : Data Structures**
- **I8CS3112 : Information Retrieval Systems**

Course Objectives:
Develop ability to
1. Understand the Structure of Words and Structure of Document.
2. Learn different Parsing Algorithms and Models for Ambiguity Resolution in Parsing.
3. Understand encoding ambiguity in the Logical form, verbs and states in Logical form.
4. Explain Predicate Structure and Discourse Processing.
5. Design different language modeling Techniques.

Course Outcomes (COs):
At the end of the course, the student should be able to:
CO1: Describe Structure of Words and Structure of Documents with Performances.
CO2: Analyze different Parsing Algorithms and Models for Ambiguity Resolution in Parsing.
CO3: Explain encoding ambiguity in the Logical form, verbs and states in Logical form.
CO4: Observe Predicate Structure and Discourse Processing.
CO5: Apply and design different language modeling Techniques.

UNIT I
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models **Finding the Structure of Documents:** Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNIT II
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT III
Semantic and Logical Form: Semantics and logical form, word senses and ambiguity, the basic logical formal language, encoding ambiguity in the logical form, verbs and states in logical form, thematic roles, speech acts and embedded sentences and defining semantics structure model theory.

UNIT IV
Predicate- Argument Structure, Meaning Representation Systems. **Discourse Processing:** Cohesion, Reference Resolution, Discourse Cohesion and Structure.

UNIT V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

TEXT BOOK(S)

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary, Oxford Higher Education.

REFERENCES BOOK(S)

1. Speech and Language Processing - Daniel Jurafsky and James H Martin, Pearson Publications.

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18EC3209 SPEECH AND VIDEO PROCESSING
(Professional Elective – III)

III Year. B.Tech. (IT) – IISem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- NONE

Course Objectives:
Develop ability to
1. Understand the anatomy and Physiology of Speech Production system and perception model
2. To study the parameters of the speech in time domain such as energy, zero crossing, pitch period etc. and to discriminate speech vs silence.
3. To provide analysis of speech using LPC parameters ,the concept of homomorphic system ,enhancement of speech and Speech Recognition.
4. Understand the representation of video signal formation models
5. Understand the principles and methods of motion estimation, video enhancement, segmentation and compression

Course Outcomes (COs):
At the end of the course, the student would be able to
- CO1: Explain the speech production mechanism and peripheral auditory system.
- CO2: Represent the speech signal in time domain and extract features of speech signals such as energy, zero crossing, pitch period etc.
- CO3: Extract the LPC coefficients that can be used to synthesize or compress the speech ,
- CO4: Design Homomorphic Vocoder and recognize speech
- CO5: Apply various formation models for video.
- CO6: Apply different estimation methods for video motion, video enhancement, segmentation and compression

UNIT I
Fundamentals of Digital Speech Processing: Anatomy and Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals. **Perception**: Anatomical pathways from the Ear to the Perception of Sound, The Peripheral Auditory system, Hair Cell and Auditory Nerve Functions, Properties of the Auditory Nerve. Block schematics of the Peripheral Auditory system.

UNIT II
Time Domain Models for Speech Processing: Introduction-Time-Dependent Processing of speech, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time

average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT III

Linear Predictive Coding (LPC) Analysis: Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

Homomorphic Speech Processing: Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

UNIT IV

Speech preprocessing and its applications:

Speech Enhancement:

Speech enhancement techniques: Single Microphone Approach, Spectral Subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi Microphone Approach.

Automatic Speech Recognition: Basic pattern recognition approaches, parametric representation of Speech, Evaluating the similarity of Speech patterns, Isolated digit Recognition System, Continuous word Recognition system. Elements of HMM, Training and Testing of Speech using HMM.

UNIT V

Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, filtering operations in cameras and display devices.

2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Application of motion estimation in Video coding. Introduction to video enhancement, segmentation and compression**.**

TEXT BOOK(S)

1. Digital Processing of Speech Signals, Lawrence R.Rabiner and Ronald W.Schafer, Pearson.
2. Discrete Time Speech Signal Processing: Principles and Practice, Thomas F. Quateri, 1st Ed., PE.
3. Video Processing and Communication, Yao Wang, Joem Ostermann and Ya–quin Zhang, 1st Edition, PH Int.

REFERENCE BOOK(S)

1. Speech and Audio Signal Processing, Ben Gold and Nelson Morgan, 1stEd.,Wiley
2. Digital Audio Signal Processing, Udo Zolzer, 2nd Edition, Wiley.
3. Digital Video Processing, M. Tekalp, Prentice Hall International

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18CS3216 MOBILE APPLICATION DEVELOPMENT (PROFESSIONAL ELECTIVE-III)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:
- 18CS3111 : Web Technologies.

Course Objectives:
Develop ability to
1. Understand the architecture of mobile software and mobile development frame works.
2. Use XML and UML for mobile computing.
3. Understand various technologies related to generic user interface development, mobile GUI's, VUIs and their applications.
4. Explain the process of modeling multichannel and multimodal user interfaces using UML.
5. Understand the mobile application development hurdles with proper selection of architecture, design and technology in mobile application development process.

Course Outcomes:
At the end of the course, the student would be able to
- CO1: Describe the architecture of mobile software application and work with mobile development frameworks and tools.
- CO2: Apply the concept of XML and UML for Mobile computing architectures.
- CO3: Identify various technologies related to generic user interface development, mobile GUI's and their applications.
- CO4: State the process of modeling multichannel and multimodal user interfaces using UML and VUI's.
- CO5: Identify and overcome mobile application development hurdles with proper selection of architecture, design and technology in mobile application development process.

UNIT I
Mobile Computing- Introduction, Added Dimensions of Mobile Computing, Condition of the Mobile User, Architecture of Mobile Software Applications.
Mobile Development Frameworks and Tools: Introduction, Fully Centralized Frameworks and Tools, N-Tier Client–Server Frameworks and Tools, Publishing Frameworks

UNIT II
XML: Introduction, XML Web Services, Key XML Technologies for Mobile Computing, XML and UML, Examples. **UML**: Introduction, User View, Structural View, Behavioral View, Implementation View- Component Diagrams

UNIT III
Generic User Interface Development: Introduction, User Interface Development, Building, Generic User Interfaces, Using UML for Modeling Generic User Interface, Components,

XForms. **Developing Mobile GUIs**: Introduction, Platforms for Mobile GUIs: WAP, J2ME, BREW, and Microsoft.

UNIT IV

VUIs and Mobile Application: Introduction, Qualities of Speech, Voice Transcription, Voice Recognition, Text-to-Speech Technologies: Converting Written Language to Spoken Language.

Multichannel and Multimodal User Interfaces: Introduction, Modeling Multichannel and Multimodal Applications with UML, Multimodal Content, Software and System Architectures for Delivering Multimodality, Internationalization and Localization, The Evolving Definition of Multimodality.

UNIT V

The Mobile Development Process: Introduction, Dimensions of Mobility, UML-Based Development Cycle for Mobile Applications.

Architecture, Design, and Technology Selection for Mobile Applications: Introduction, Practical Concerns with Architectures, Architectural Patterns for Mobile Applications.

TEXT BOOK(S)

1. Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Reza B'Far, Cambridge University Press, 2005.

REFERENCE BOOK(S)

1. Professional Mobile Application Development, Jeff McWherter, Scott Gowell, John Wiley and Sons, Inc, 2012.

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18IT3203 -DESIGN PATTERNS
(Professional Elective-III)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites

- **18CS2102: Object Oriented Programming Using Java**

Course Objectives:

1. Uunderstand the idea behind Design Patterns in handling common problems faced during building an application.
2. Design a Document Editor, Embellishing the User Interface supporting multiple window systems
3. Understand different object creation mechanisms, trying to create objects in a manner suitable to the situation
4. Ease the design by identifying a simple way to realize relationships among entities.
5. Identify common communication patterns among objects.

Course Outcomes:

CO1: Create software designs that are scalable and easily maintainable
CO2: Understand the best use of Object Oriented concepts for creating truly OOP programs
CO3: Use creational design patterns in software design for class instantiation
CO4: Use structural design patterns for better class and object composition
CO5: Use behavioral patterns for better organization and communication between the objects

UNIT I

Introduction: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT II

Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation

UNIT III

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT IV

Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

UNIT V

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

TEXT BOOK:

1. Design Patterns: Elements Of Reusable Object Oriented Software by Erich Gamma, Richard Helm, Ralph Johnson and John Vlissidess, Pearson India, 2015

REFERENCE BOOKS:

1. Pattern's in Java, Vol –I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

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18CS3219 OPTIMIZATION TECHNIQUES
(Professional Elective-III)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:
- **18CS1101: Programming for Problem Solving**
- **18CS2102: Object Oriented Programming using Java**
- **18MA2102: Probability and Statistics**

Course Objectives:
Develop ability to
1. Interpret various classical optimization techniques.
2. Apply the basics of linear programming on real time scenarios.
3. Build an Understanding on the basis of optimization techniques.
4. Classify the Characteristics a constrained problem.
5. Generalize the concept of Dynamic programming and its applications to project implementation.

Course Outcomes:
After completion of this course, the student will be able to
CO1: Determine the Need of Optimization for Engineering Systems.
CO2: Get the skill to apply Optimization techniques to address the real time problems.
CO3: Summarize the Unconstrained Optimization techniques
CO4: Apply Constrained Non-Linear Programming for Optimization problems
CO5: Illustrate dynamic programming for Optimization

UNIT I
Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – Multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT II
Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm. Transportation Problem: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT III

Unconstrained Nonlinear Programming: One dimensional minimization methods, Classification, Fibonacci method and Quadratic interpolation method. Unconstrained Optimization Techniques: Univariant method, Powell's method and steepest descent method.

UNIT IV

Constrained Nonlinear Programming: Characteristics of a constrained problem – classification – Basic approach of Penalty Function method – Basic approach of Penalty Function method – Basic approaches of Interior and Exterior penalty function methods – Introduction to convex programming problem.

UNIT V

Dynamic Programming: Dynamic programming multistage decision processes – types-concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution – examples illustrating the tabular method of solution.

TEXT BOOK(S)

1. Engineering Optimization: Theory and Practice by John Wiley and Sons by Singiresu S. Rao, 4th edition, 2009. (Unit I to Unit V)
2. Introductory Operations Research, Springer (India), Pvt. Ltd., 2004 by H. S. Kasene and K. D. Kumar.(Unit II)

REFERENCE BOOK(S)

1. Linear programming, Springer series in operations research 3rd edition, 2003 by George Bernard Dantzig, Mukund Narain Thapa.
2. Operations Research: An Introduction, 8th Edition, Pearson/Prentice Hall, 2007 by H.A. Taha.
3. Optimization for Engineering Design – Algorithms and Examples, PHI Learning Pvt. Ltd, New Delhi, 2005 by Kalyanmoy Deb.

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18CE3231 – BUILDING TECHNOLOGY
(OPEN ELECTIVE – II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites: None

Course Objectives:

Develop ability to

1. Know the various materials used in the buildings.
2. Understand the building by-laws and ventilation required in the buildings.
3. Estimate the repairs and transportation systems required in buildings.
4. Know the prefabrication and Air condition requirements.
5. Know the plumbing systems required in building.

Course Outcomes (COs):

At the end of the course, student would be able to

CO1: Explain characteristics of building materials.
CO2: Describe the building Bye laws and plan the building.
CO3: Estimate the repairs in building and types of transportation in building.
CO4: Assess the prefabrication systems and air conditioning required in buildings.
CO5: Explain principles of acoustics in building and plumbing.

UNIT I

Stones: Uses of stones as building materials, Characteristics of good building stones. Types of stones and their significance.
Bricks: Characteristics of good building bricks. Types of bricks and their significance.
Cement and Concrete: Ingredients of cement – Types of cement, properties and uses of cement. Overview on concrete.

UNIT II

Building: Basic definitions, Types, components, economy and design, principles of planning of buildings and their importance, building bye-laws.
Ventilation: Definitions and importance of circulation; Lighting and ventilation; how to consider these aspects during planning of building.

UNIT III

Repairs in Buildings: Inspection, control measures and precautions for various construction defects, General principles of design of openings, and various types of fire protection measures to be considered while planning a building.
Vertical transportation in buildings: Types of vertical transportation, Stairs, different forms of stairs, planning of stair cases, other modes of vertical transportation – lifts, ramps, escalators.

UNIT IV

Prefabrication systems: Prefabrication systems in residential buildings – walls, openings, cupboards, shelves, etc., planning and modules and sizes of components in prefabrication.

Air conditioning: Process and classification of air conditioning, Dehumidification. Systems of air conditioning, ventilation, functional requirements of ventilation.

UNIT V

Acoustics: Acoustics, effect of noise, properties of noise and its measurements, Principles of acoustics of building. Sound insulation – Importance and measures.

Plumbing services: Water supply system, maintenance of building pipe line, Sanitary fittings, principles governing design of building drainage.

TEXT BOOK(S)

1. Building Materials, P.C. Varghese, Prentice Hal India Learning Pvt. Ltd., 2015.
2. Building Construction, B.C.Punmia, Er. Ashok Kumar Jain and Dr. Arun Kumar Jain, Laxmi Publications, 2016.

REFERENCE BOOK(S)

1. Building Materials, S.K. Duggal, New Age, 2016.
2. Building Materials, S.S. Bhavikatti, Vikas Publishers, 2016.
3. Engineering Materials and Building Construction, Rangwala, Charotar Publishing House, 2015.
4. A Text book of Building Construction, Arora and Bindra, Dhanpat Rai Publications, 2014.

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18EE3232 – ENERGY CONSERVATION AND MANAGEMENT
(OPEN ELECTIVE – II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand different basic terms related to Indian Energy Scenario and Energy Conservation Act.
2. Understand the principles of energy conservation, audit and management.
3. Understand energy conservation in different mechanical utilities.
4. Understand efficient heat and electricity utilization, saving and recovery in different thermal and electrical systems.
5. Understand different basic terms related to Energy economy, Financial Management and to understand the role of Energy Service Companies.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Perform energy accounting and balancing
CO2: Prepare energy audit report for different energy conservation instances.
CO3: Suggest energy saving methodologies.
CO4: Evaluate the energy saving and conservation in different mechanical utilities.
CO5: Evaluate the energy saving and conservation in different electrical utilities.

UNIT I
Energy Scenario, Conservation Act and related policies: Energy Scenario of India. Present Nonrenewable Energy Scenario, Present Energy Consumption, Energy security, Energy strategy for the future.

UNIT II
Energy Management and Audit
Principles of Energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting – Energy management qualities and functions, language Questionnaire – check list for top management. Definition, energy audit, need, types of energy audit. Energy management (audit) approach – understanding energy costs, Bench marking.

UNIT III
Energy Efficient Systems-I
Classification of motors - factors affecting efficiency – Energy conservation in motors – Energy efficient motors.
Lighting and Energy Instruments
Good lighting system design and practice, lighting control, lighting energy audit – energy instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers.

UNIT IV

Energy Efficient Systems-II

Thermal utilities and systems: Boilers – types, combustion in boilers, performances evaluation, analysis of losses, feed water treatment, blow down, energy conservation opportunities.

UNIT V

Financial Analysis: Simple Payback, Return on Investment, net present value and internal rate of return, life cycle cost method, Sensitivity analysis, Project-financing options, Energy monitoring and targeting.

TEXT BOOK(S)

1. Handbook of Energy Audit, Sonal Desai, McGraw Hill. 2018
2. Energy Management Handbook, W.C. Turner, John Wiley and Sons, A Wiley Inter-science publication.

REFERENCE BOOK(S)

1. Handbook of Energy Audits, Albert Thumann, 6th Edition, The Fairmont Press.
2. Bureau of Energy Efficiency Reference book: Vol No.1, 2, 3 4.
3. Energy Management, W.R. Murphy and G. Mckay, Butter Worth Publications.
4. Energy Manager Training Manual (4 Volumes) available at https://beeindia.gov.in administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004

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18ME3233 – DIGITAL FABRICATION
(OPEN ELECTIVE-II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Pre-requisites: None

Course Objectives:
Develop ability to
1. Introduce basics of geometric modeling of physical objects,
2. Convert digital data to obtain physical components by metal subtraction and addition processes.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Select an appropriate geometric modeling scheme required for manufacturing
- CO2: Interpret machining operations required in subtractive manufacturing
- CO3: Compare additive manufacturing methods and comprehend on the process to be adopted
- CO4: Illustrate the robotic applications in manufacturing and assembly
- CO5: Select an appropriate polymer by comparing properties and manufacturing requirements

UNIT I
Geometric modelling-2D, 2 ½ D, 3D Modelling; Solid representations-CSG, Boundary representations, VOXEL representations; Overview of digital manufacturing processes

UNIT II
Subtractive Manufacturing –Introduction to G codes and M codes; Operations on CNC Lathe- Turning and facing; operations on CNC Mill-Planing, grooving and drilling; Introduction to simple CNC Program (Demonstration only);

UNIT III
Additive Manufacturing- Stereo lithography, Selective Laser Sintering, Fused Deposition Modeling; Conversion of Geometric model to .stl for 3D printing (Demonstration only)

UNIT IV
Robotic manipulations: Cutting- Laser Cutting, Plasma Cutting, Water jet cutting; bending; folding; stacking; weaving; stitching, Bio printing, Food Printing;

UNIT V
Introduction to Engineering polymers- acetals (polyoxymethylenes), ABS, (Acrilonitrile-Butadiene-Suyrene), polycarbonates, polyphenylene ethers and oxides, polyamides (nylons); and thermoplastic polyesthers.

TEXT BOOK(S)

1. Digital Fabrication, Philip F. Yuan, Neil Leach, Tonji University press
2. Digital Fabrication in Architecture, Luca Caneparo, Engineering and Construction, Springer

REFERENCE BOOK(S)

1. Additive Manufacturing Methodologies: Rapid Prototyping to Direct Digital Manufacturing,Gibson, I, Rosen, D W., and Stucker, B., Springer, 2010.
2. Rapid Prototyping – Laser Based and Other Technologies, Venu vinod, PK., Ma, W., Kluwer, 2004.
3. Fundamentals of electronic materials and devices, Safa O Kasap, Mc Graw Hill, 3rd ed

WEB SOURCE ON FREE ON LINE COURSE(S)

1. https://www.classcentral.com/course/kadenze-introduction-to-digital-fabrication-and-technical-design-9440
2. https://nptel.ac.in/courses/112102103/13

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18EC3234 – PRINCIPLES OF COMMUNICATION SYSTEMS
(OPEN ELECTIVE - II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Note: Only Block Diagram Approach with Qualitative Treatment of the topics is required. Detailed mathematical treatment is not required.

Course Objectives:

Develop ability to

1. Introduce the students to modulation and various analog and digital modulation schemes.
2. They can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecom concepts.

Course Outcomes (COs):

At the end of the course, the student would be able to

CO1: Distinguish various types of modulations.
CO2: Explain different communication modules and their implementation.
CO3: Distinguish various wireless and cellular, mobile and telephone communication systems.

UNIT I

Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

UNIT II

Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, AM Radio, FM Radio, Transmitters and Receivers

UNIT III

Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.

Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT IV

Satellite Communication: Satellite Orbits, Satellite communication systems, Satellite subsystems, Ground Stations, Satellite Applications, Global Positioning systems.

Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters and Receivers, Wavelength Division Multiplexing.

UNIT V

Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.

Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

TEXT BOOK(S)

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Electronic Communications Systems, Kennedy, Davis, 4e, TMH, 1999

REFERENCE BOOK(S)

1. Introduction to Telecommunications Network Engineering, Tarmo Anttalainen, Artech House
2. Wireless Communications-Principles and practice, Theodore Rappaport, Prentice Hall, 2002.
3. Fundamentals of Telecommunications, Roger L. Freeman, 2e, Wiley publications.
4. Introduction to data communications and networking, Wayne Tomasi, Pearson Education, 2005.

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18MB3236 - SUPPLY CHAIN MANAGEMENT
(OPEN ELECTIVE – II)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Pre requisites: None

Course Objectives:
Develop ability to
1. Distinguish the different functional areas in businesses management; understand the cross functional integrations and map supply chains of various business sectors.
2. Identify different types of distribution/ modes of transport/ network design.
3. Analyze the operational issues in SCM.
4. Recognize the drivers of supply chain.
5. Interpret the importance of relationships with suppliers and customers.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Understand the role of an Engineer as well as Manager in Supply chain management
- CO2: Appreciate the importance of logistics in integrating different functional areas.
- CO3: Integrate operations with functional areas.
- CO4: Visualize the role of logistics and distribution as supply chain drivers
- CO5: Understand the importance of supplier and customer relationship management.

UNIT I
INTRODUCTION TO SUPPLY CHAIN MANAGEMENT
Understanding the Supply Chain, Supply Chain Performance: Achieving Strategic Fit and Scope including: Customer and Supply Chain Uncertainty, Competitive and Supply Chain Strategies, Product development strategy, Marketing and sales strategy, Supply chain strategy, Scope of strategic fit; Supply Chain Drivers and Metrics.

UNIT II
LOGISTICS MANAGEMENT
Designing distribution networks and applications to e-Business, Network design in the Supply Chain, Designing global supply chain, network design, 3 PL, 4 PL, Transportation in supply chain management.

UNIT III
PLANNING AND MANAGING INVENTORIES
Managing Economies of Scale in a Supply Chain: Cycle Inventory, Managing Uncertainty in a Supply Chain: Safety Inventory, Determining the Optimal Level of Product Availability. Demand Forecasting in a Supply Chain, Aggregate Planning in a Supply Chain, Sales and Operations Planning: Planning Supply and Demand in a Supply Chain, Coordination in a Supply Chain. E- Procurement, Global alliances.

UNIT IV

MANAGING CROSS-FUNCTIONAL DRIVERS IN A SUPPLY CHAIN

Importance of sourcing decisions in Supply Chain Management, Price and Revenue management, role of Information Technology in a Supply Chain, Sustainability and the Supply Chain. Customer Relationship management.

UNIT V

LOGISTICS AND SUPPLY CHAIN RELATIONSHIPS

Identifying logistics performance indicators- channel structure- economics of distribution- channel relationships- logistics service alliance. Managing global logistics and global supply chains: Logistics in a global economy- Views of global logistics- global operating levels interlinked global economy. Global supply chain, Supply chain management in Global environment Global strategy- Global purchasing- Global logistics- Global alliances- Issues and Challenges in global supply chain management.

TEXT BOOK(S)

1. Supply Chain Management, Sunil Chopra, Peter Meindle, D.V Kalra, 6/e, Pearson.
2. Logistics Management: The Integrated Supply Chain Process, Donald J. Bowersox and David J. Closs, TMH, 2006.
3. Logistics and Supply Chain Management, Sridhara Bhat, EXCEL, 2009.

REFERENCE BOOK(S)

1. The Toyota Way Paperback, Jeffrey Liker.

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18CS32L4 – INTERNET OF THINGS LAB

L	T	P/D	C
-	-	2/-	1

III Year. B.Tech. (IT) – II Sem

Prerequisite(s):
18CS11L1: Programming for Problem Solving Lab
18CS31L2: Computer Networks Lab

Course Objectives:
Develop ability to
1. Assess the vision and introduction of IoT and understanding how M2M is connected to internet of things
2. Identify the appropriate Hardware and software components of IoT for communication
3. Gain knowledge on Cloud Storage models, web servers and how to integrate device, data and cloud management framework for IoT.
4. Learn the concepts of various data analytics and operational technology security with IoT.
5. Understand advanced and emerging concepts fog computing and Edge computing-IoT

Course Outcomes (COs):
After completion of the course, student would be able to
CO1: Interpret the vision of IoT from a global context, compare and contrast M2M and IoT Technology
CO2: Relate the appropriate Hardware and software components of IoT for providing the communication among the devices
CO3: Implement device, data and cloud management services for IoT applications.
CO4: Explore various data analytical techniques and operational security for IoT applications.
CO5: Comprehend the need of Fog Computing and Edge Computing-IoT

List of Experiments

1. Getting Started with IoT (Arduino).

2. Write an Arduino sketch to blink an LED Light for a particular interval of time.

3. Write an Arduino sketch to measure the distance(in cms) of a certain object.

4. Write an Arduino sketch to
   i. Blink an LED and a buzzer if the distance measured is less than a threshold value
   ii. Illustrate the working of PIR Sensor with an example.
   iii. Illustrate the IR and DHT Sensor.

5. Write a Program to send the humidity and temperature data to Cloud (ThingSpeak)

6. Write a program to alert the user through SMS and Email notification if humidity is greater than a threshold value using IFTTT and ThingSpeak cloud.

7. Write a Python program that blinks an LED at a rate of 3 second ON, 1 second OFF

8. Connect a PIR sensor to the GPIO pins of the Raspberry Pi. Perform measurements to determine the range of the sensor, i.e., start with a small distance (e.g., a few inches) and see if the motion sensor responds. Repeat these for increasing distances until the sensor stops responding. Report the measured distance.

9. Select at least 1 input sensor (not PIR) and 1 output device and make the RPi control the chosen output device in response to activity by the input device (e.g., a temperature sensor as input and two or more LEDs indicating the current temperature in binary code).

10. Write a python program for client-server based intruder detection system using mqtt application layer protocol

11. Write an Arduino sketch to blink an LED Light for a particular interval of time using wireless communication protocol.

Case study :

1.Design an intelligent patients monitoring system to monitor the patient automatically with the help of IoT that collects the status information which include patient's ECG, body temperature, humidity unexpected body movement etc. and sends these data to the cloud.

2. With the existing information, a web page is designed for this system for remote monitoring of patients health condition.

3. Assume that you are in a college, design and implement a IoT prototype to measure the amount of usage of water at a given location (take the location from user) on a day to day basis and send the information to Cloud.

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18CS32L2 - SOFTWARE ENGINEERING LAB

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
-	-	2/-	1

Prerequisites: None

Course Objectives:
Develop ability to
1. Understand the basis of software development process.
2. Design the requirements of the customer.
3. Elaborate the design process of software development.
4. Identify various project and process metrics.
5. Apply software testing and its importance in assuring quality.

Course Outcomes (COs):
At the end of this course, student would be able to
CO1: Identify various software process models and its techniques.
CO2: Analyze the requirements and specifications of the project.
CO3: Design software architecture and its process.
CO4: Evaluate the project using process and project metrics.
CO5: Confirm the quality of the software through testing.

1. Given a problem statement, analyze it using any one of the software process models of your choice for the ATM system project using waterfall process model.

ATM SYSTEM CASE STUDY
The ATM System is the project which is used to access their bank accounts in order to make cash withdrawals. Whenever the user need to make cash withdraws, they can enter their PIN number (personal identification number) and it will display the amount to be withdrawn in the form of 100's 500's and 1000's. Once their withdrawn was successful, the amount will be debited in their account. The ATM System project will be developing in VB.Net and back-end database as Microsoft-Access. VB.Net is the one of the powerful version of Framework and object oriented programming. Hence we use this software in our project.

The ATM will service one customer at a time. A customer will be required to enter ATM Card number, personal identification number (PIN) – both of which will be sent to the database for validation as part of each transaction. The customer will then be able to perform one or more transactions. Also customer must be able to make a balance inquiry of any account linked to the card. The ATM will communicate each transaction to the database and obtain verification that it was allowed by the database. In the case of a cash withdrawal, a second message will be sent after the transaction has been physically completed (cash dispensed or envelope accepted). If the database determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed.
If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction.

The ATM will provide the customer with a printed receipt for each successful transaction, showing the date, time, machine location, type of transaction, account(s), amount, and ending and available balance(s) of the affected account ("to" account for transfers).
Adopt the following software development strategy.

- Water fall model
- Iterative model
- Rapid-prototyping model
- Spiral model
- Unified Process

Software documentation Standard to follow:

- IEEE standard or DOD-2167A.

Milestones in the project:

1. Problem Analysis and Project Planning

Thorough study of the problem – Identify project scope, Objectives, infrastructure, and plan for the project; Document it.

2. Software Requirement Analysis

Describe the individual Phases/ modules of the project, Identify deliverables; Document it.

3. Data Modeling

Use work products – use case diagram, data flow diagram, Flow chart.

4. Software Development and Debugging

Choose programming language of your choice.

5. Software Testing

Prepare test plan, perform validation testing, coverage analysis, test case prioritization.

NOTE:

- Each student can adopt different software development life cycle (such as Water fall model, iterative model, spiral model, RAD, prototyping model etc…) and programming language combination so that each student work in unique but still conform to over all deliverable.
- Teams to be formed containing 5 in each to make the software engineering activities effectively with good coordination.
- Any other systems like(Library Management system, hospital management system, course registration system, railway reservation system) can also be done.
- If the problem statement is not mentioned explicitly, first the problem statement can be written, then follow the same flow.

Software Testing Tools Used: Selenium, JMeter

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18EN32L1 – ADVANCED ENGLISH COMMUNICATION SKILLS LAB

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
-	-	2/-	1

Prerequisites: None

Course Objectives: Develop ability to

1. Improve students‘ fluency in spoken English.
2. Enable them to acquire behavioral skills required for their personal and professional life.
3. Help students develop their vocabulary.
4. Read and comprehend texts and respond appropriately in different socio-cultural contexts.
5. Communicate their ideas.

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

CO1: Acquire vocabulary and use it contextually
CO2: Demonstrate effective Listening and Speaking Skills
CO3: Develop proficiency in academic reading and writing
CO4: Establish employability skills thereby increasing Job prospects
CO5: Communicate confidently in formal and informal contexts

The following Course Content with activities/tasks is proposed for the Advanced English communication Skills (AECS) Lab sessions:

1. **Activities on Fundamentals of Inter-Personal Communication and Vocabulary Building:** Responding appropriately and relevantly using the right body language, Discourse skills, Word Roots, One Word Substitutes, Business Vocabulary, Analogy, Collocations and uses of vocabulary, Resilience and Personal Management, Managing stress, time, anger and other emotions, Assertiveness and Culture shock.
2. **Reading Skills:** Reading for facts, specific information, Reading between the lines, Negative facts, Inferential Reading, Critical Reading.
3. **Activities on Writing:** Writing Process, Gathering Information, Analyzing the content, Formatting, Editing, Resume Writing and C.V preparation, Writing SOP, Letter Writing, email Writing.
4. **Activities on Presentation Skills:** Oral Presentations (Individual and Group), Seminars, PPTs and Written Presentations through posters, Projects, Portfolio Writing, Brochures and Reports.
5. **Activities on Group Discussion and Interview Skills:** Dynamics of Group Discussions, intervention, summarizing, body language, relevance and organization of ideas and rubrics for evaluation, Pre-Interview Planning, opening strategies, answering strategies, Interview through Tele-Conference and Video Conference and Mock Interviews, Videos of Mock Interviews.

REFERENCE BOOK(S)

1. Technical Communication by Meenakshi Raman and Sangeetha Sharma, Oxford University Press, 2009.
2. English Vocabulary in Use series, Cambridge University Press 2008.
3. Communication Skills by Leena Sen , PHI Learning pvt ltd, New Delhi 2009.
4. Communication Skills by Sanjay Kumar and Pushp Lata, 2nd edition, Oxford University Press.

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18MB3203 - PROFESSIONAL ETHICS
(Mandatory Course)

III Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Pre requisites: None

Course Objective:
Develop ability to
1. imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

Course Outcomes:
At the end of the course, Students would be able to
- CO1: understand the importance of Values and Ethics in their personal lives and professional careers.
- CO2: learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT I
Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal and Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT II
Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT III
Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT IV
Work Place Rights and Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing and editing.

UNIT V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOK(S)

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice and Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCE BOOK(S)

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.
2. Business Ethics concepts and Cases: Manuel G Velasquez, 6e, PHI, 2008.

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18IT3204 DESIGN THINKING
(Mandatory Course)

III Year. B.Tech.(IT) – II Sem

L	T	P/D	C
3	-	-/-	-

Prerequisite(s): None.

Course Objectives

1. To familiarize students with design thinking concepts and principles
2. To ensure students can practices the methods, processes and tools of design thinking.
3. To ensure students can apply the design thinking approach and have ability to model real world situations.
4. To enable students to analyse primary and secondary research in the introduction to design thinking

Course Outcomes (COs)

CO1. Examine Design Thinking concepts and principles
CO2. Practice the methods, processes, and tools of Design Thinking
CO3. Apply the Design Thinking approach and model to real world situations
CO4. Analyze the role of primary and secondary research in the discovery stage of Design Thinking

UNIT I

Introduction to Design Thinking, Business Model Innovation, Challenges Best-Suited for Design Thinking, Visualization Tool, Product Life Cycle - Design Ethics

UNIT II

PROCESS OF DESIGN: Introduction - Design Process - Four Step - Five Step - Twelve Step - Creativity and Innovation in Design Process - Design limitation, Creative Thinking, Lean Canvas Model and other Business Models

UNIT III

GENERATING AND DEVELOPING IDEAS: Introduction - Generating Design Ideas - Lateral Thinking – Anologies – Brainstorming - Mind mapping - National Group Technique – Synectics - Development of work - Analytical Thinking.

UNIT IV

The Physics of Innovation, The IBM model of design thinking, Learning Launch Tool, Strategic Opportunities, Identifying customer needs- Empathic design,Customer needs and markets analysis tools, Translating customer needs into measurable specifications, Case-studies

UNIT V

The macro framework- Commercial assessment tools, Integral and modular approaches to design, Design for environment theories, Sustained and maintained innovation – creating systemic innovation culture and principles

TEXT BOOK(S)

1. An AVA Book, “Design Thinking”, AVA Publishing, 2010.
2. David Ralzman, “History of Modern Design”, 2nd edition, Laurence King Publishing Ltd., 2010

REFERENCE BOOK(S)

1. Tom Kelley, Jonathan Littman, “Ten Faces in Innovation”, Currency Books, 2006
2. G. Pahl, W.Beitz, J. Feldhusen, KH Grote, “Engineering Design: A Systematic Approach”, 3rd edition, Springer, 2007.
3. The field guide to human centered design by Design Kit.

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18CS4101-DATA ANALYTICS

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:

- **18CS2102 - Object Oriented Programming using Java**
- **18MA2102 - Probability and Statistics**
- **18CS2203 - Database Management Systems**

Course Objectives:
Develop ability to

1. Know the basic elements of Big Data and Data science to handle huge amount of data.
2. Gain knowledge of basic mathematics behind the Big data.
3. Understand the different Big data processing technologies.
4. Apply the Analytical concepts of Big data using R and Python.
5. Visualize the Big Data using different tools.

Course Outcomes (COs):
At the end of the course, student would be able to:

CO1: Observe Big Data elements and Architectures.
CO2: Apply different mathematical models for Big Data.
CO3: Demonstrate their Big Data skills by developing different applications.
CO4: Apply each learning model for different datasets.
CO5: Analyze needs, challenges and techniques for big data visualization.

UNIT I
Introduction: Data Science and Big Data:
Introduction to Data science and Big Data, Defining Data science and Big Data, Big Data examples, Data explosion, Data volume, Data Velocity, Big data infrastructure and challenges, Big Data Processing Architectures, Data Warehouse.

UNIT II
Summarizing Data and Revisiting Probability:
Summary Statistics- Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem, Regression Analysis, Regression Modeling.

UNIT III
Big Data processing:
Big Data technologies, Introduction to Google file system, Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Name Node, Secondary Name Node, and Data Node, Hadoop Map Reduce paradigm, Map Reduce tasks, Job, Task trackers, Introduction to NOSQL, Textual ETL processing.

UNIT IV

Big Data analytics:

Data analytics life cycle, Data cleaning , Data transformation, Comparing reporting and analysis, Types of analysis, Analytical approaches, Data analytics using R, Exploring basic features of R, Exploring R GUI, Reading data sets, Manipulating and processing data in R, Functions and packages in R, Performing graphical analysis.

UNIT V

Big Data Visualization:

Introduction to Data visualization, Challenges to Big data visualization, Types of data visualization, Visualizing Big Data, Tools used in data visualization, Proprietary Data Visualization tools, Open source data visualization tools, Data visualization with Tableau.

TEXT BOOK(S)

1. Data warehousing in the age of Big Data, Krish Krishnan, Elsevier, ISBN: 9780124058910, 1st Edition.
2. Probability and Computing: Randomized Algorithms and Probabilistic Analysis, Mitzenmacher and Upfal, Cambridge University press, ISBN:521835402 hardback.
3. Big Data, Black Book, DT Editorial Services, ISBN: 9789351197577, 2016 Edition.

REFERENCES BOOK(S)

1. Algorithmic and Analysis Techniques in Property Testing, Dana Ron, School of EE.
2. Synopses for Massive Data: Samples, Histograms, Wavelets, Sketches, Foundation and trends in databases, Graham Cormode, Minos Garofalakis, Peter J. Haas and Chris Jermaine.
3. R for Business Analytics, A.Ohri, Springer, ISBN:978-1-4614-4343-8.
4. Hadoop in practice, Alex Holmes, Dreamtech press, ISBN:9781617292224.

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18CS4102- MACHINE LEARNING

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS2201- Design and Analysis of Algorithms**
- **18MA2102- Probability and Statistics**

Course Objectives:
Develop ability to

1. Understand all principal elements of Computational Learning Theory
2. Acquire the knowledge of decision tree and decision tree learning algorithms.
3. Study the concept of neural networks and its algorithms to solve problems using neural networks.
4. Obtain the knowledge of Bayesian reasoning and also instance based learning techniques in order to easily master different Machine Learning models
5. Understand the concept of Genetic algorithms and Genetic Programming

Course Outcomes (COs):
At the end of the course, student would be able to

CO1: Describe the concepts of computational intelligence like machine learning and design an exemplarily learning system.
CO2: Use the concept of Decision Trees in machine learning models.
CO3: Discuss about the Neural Networks and its usage in machine learning application.
CO4: Apply Bayesian reasoning and also target based learning techniques to develop a machine learning application.
CO5: Summarize the concept of Genetic algorithms and Genetic Programming.

UNIT I
Introduction - Well-posed learning problems, designing a learning system Perspectives and issues in machine learning.
Concept learning and the general to specific ordering – Introduction, A concept learning task, concept learning as search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.

UNIT II
Decision Tree Learning – Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT III
Artificial Neural Networks Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm.

Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition

UNIT IV

Bayesian learning - Introduction, Bayes Theorem, Bayes Theorem and Concept Learning Maximum Likelihood and Least Squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EM Algorithm.

Instance-Based Learning: Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

UNIT V

Genetic Algorithms: Genetic algorithms: Representing Hypothesis, Genetic Operators, Fitness function and selection. An illustrative example, Genetic Programming, Models of Evolution and Learning, Parallelizing genetic algorithms.

Reinforcement Learning: Introduction, learning task, Q Learning, Non-Deterministic Actions and rewards, temporal different learning, Generalizing from Examples, Relation to Dynamic Programming.

TEXT BOOK(S)

1. Machine Learning, Tom M. Michel, McGraw Hill, 1997.

REFERENCES BOOK(S)

1. The Elements of Statically Learning, Second Edition, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer Veriag 2001.
2. Machine Learning Methods in the Environmental Science-Neural Networks and Kernels, William W Hsieh, Cambridge University Press, 2009.
3. Pattern Classification, Second Edition, Richard O. Duda, Peter E. Hart and David G. Stork, John Wiley – Interscience, 2001.
4. Neural Network for Pattern Recognition, Christopher M. Bishop, Oxford University Press. 1995.

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18IT4101-BLOCK CHAIN TECHNOLOGIES

IV Year B.Tech (IT) -I Sem

L	T	P/D	C
3	-	-/-	3

Pre-requisites:

- **18IT3202: Cryptography and Network Security**
- **18CS2101: Advanced Data Structures**
- **18CS1101: Programming for Problem Solving**

Course Objectives:
Develop ability to
1. Understand block chain technology
2. Learn to develop block chain based solutions and write smart contracts
3. Understand on-premise and cloud based architectures for block chain applications
4. Learn to integrate ideas from various domains and implement them using block chain technology in different perspectives.
5. Understand framework implementation with a modular architecture.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Describe block chain technology.
- CO2: Develop block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
- CO3: Build and deploy block chain application for on premise and cloud based architecture.
- CO4: Integrate ideas from various domains and implement them using block chain technology in different perspectives.
- CO5: Implementation of framework intended as a foundation for developing applications or solutions with a modular architecture.

UNIT I
Introduction
Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain.
Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

UNIT II
Understanding Block chain with Crypto currency
Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW – basic introduction, Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

UNIT III

Understanding Block chain for Enterprises

Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

UNIT IV

Enterprise application of Block chain

Cross border payments, Know Your Customer (KYC, Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain.

UNIT V

Block chain application development

Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda.

TEXT BOOKS

1. Melanie Swan, “Block Chain: Blueprint for a New Economy”, O’Reilly, 2015
2. Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming”, CreateSpace Independent Publishing Platform,2017

REFERENCE BOOKS

1. Daniel Drescher, “Block Chain Basics”, Apress; 1st edition, 2017
2. Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi.
3. Imran Bashir, “Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing
4. Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build Smart Contracts for Ethereum and Block Chain”, Packt Publishing
5. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O’Dowd, Venkatraman Ramakrishna, “Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer”, Import, 2018.

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18CS4104 -WEB SERVICES
(Professional Elective – IV)

IV Year B.Tech (IT) -I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- **18CS3111 -Web Technologies**
- **18CS2203-Database Management Systems**

Course Objectives:
Develop ability to
1. Summarize evolution, emergence, introduction and architecture of web services.
2. Discover core fundamentals of SOAP and development of web services using SOAP.
3. Articulate WSDL.
4. Anticipate web service discovery.
5. Explain the interoperability of web services.

Course Outcomes (COs):
At the end of this course, student would be able to
CO1: Describe evolution, emergence, introduction and architecture of web services.
CO2: Examine core fundamentals of SOAP and develop web services using SOAP.
CO3: Apply WSDL.
CO4: Explain web service discovery.
CO5: Articulate the interoperability of web services.

UNIT I
Evolution and Emergence of Web Services - Evolution of distributed computing, Core distributed computing technologies, Challenges in Distributed Computing. Role of J2EE and XML in distributed computing, emergence of Web Services.
Introduction to Web Services - The definition of web services, basic operational model of web services, Core web services Standards, benefits and challenges of using web services.

UNIT II
Web Services Architecture - Web services Architecture and its core building blocks, Tools of the Trade, Web Services Communication Models, Implementing Web Services, Developing Web Services-Enabled Applications
Core fundamentals of SOAP - SOAP Message Structure, SOAP encoding, SOAP message exchange model, SOAP communication and messaging, SOAP security.

UNIT III
Developing Web Services using SOAP - Building SOAP Web Services, developing SOAP Web Services using Java, limitations of SOAP.
Describing Web Services - WSDL - WSDL in the world of Web Services, Web Services life cycle, Anatomy of WSDL definition document, WSDL bindings, WSDL Tools, Future of WSDL, Limitations of WSDL.

UNIT IV

Discovering Web Services- Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI - UDDI Registries, uses of UDDI Registry, Programming with UDDI. UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDI Registry, searching information in a UDDI Registry, deleting information in a UDDI Registry, limitations of UDDI.

UNIT V

REST: Representational State Transfer: Messages, HTTP Request and format, HTTP Response and format, Query Parameters, Protocol Semantics of HTTP(GET, PUT, POST, DELETE, HEAD, OPTIONS, TRACE) , REST vs SOAP..

TEXT BOOK(S)

1. Developing Java Web Services, R Nagappan, R. Skoczylas, R.P. Sriganesh, Willey India, 2003, (Unit I to Unit IV).
2. RESTful Web Services, First Edition, L.Richardson and S. Ruby, O'Reilly Media, 2007,(Unit V).

REFERENCE BOOK(S)

1. Building Web Services with Java, Second Edition, S. Graham and others. Pearson Education., 2005.
2. Java Web Services, First Edition,D. A. Chappell and Tyler. Jewell, O'Reilly, SPD, 2002.
3. J2EE Web Services, First Edition, Richard Monson, Haefel, Pearson Education, 2004.
4. Web Services, Gustavo. Alonso, Fabio. Harumi Casati Vijay Machiraju, Springer, 2004.
5. XML, Web Services, and the Data revolution, F.P. Coyle, Pearson Education.

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18CS4113-PARALLEL ALGORITHMS
(Professional Elective – IV)

L	T	P/D	C
3	-	-/-	3

IV Year B.Tech (IT) -I Sem

Pre-requisites:
- **18CS2201: Design and Analysis of Algorithms**
- **18CS3102: Computer Networks**

Course Objectives
Develop ability to
1. Explain various aspects of PRAM model.
2. Compare sorting networks.
3. Describe networking topologies, interconnection and communication models.
4. Analyze various algorithms on a ring of processors.
5. Analyze various algorithms on grids of processors.

Course Outcomes (COs)
After completion of the course, student would be able to
CO1: Describe various aspects of PRAM model
CO2: Explain sorting networks
CO3: Demonstrate impact of networking topologies, interconnection and communication models on performance of parallel algorithms.
CO4: Comprehend and analyze efficiency of various algorithms on a ring of processors.
CO5: Comprehend and analyze efficiency of various algorithms on grids of processors.

UNIT I
Models, PRAM Model, Pointer Jumping, List, Ranking Prefix Computation, Euler Tour, Performance Evaluation of PRAM Algorithms Cost, Work, Speedup and Efficiency, A Simple Simulation Result, Brent's Theorem, Comparison of PRAM Models, Model Separation, Simulation Theorem, Sorting Machine, Merge, Sorting Trees, Complexity and Correctness, Relevance of the PRAM Model.

UNIT II
Sorting Networks, Odd-Even Merge Sort, Odd-Even Merging Network, Sorting Network, 0–1 Principle, Sorting on a One-Dimensional Network, Odd-even Transposition Sort, Odd-even Sorting on a One-Dimensional Network.

UNIT III
Networking, Interconnection Networks, Topologies, A Few Static Topologies, Dynamic Topologies, communication Model, A Simple Performance Model, Point-to-Point Communication Protocols, More Precise Models, CASE Study: the Unidirectional Ring, Broadcast, Scatter, all-to-all, Pipelined Broadcast, Case Study: the Hypercube, Labeling Vertices, Paths and Routing in a Hypercube, Embedding Rings and Grids into Hypercubes, Collective Communications in a Hypercube, Peer-to-Peer Computing, distributed Hash Tables and Structured Overlay Networks.

UNIT IV

Algorithms on a Ring of Processors, matrix-Vector Multiplication, Matrix-Matrix Multiplication, First Look at Stencil Applications, A Simple Sequential Stencil Algorithm, Parallelizations of the Stencil Algorithm, LU Factorization, Pipelining on the Ring, Look-Ahead Algorithm, Parallelization on a Unidirectional Ring, Parallelization on a Bidirectional Ring, implementing Logical Topologies, distributed vs. Centralized Implementations.

UNIT V

Algorithms on Grids of Processors, Logical 2-D Grid Topologies, Communication on a Grid of Processors, Matrix Multiplication on a Grid of Processors, The Outer-Product Algorithm, Grid vs. Ring, Three Matrix Multiplication Algorithms, Performance Analysis of the Three Algorithms, 2-D block cyclic data distribution.

TEXT BOOK(S)

1. Parallel Algorithms, Henri Casanova, Arnaud Legrand, Chapman and Hall/CRC Numerical Analysis and Scientific Computing Series, 2008

REFERENCE BOOK(S)

1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar Second Edition, Addison Wesley.
2. The Design and Analysis of Parallel Algorithms, S.G.Akl, PHI.
3. Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hyper cubes, F.T.Leighton MK Publishers, San Mateo California.

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18CS4114- NEURAL NETWORKS
(Professional Elective-IV)

IV Year B.Tech (IT) -I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- **18CS2103: Discrete Mathematics**
- **18MA2102: Probability and Statistics**

Course Objectives:
Develop ability to
1. Understand the biological neural network and to model equivalent neuron models.
2. Understand the architecture, learning algorithm and issues of various feed forward
3. and feedback neural networks.
4. Understand single and multi-layer-feed-forward network.
5. Understand the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications and Neuro dynamical models.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Create different neural networks of various architectures both feed forward and feed backward.
- CO2: Perform the training of neural networks using various learning rules.
- CO3: Design single and multi-layer-feed-forward network.
- CO4: Perform the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications.
- CO5: Design Neuro dynamical models.

UNIT I
INTRODUCTION– what is a neural network? Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation.

LEARNING PROCESS 1-Error-Correction learning, Memory-based learning, Hebbian learning.

UNIT II
LEARNING PROCESS 2- Competitive learning, Boltzmann learning, Credit Assignment Problem, Memory, Adaptation, Statistical Nature of the learning process.

SINGLE LAYER PERCEPTRONS- Adaptive filtering problem, Unconstrained Optimization Techniques, Linear least-squares filters, Least-mean-square algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron– Perceptron Convergence Theorem, Relation between the perceptron and Bayes Classifier for a Gaussian Environment.

UNIT III

MULTILAYER PERCEPTRON - Back propagation algorithm, XOR problem, Heuristics, Output Representation and Decision rule, Computer Experiment, Feature detection.

BACK PROPAGATION - Back propagation and differentiation, Hessian Matrix, Generalization, Cross validation, Network Pruning Techniques, Virtues and Limitations of Back propagation Learning, Accelerated convergence of Back propagation Learning, Supervised learning Viewed as an Optimization problem.

UNIT IV

SELF ORGANIZATION MAPS - Two basic Feature-Mapping models, Self-Organization map, Summary of the SOM algorithm, Properties of the Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Pattern Classification, Hierarchal Vector quantization, Contextual Maps**.**

UNIT V

NEURO DYNAMICS - Dynamical systems, Stability of Equilibrium States, Attractors, Neuro dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm.

HOPFIELD MODELS - Hopfield Models, Computer Experiment.

TEXT BOOK(S)

1. Neural networks A Comprehensive Foundation, Second Edition, Simon Haykin, Pearson Education 1997**.**

REFERENCES BOOK(S)

1. Artificial Neural Networks, B.Yegnanarayana Prentice Hall Learning Pvt. Ltd, 2006.
2. Neural Networks in Computer Intelligence, LiMin Fu Tata McGraw Hill, 1994.
3. Neural networks: Algorithms, Applications, and Programming Techniques, James A. Freeman, David M. Skapura Pearson Education, 2008.

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18CS4115-DISTRIBUTED DATABASES
(Professional Elective - IV)

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:

- **18CS2203: Database Management Systems**

Course Objectives:
Develop ability to

1. Acquire knowledge on parallel and distributed databases and its applications.
2. Study the usage and applications of Object Oriented databases.
3. Learn the modeling and design of databases
4. Acquire knowledge on parallel and distributed databases and its applications
5. Equip students with principles and knowledge of parallel and object oriented databases.

Course Outcomes (COs):
After completion of the course, student would be able to

CO1: Describe theoretical and practical aspects of distributed database systems.
CO2: Study and identify various issues related to the development of distributed database system.
CO3: Explain design aspects of object oriented database system and related development.
CO4: Highlight distributed transaction management and reliability; parallel and object database management systems.
CO5: Describe distributed DBMS architecture and design; query processing and optimization;

UNIT I
Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design

UNIT II
Translation of Global Queries to Fragment Queries, Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries. Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries

UNIT III
The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions Concurrency Control,

Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT IV

Reliability, Basic Concepts, Non-blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

UNIT V

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multi database Concurrency Control, Multi database Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies

TEXT BOOK(S)

1. Distributed Databases Principles and Systems, Stefano Ceri, Giuseppe Pelagatti, Tata McGraw- Hill,2008.

REFERENCES BOOK(S)

1. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez, Springer,4th Edition,2020.
2. Distributed Database Systems, Chanda Ray, Pearson Education,2009.
3. Distributed Database Management Systems: A Practical Approach, Saeed K. Rahimi and Frank. S. Haug, Wiley,2011.

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18CS4116-CLOUD COMPUTING
(Professional Elective – V)

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):
- **18CS2205: Operating Systems**
- **18CS3102: Computer Networks**

Course Objectives:
Develop ability to
1. Understand different computing models.
2. Describe various types of virtualizations and hypervisors.
3. Use and adopt Cloud Computing services and tools in their real life scenarios.
4. Explore some important cloud computing driven commercial systems such as Amazon Web Services, Google cloud services, Microsoft Azure etc.
5. Describe the security aspects in cloud.

Course Outcomes (COs):
Upon successful completion of this course, students will be able to
CO1: Distinguish different types of Distributed Computing models and demonstrate architectural support for virtualization.
CO2: Illustrate Cloud Applications and Paradigms with proper identification of different cloud computing models and services provided by cloud providers.
CO3: Apply and design Cloud Resource Management algorithms.
CO4: Understand distributed networking and storage models for Cloud.
CO5: Analyze security risks, privacy and trust for Cloud.

UNIT I
Introduction: System models for Distributed and Cloud Computing: Clusters of Cooperative Computers, Grid computing infrastructures, Peer-to-Peer Network families, Cloud computing over the internet, Cloud Computing Delivery Models and Services, Ethical Issues in Cloud Computing, Cloud Vulnerabilities, Major Challenges of Cloud Computing.
Cloud Resource Virtualization: Virtualization, Layering and Virtualization, Virtual Machine Monitors, Virtual Machines, Performance and Security Isolation, Full Virtualization and Para virtualization, Hardware Support for Virtualization, Case Study: Xen, a VMM Based on Para virtualization, Optimization of Network Virtualization in Xen, vBlades: Para virtualization Targeting an Itanium Processor, The Darker Side of Virtualization.

UNIT II
Cloud Infrastructure: Cloud Computing at Amazon, Cloud Computing: The Google Perspective, Microsoft Windows Azure and Online Services, Open-Source Software Platforms for Private Clouds, Cloud Computing Interoperability: The Intercloud, Service- and Compliance-Level Agreements.
Cloud Computing Applications and Paradigms: Challenges for Cloud Computing applications, Existing Cloud Applications and New Application Opportunities, Architectural

Styles for Cloud Applications, Workflows: Coordination of Multiple Activities, Coordination Based on a State Machine Model: The ZooKeeper, The MapReduce Programming Model.

UNIT III

Cloud Resource Management: Policies and Mechanisms for Resource Management, Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two-Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds, Coordination of Specialized Autonomic Performance Managers, A Utility-Based Model for Cloud-Based Web Services, Resource Bundling: Combinatorial Auctions for Cloud Resources, Dynamic application scaling.

UNIT IV

Networking support: Packet-Switched Networks, Network Resource Management, Interconnection Networks for Computer Clouds, Storage Area Networks, Content-Delivery Networks.

Storage Systems: The Evolution of Storage Technology, Storage Models, File Systems, and Databases, Distributed File Systems: General Parallel File System, Google File System, Apache Hadoop, Locks and Chubby: A Locking Service, Transaction Processing and NoSQL Databases, BigTable, Megastore Cloud.

UNIT V

Cloud Security: Cloud Security Risks, Security: The Top Concern for Cloud Users, Privacy and Privacy Impact Assessment, Trust, Operating System Security, Virtual Machine Security, Security of Virtualization, Security Risks Posed by Shared Images, Security Risks Posed by a Management OS, Xoar: Breaking the Monolithic Design of the TCB, A Trusted Virtual Machine Monitor.

TEXT BOOK(S)

1. Cloud Computing Theory and Practice, First Edition, Dan C. Marinescu, Elsevier,2013.
2. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Kai Hwang, Geoffrey C. Fox, Jack J.Dongarra, Morgan Kauffman,Elsevier, 2012.

REFERENCE BOOK(S)

1. Cloud Computing ,A practical approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw Hill, 2010.
2. Cloud Computing, Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, John Wiley and Sons, Inc, 2011.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly,2009.

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18CS4108 SIMULATION AND MODELLING
(PROFESSIONAL ELECTIVE-V)

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:
- **18CS1101 - Programming for Problem Solving**
- **18CS2102 - Object Oriented Programming using Java**
- **18MA2102 - Probability and Statistics**

Course Objectives:
Develop ability to
1. Understand simulation and system studies.
2. Explain techniques of random number generation and random variate generation.
3. Distinguish simulation of continuous and discrete Systems.
4. Describe simulation of queuing systems and Pert-network.
5. Design and evaluation of simulation experiments and simulation languages

Course Outcomes (COs):
At the end of the course, the student would be able to:
CO1: Explain the need of simulation and steps in simulation.
CO2: Generate random numbers and random variants employing various techniques.
CO3: Compare simulation of continuous and discrete systems.
CO4: Analyze the simulation of queuing systems and apply Pert Network models.
CO5: Design and evaluate simulation experiments and acquire knowledge on simulation languages.

UNIT I
Introduction: Concepts of Simulation**,** Advantages and disadvantages of simulation, Areas of application, Recent applications of simulation, Discrete and Continuous Systems, System Modeling, Types of Models, Steps in simulation study.

UNIT II
RANDOM NUMBERS
Random Number Generation: Properties, Generation of Pseudo-Random Numbers, Techniques of generating random numbers, tests for random numbers.
Random-Variate Generation: Inverse-Transform Technique, Acceptance-Rejection Technique, Special Properties.

UNIT III
SIMULATION OF CONTINUOUS AND DISCRETE SYSTEMS
Simulation of Continuous Systems: A chemical reactor. Numerical integration vs. continuous system simulation. Selection of an integration formula, Runge-Kutta integration formulas. Simulation of a servo system, Simulation of a water reservoir system, Analog vs. digital simulation.
Discrete System Simulation: Fixed time-step vs. event-to-event model, On simulating

randomness, generation of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

UNIT IV
SYSTEM SIMULATION

Simulation of Queuing Systems: Rudiments of queuing theory, Simulation of a single-server queue, Simulation of a two-server queue, Simulation of more general queues. **Simulation of a Pert Network:** Network model of a project, Analysis of activity network, Critical path computation, Uncertainties in activity durations, Simulation of activity network, Computer program for simulation, Resource allocation and cost considerations.

UNIT V
SIMULATION EXPERIMENTATION

Design and Evaluation of Simulation Experiments: Length of simulation runs, Variance reduction techniques, Experimental layout, Validation. **Simulation Languages:** Continuous and discrete simulation languages, Continuous simulation languages, Block-structured continuous simulation languages, Expression-based languages, Discrete-system simulation languages, GPSS.

TEXT BOOK(S)

1. Discrete-Event System Simulation, Jerry Banks, John S. Carson II, Barry L. Nelson, David M.Nicol, Pearson, Fifth Edition.
2. System Simulation with Digital Computer, Narsingh Deo, Prentice-Hall of India Private Limited.

REFERENCE BOOK(S)

1. System Modeling and Simulation: An Introduction, Frank L. Severance, Wiley Publisher.
2. System Simulation, Geoffrey Gordon, Prentice-Hall of India Private Limited, Second Edition.

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18IT4102-DIGITAL FORENSICS
(Professional Elective - V)

IV Year B.Tech.(IT) – I Sem

L	T	P/D	C
2	-	-/-	1.5

Prerequisite(s):

- **18IT3202 - Cryptography and Network Security**

Course Objectives:

1. To examine digital devices in a constructive way with the goal of identifying, preserving, recovering, analyzing, and presenting the evidence in a court of law.
2. To become familiar with evidence collection and forensics tools
3. To analyze and validate forensics data
4. To learn about how to gain unauthorized access to a computer system, application, or data
5. To Learn act of tricking someone into divulging information or taking action, usually through technology

Course Outcomes(COs):

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

CO1: Understand the basics of computer forensics
CO2: Apply a number of different computer forensic tools to a given scenario
CO3: Analyze and validate forensics data
CO4: Identify the vulnerabilities in a given network infrastructure
CO5: Implement real-world hacking techniques to test system security

UNIT I
INTRODUCTION TO COMPUTER FORENSICS

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft and Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II
EVIDENCE COLLECTION AND FORENSICS TOOLS

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools like Autopsy, Wireshark.

UNIT III
ANALYSIS AND VALIDATION

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.

UNIT IV
ETHICAL HACKING
Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT V
ETHICAL HACKING IN WEB
Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TEXT BOOK(S)
1. Computer Forensics and Investigations, Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart , Cengage Learning, India Edition, 2016.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.
3. Man Young Rhee, "Internet Security: Cryptographic Principles, Algorithms and Protocols", Wiley Publications, 2003.

REFERENCE BOOK(S)
1. Computer Forensics, Computer Crime Scene Investigation by John R,Vacca, Firewall Media, New Delhi,2015.
2. Computer Forensics and Cyber Crime: An Introduction,MarjieT.Britz,3rd Edition, Prentice Hall, 2013.
3. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations, Cengage Learning, India Edition, 2008.
4. Ethical Hacking, Second Edition, AnkitFadia, Macmillan India Ltd, 2006
5. Insider Computer Fraud, Kenneth C.Brancik, Auerbach Publications Taylor andamp; Francis Group–2008.

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18CS4105 HUMAN COMPUTER INTERACTION
(Professional Elective - V)

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites:

- **18IT2201: Computer Architecture and Assembly Language Programming**

Course Objectives:

1. To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing;
2. Become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans
3. Be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and
4. Appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user
5. Be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing;

Course Outcomes:

CO1: Ability to apply HCI and principles to interaction design.
CO2: Ability to design certain tools for blind or PH people.
CO3: Recognize the limits of human performance as they apply to computer operation.
CO4: Learn how HCI is used in the software process.
CO5: Understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems.

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions. Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT III

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT IV

HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.
2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education.

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning

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18CS41L1-DATA ANALYTICS LAB

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):

- **18CS21L3 - Object Oriented Programming Java Lab**
- **18CS22L3 - Database Management Systems Lab**

Course Objectives:

Develop ability to

1. Know the basic elements of Big Data and Data science to handle huge amount of data.
2. Gain knowledge of basic mathematics behind the Big data.
3. Understand the different Big data processing technologies.
4. Apply the Analytical concepts of Big data using R and Python.
5. Visualize the Big Data using different tools.

Course Outcomes (COs):

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

CO1: Observe Big Data elements and Architectures.
CO2: Apply different mathematical models for Big Data.
CO3: Demonstrate their Big Data skills by developing different applications.
CO4: Apply each learning model for different datasets.
CO5: Analyze needs, challenges and techniques for big data visualization.

LIST OF EXPERIMENTS

Week 1: Overview of R, R data types and objects, reading and writing data
Week 2: R Loop functions, debugging tools
Week 3: Installation, Configuration, and Running of Hadoop and HDFS.
Week 4: Implementation of Word Count / Frequency Programs using MapReduce
Week 5: Implementation of MR Program that processes a Weather Dataset.
Week 6: Implementation of Linear and Logistic Regression
Week 7: Implementation of SVM Classification Technique
Week 8: Implementation of Decision Tree Classification Technique
Week 9: Data Visualization using Pie, Bar, Boxplot Chart Plotting Framework.
Week 10: Data Visualization using Histogram Plotting Framework.
Week 11: Data Visualization using Line Graph Plotting, Scatterplot Plotting Framework.
Week 12: Application to analyze Stock Market Data using R Language.

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18CS41L2- MACHINE LEARNING LAB

IV Year. B.Tech. (IT) – I Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):

- **18CS21L3-Object Oriented Programming Java Lab**

Course Objectives:

Develop ability to

1. Understand all principal elements of Computational Learning Theory.
2. Gain the knowledge of decision tree and decision tree learning algorithms.
3. Study the concept of neural networks and its algorithms to solve problems on neural networks.
4. Obtain the knowledge of Bayesian reasoning and also target based learning techniques in order to easily master different Machine Learning models.
5. Identify the different search methods.

Course Outcomes (COs):

At the end of the course, student would be able to

CO1: Observe the concepts of computational intelligence like machine learning and Design an exemplarily learning system.
CO2: Apply the algorithms (Decision Tre techniques) to a real-world problem, optimize the models learned and report on the expected accuracy.
CO3: Analyze the Neural Networks and its usage in machine learning application.
CO4: Apply Bayesian reasoning and also target based learning techniques to develop a machine learning application.
CO5: Analyze the different search methods.

Week	Name of the program
1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
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 Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.
5	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.
6	Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7	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. You can add Java/Python ML library classes/API in the program.
8	Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
9	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
10	Implementation of Hierarchical Clustering.
11	Implementation of Partitioning Clustering.

NOTE:

1. The programs can be implemented in either JAVA or Python.
2. For Problems 1 to 6 and 9, programs are to be developed without using the built-in classes or APIs of Java/Python.

3. Data sets can be taken from standard repositories. (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

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18IT41L1-BLOCK CHAIN TECHNOLOGIES LAB

IV Year B.Tech.(IT) – I Sem

L	T	P/D	C
2	-	-/-	1.5

Prerequisite(s):

- **18IT3202: Cryptography and Network Security**
- **18CS21L1: Advanced Data Structures Lab**
- **18CS11L1: Programming for Problem Solving Lab**

Course Objectives:
Develop ability to
1. Understand block chain technology
2. Learn to develop block chain based solutions and write smart contracts
3. Understand on-premise and cloud based architectures for block chain applications
4. Learn to integrate ideas from various domains and implement them using block chain technology in different perspectives.
5. Understand framework implementation with a modular architecture.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Describe block chain technology.
- CO2: Develop block chain based solutions and write smart contract using Hyperledger fabric and Ethereum frameworks.
- CO3: Build and deploy block chain application for on premise and cloud based architecture.
- CO4: Integrate ideas from various domains and implement them using block chain technology in different perspectives.
- CO5: Implementation of framework intended as a foundation for developing applications or solutions with a modular architecture.

LIST OF EXPERIMENTS:

1. Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on Cloud to run.

2. Create and deploy a block chain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chaincode, and perform invoke and query on your block chain network.

3. Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules.

4. Deploy an asset-transfer app using block chain. Learn app development within a Hyperledger Fabric network.

5. Use block chain to track fitness club rewards. Build a web app that uses Hyperledger Fabric to track and trace member rewards.

6. Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyperledger Fabric to invoke chaincode while storing results and data in the starter plan.

7. Develop an IoT asset tracking app using Block chain. Use an IoT asset tracking device to improve a supply chain by using Block chain, IoT devices, and Node-RED.

8. Secure art using block chain digital certificates. Node.js-based auction application can help democratize the art market.

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18IT4201-SEMANTIC WEB AND SOCIAL NETWORKS
(PROFESSIONAL ELECTIVE - VI)

IV Year B.Tech.(IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS3102-Computer Networks**

Course Objectives

1. To understand World Wide Web through standards set by the World Wide Web Consortium.
2. Familiarize with gathering and analyzing data from social networks
3. to study the role of ontology and inference engines in semantic web
4. to give an overview of social relationships
5. How to Develop social semantic applications

Course Outcomes

Students will

CO1: Demonstrate knowledge and be able to explain the three different "named" generations of the web.
CO2: Demonstrate the ability to anticipate materially in projects that develop programs relating to Web applications and the analysis of Web data.
CO3: Be able to understand and analyze key Web applications including search engines and social networking sites.
CO4: Be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
CO5: Be able to analyze and explain how technical changes affect the social aspects of Web-based computing.
CO6: Be able to develop "linked data" applications using Semantic Web technologies.

UNIT I

The Semantic web: Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

UNIT II

Social Network Analysis: What is network analysis?, Development of Social Network Analysis, Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks.

UNIT III

Knowledge Representation on the Semantic Web: Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

UNIT IV

Modeling and Aggregating Social Network Data: State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

UNIT V

Developing social semantic applications: Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

TEXT BOOK(S)

1. Social Networks and the Semantic Web, Peter Mika,Springer,2007.
2. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, John Wiley and Sons.

REFERENCE BOOK(S)

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers,(Taylor and Francis Group)
2. Information Sharing on the semantic Web – Heiner Stucken schmidt; Frank Van Harmelen, Springer Publications

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18IT4202-CYBER SECURITY
(PROFESSIONAL ELECTIVE - VI)

IV Year B.Tech.(IT) – II Sem

Prerequisite(s):

- **18IT3202 - Cryptography and Network Security**
- **18IT4102 - Digital Forensics**

L	T	P/D	C
3	-	-/-	3

Course objectives:

1. To familiarize various types of cyber-attacks and cyber-crimes
2. To give an overview of the cyber laws
3. To study the defensive techniques against Mobile and Wireless attacks
4. To Learn about Cyber security and cyber crime
5. To familiarize various Basic Data Privacy Concepts

Course Outcomes:

The students will be able to

CO1. Classify cyber security aspects, namely, security attacks, services and mechanisms.
CO2. Understand the notional environment in which communication over computer networks occurs.
CO3. Know about crime that involves a computer and a network.
CO4. How to protect them self and the entire Internet community from Cyber attacks.
CO5. Analyze how data is shared with third parties.

UNIT I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defence, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT II

Cyberspace and the Law and Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing

Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases: Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOK(S)

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives ,First Edition, Nina Godbole and Sunit Belpure, Wiley, 2011.
2. Computer and Cyber Security: Principles, Algorithm, Applications and Perspectives Brij B. Gupta, Dharma. P. Agrawal, Haoxiang Wang, CRC Press Taylor and Francis Group, 2019.

REFERENCE BOOK(S)

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press Taylor and Francis Group, 2010.
2. Introduction to Cyber Security, Chwan-Hwa(John) Wu, J.David Irwin, CRC Press Taylor and Francis Group, 2013**.**

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18CS4201– SOFTWARE PRACTICES AND TESTING
(Professional Elective – VI)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS3202- Software Engineering.**

Course Objectives:

The student should develop ability to

1. Understand the software testing process and its principles.
2. Design different test cases using testing techniques.
3. Be acquainted with various levels of testing and their performance.
4. Create test plan components to generate test results.
5. Learn various testing automation techniques and testing tools.

Course Outcomes (COs):

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

CO1: Identify the best software testing process to find defects.
CO2: Write suitable test cases for a given application under test.
CO3: Apply various levels of testing on the application.
CO4: Develop test plan components and generate its results.
CO5: Use the testing tools to automate the testing process.

UNIT I

Introduction: Testing as an Engineering Activity – Testing as a Process – Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support of Developing a Defect Repository – Defect Prevention strategies.

UNIT II

Test Case design: Test case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning– Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Paths – code complexity testing.

UNIT III

Level of Testing: The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing –Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Agile testing - Agile Testing Strategies -The Agile Testing Quadrant- QA challenges with agile software development-Website testing.

UNIT IV

Test Management: People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V

Test Automation: Software test automation – skill needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics. Testing Tools- QTP (Quick Test Professional), IBM Rational Functional Tester, JUNIT, Selenium.

TEXT BOOK(S)

1. Practical Software Testing, Ilene Burnstein, Springer International Edition, 2003, (UNIT I, II, III).
2. Software Testing – Principles and Practices, Srinivasan Desikan and Gopalaswamy Ramesh, Pearson Education, 200,.(UNIT IV).
3. Software Testing Tools: Dr. K.V.K.K. Prasad, DreamTech Press India limited, 2004,(UNIT- V) Testing Tools.

REFERENCE BOOK(S)

1. Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers, 2003.
2. Software Testing Techniques, Second Edition, Bories Beizer, Dreamtech Press,1990
3. Managing the Testing Process, Third Edition, Rex Black, Wiley, 2009.
4. Handbook of Software Quality Assurance, Second Edition G. Gordon Schulmeyer, James I.McManus, International Thomson Computer Press, 1998.
5. Metrics and Models for Software Quality Engineering, Second Edition, Stephen H. Kan, Pearson Education, 2003.

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18CS4208 - DEEP LEARNING
(PROFESSIONAL ELECTIVE-VI)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):

- **18CS3103 -Artificial Intelligence**
- **18CS4114 - Neural Networks**

Course Objectives:

Develop ability to

1. Identify the different deep learning algorithms and its performance.
2. Design the feed forward neural network using appropriate techniques.
3. Analyze the conditional random fields and its use in designing the deep neural network.
4. Identify the different problems in deep neural networks.
5. Understand various ddeep learning tool and its uses.

Course Outcomes (COs):

At the end of this course, student would be able to

CO1: Describe the various deep learning algorithms used across various domains.
CO2: Design the feed forward neural network using appropriate techniques.
CO3: Develop the conditional random fields and its use in designing the deep neural network.
CO4: Perform research on various challenges in deep neural networks.
CO5: Optimize the deep neural network and to experiment various tools.

UNIT I

Introduction: Historical Trends in Deep Learning, Applied Math and Machine Learning Basics, Linear Algebra- Scalars, Vectors, Matrices and Tensors, Multiplying Matrices and Vectors, Identity and Inverse Matrices, Linear Dependence and Span, Norms, Eigen decomposition, Singular Value Decomposition, The Moore-Penrose Pseudo inverse, The Trace Operator, The Determinant, Example: Principal Components Analysis

UNIT II

Numerical Computation: Overflow and Underflow, Poor Conditioning, Gradient-Based Optimization, Constrained Optimization, Example: Linear Least Squares.

Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning.

UNIT III

Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Diff erentiation Algorithms.

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness.
Optimization for Training Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

UNIT IV
Convolutional Networks: The Convolution Operation, Motivation, Pooling, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks.
Sequence Modeling Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks.
Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyper parameters, Debugging Strategies.

UNIT V
Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications
Deep Learning Research: Linear Factor Models, Auto encoders, Representation Learning, Structured Probabilistic Models for Deep Learning, Probabilistic Models.
Deep Generative Models: Boltzmann Machines, Deep Belief Networks Deep Boltzmann Machines, Boltzmann Machines for Real-Valued Data, Convolutional Boltzmann Machines, Back-Propagation through Random Operations, Drawing Samples from Auto encoders Generative Stochastic Networks.

TEXT BOOK(S)

1. Deep Learning, Goodfellow, I., Bengio,Y., and Courville, A., MIT Press, 2016.

REFERENCE BOOK(S)

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub G. H., and Van Loan C.F., JHU Press, 2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.
4. Students can also register and use the MOOC course on “Deep Learning Part-I” offered by IIT-M.
5. https://www.deeplearningbook.org/contents/TOC.html

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18CE4241 – DISASTER MANAGEMENT
(Open Elective – III)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course objectives:
Develop ability to
1. Gain knowledge on disasters and assess their impact.
2. Understand disaster management mechanisms.
3. Understand capacity building concepts and planning of disaster managements.
4. Assess various coping strategies during disasters.
5. Understand disaster management acts and policies in India.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Explain the basic concepts of disasters, hazards, risks and vulnerabilities.
- CO2: Develop disaster management mechanisms to protect society.
- CO3: Perform capacity assessment and explain legislative support at state and national levels.
- CO4: Develop coping strategies at the time of disasters.
- CO5: Prepare disaster risk reduction and management plans.

UNIT I
Understanding Disaster: Concept of Disaster – Different approaches – Concept of Risk – Levels of Disasters – Disaster Phenomena and Events (Global, national and regional)
Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards – Characteristics and damage potential or natural hazards; hazard assessment – Dimensions of vulnerability factors; vulnerability assessment – Vulnerability and disaster risk – Vulnerabilities to flood and earthquake hazards.

UNIT II
Disaster Management Mechanism: Concepts of risk management and crisis managements – Disaster Management Cycle – Response and Recovery – Development, Prevention, Mitigation and Preparedness – Planning for Relief

UNIT III
Capacity Building: Concept – Structural and Non-structural measures – Capacity Assessment; Strengthening Capacity for Reducing Risk – Counter – Disaster Resources and their utility in Disaster Management – Legislative Support at the state and national levels

UNIT IV
Coping with Disaster: Coping Strategies; alternative adjustment process – Changing concepts of disaster management – Industrial Safety Plan; Safety norms and survival kits – Mass media and disaster management.

UNIT V

Planning for disaster management: Strategies for disaster management planning – Steps for formulating a disaster risk reduction plan – Disaster management Act and Policy in India – Organizational structure for disaster management in India- Preparation of state and district disaster management plans.

TEXT BOOK(S)

1. Disaster Management, Dr. Mrinalini Pandey, Wiley India Pvt Ltd., 2014.
2. Disaster Science and Management, Tushar Bhattacharya, McGraw Hill Education, 2015.
3. Manual on Disaster Management in India, Ministry of Home Affairs, Government of India.https://www.undp.org/content/dam/india/docs/disaster_management_in_india.pdf

REFERENCE BOOK(S)

1. Disaster Mitigation: Experiences and Reflections, PardeepSahni, PHI Learning, 2010.
2. Disaster Management Global Challenges and Local Solutions, Rajib, S and Krishna Murthy, R.R, Universities Press Hyderabad, 2012.
3. Earth and Atmospheric Disaster Management: Nature and Manmade, Navale Pandharinath and C.K. Rajan, B.S. Publications, Hyderabad, 2009.
4. Manual on National Disaster Management Plan, National Disaster Management Authority, Ministry of Home affairs, Government of India. (http://ndma.gov.in/images/policyplan/dmplan/National%20Disaster%20Management%20Plan%20May%202016.pdf)
5. https://ndma.gov.in/images/pdf/NDMP-2018-Revised-Draft-1-2018OCT16-A.pdf

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18EE4242 MICRO ELECTRO MECHANICAL SYSTEMS
(Open Elective – III)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives:
Develop ability to
1. Understand semiconductors and solid mechanics used to fabricate MEMS devices.
2. Understand basics of Micro fabrication techniques.
3. Understand various sensors and actuators
4. Understand different materials used for MEMS
5. Understand applications of MEMS to disciplines beyond Electrical and Mechanical engineering.

Course Outcomes (COs):
At the end of the course, student would be able to
- CO1: Identify different types of semiconductor and solid mechanic materials that are used to fabricate MEMS devices.
- CO2: Apply basic science, circuit theory, Electro-magnetic field theory, control theory in Micro fabrication techniques.
- CO3: Distinguish between different sensors and actuators.
- CO4: Distinguish between various processes involved in Micro machining.
- CO5: Apply the knowledge of MEMs to other advanced applications such as polymer and optical MEMs.

UNIT I
Basics: Intrinsic Characteristics of MEMS, Energy Domains and Transducers, Sensors and Actuators, Introduction to Micro fabrication, Silicon based MEMS processes, New Materials, Review of Electrical and Mechanical concepts in MEMS, Semiconductor devices, Stress and strain analysis, Flexural beam bending, Torsional deflection

UNIT II
Sensors and Actuators-I: Electrostatic sensors, Parallel plate capacitors, Applications, Inter-digitated Finger capacitor, Comb drive devices, Micro Grippers, Micro Motors, Thermal Sensing and Actuation , Thermal expansion, Thermal couples, Thermal resistors, Thermal Bimorph, Applications, Magnetic Actuators, Micro-magnetic components, Actuation using Shape Memory Alloys

UNIT III
Sensors and Actuators-II: Piezo resistive sensors, Piezo resistive sensor materials, Stress analysis of mechanical elements, Applications to Inertia, Pressure, Tactile and Flow sensors, Piezoelectric sensors and actuators, piezoelectric effects, piezoelectric materials, Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV
Micromachining: Silicon Anisotropic Etching, Anisotrophic Wet Etching, Dry Etching of Silicon, Plasma Etching, Deep Reaction Ion Etching (DRIE), Isotropic Wet Etching, Gas

Phase Etchants, Case studies, Basic surface micro machining processes, Structural and Sacrificial Materials, Acceleration of sacrificial Etch, Striction and Antistriction methods.

UNIT V

Polymer and Optical MEMS Polymers in MEMS, Polimide, SU-8, Liquid Crystal Polymer (LCP), PDMS, PMMA, Parylene, Fluorocarbon, Application to Acceleration, Pressure, Flow and Tactile sensors, Optical MEMS, Lenses and Mirrors, Actuators for Active Optical MEMS.

TEXT BOOK(S)

1. Foundations of MEMS, Chang Liu, Pearson Education Inc., 2006.
2. MEMS and Micro systems Design and Manufacture, Tai Ran Hsu, Tata McGraw Hill, New Delhi, 2002.

REFERENCE BOOK(S)

1. An Introduction to Micro Electro Mechanical System Design, Nadim Maluf, Artech House, 2000.
2. Microsystem Design, Stephen D Senturia, Springer Publication, 2000.
3. The MEMS Handbook, Mohamed Gad-el-Hak, editor, CRC press Baco Raton, 2000
4. Micro Sensors MEMS and Smart Devices, Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim, John Wiley and Son LTD,2002
5. Micro Electro Mechanical System Design, James J.Allen, CRC Press Publisher, 2010
6. Introduction MEMS, Fabrication and Application, Thomas M.Adams and Richard A.Layton, Springer 2012.

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18ME4243 PRINCIPLES OF AUTOMOBILE ENGINEERING
(Open Elective-III)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites: None

Course Objectives:
Develop ability to,
1. Introduction to Engineering analysis of the automobiles and their sub systems.
2. Applications of engineering principles to automotive design.
3. Improves ability to understand the different types of engines and automobile bodies.
4. Familiarization with the automotive industry and its terminology.
5. Develops an idea of utilization of resources duly reducing emission levels for achieving eco-friendly environment.

Course Outcomes (COs):
At the end of the course, the student will be able to
CO1: Demonstrate the basic lay-out of an automobile.
CO2: Distinguish between SI and CI engine's fuel system and cooling systems.
CO3: Classify the principles of fuel ignition systems.
CO4: Infer and select transmission system of an automobile
CO5: Differentiate the steering systems

UNIT I
Introduction: History of Automobiles, Classification of Automobiles. Chassis and body building, Engine Terminology, Classification of Engines

UNIT II
Fuel System: spark Ignition engines-Fuel tank, fuel filter, fuel pump, air cleaner/filter, carburetor types, injection of petrol engines. Compression Ignition engines, Fuel Injection System- air and solid injection system, Pressure charging of engines, super charging and turbo charging
Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System, Radiators, Cooling Fan - water pump, thermostat, evaporating cooling, pressure sealed cooling, antifreeze solutions.

UNIT III
Ignition System: Function of an ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, Battery ignition system

UNIT IV
Transmission System: Clutch principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, gear boxes, types. Propeller shaft, Hotch Kiss drive, Torque tube drive, universal joint, differential, live and dead axles, wheels and tyres.

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder, tandem master cylinder, Requirement of brake fluid, Pneumatic and vacuum brakes.

UNIT V

Steering System: Types of steering mechanism, Ackerman steering mechanism, Davis steering mechanism.

TEXT BOOK(S)

1. Automobile Engineering, Kirpal Singh, Vol.1 and 2, Standard Publishers, New Delhi, 2003.
2. A Text Book of Automobile Engineering, R K Rajput. Laxmi Publications.

REFERENCE BOOK(S)

1. Automotive Engines, Srinivasan.
2. A Text Book of Automobile Engineering By Khalil U Siddiqui New Age International
3. Automobile Engineering,/ William H Crouse
4. A Text Book Automobile Engineering, Manzoor, Nawazish Mehdi and Yosuf Ali, Frontline Publications.

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18EC4244 - BIOMEDICAL INSTRUMENTATION
(Open Elective- III)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Note: No detailed mathematical treatment is required and only elementary treatment is sufficient.

Course Objectives:

Develop ability to

1. Learn the basics of human physiology
2. Understand the basics of bio-medical transducers and recorders.
3. Understand the applications of measuring, recording and monitoring instruments.
4. Understand the concepts of various medical instruments and supporting systems.

Course Outcomes (COs):

At the end of the course, student would be able to

CO1: Explain the functioning of different human physiological systems.
CO2: Explain the operations of transducers and recorders used for bio-medical applications.
CO3: Explain the principles of medical imaging systems.
CO4: Explain the principles of monitoring instruments used for bio-medical application
CO5: Explain the need for health supporting systems

UNIT I
HUMAN PHYSIOLOGY

Introduction to generalized medical instrumentation system, components of instrumentation system , physiological system of human body, cardiovascular system. Respiratory system, Nervous system , generation of bioelectric potentials, Action potential, resting potential, Neuronal communication.

UNIT II
BIO- POTENTIAL ELECTRODES, TRANSDUCERS AND RECORDERS

The electrode – electrolyte interface, Polarization, Ag/Agcl Electrodes, Body surface electrodes, Internal Electrodes. Transducers in general, Pressure Transducers, Temperature transducers, pulse sensors, Basic recording systems.

UNIT III
MEDICAL IMAGING SYSTEMS

Basics of medical imaging systems, block diagrams and applications of - X-ray machine, Computer Tomography, Magnetic Resonance Imaging systems, Ultrasonic Imaging systems.

UNIT IV
MONITORING SYSTEMS
Basic principles of -Stethoscope, BP measuring Instrument, Electrocardiography(ECG), Electroencephalography(EEG) and Electromyography(EMG) recorders,

UNIT V
SUPPORTING SYSTEMS
Basic principles of Pacemaker system, Transcutaneous Electrical Nerve stimulation (TENS), surgical diathermy, Heart lung machine, Hemo Dialysis, Lithotripsy.

TEXT BOOK(S)
1. Bio-Medical Instruments and Measurements, Cromwell, Prentice Hall of India, 1990.
2. Bio-Medical Instrumentation, Dr. Arumugam, Anuradha Agencies, 1994.

REFERENCE BOOK(S)
1. Bio-Medical Electronics and Instrumentation, Prof.Venkataram.S.K, Galgotia Publications, 2000.
2. Introduction to Bio Medical Equipment Technology, John. Can. Brown, Pearson Education of ASIA, 2001.
3. Hand book of Bio-Medical Instrumentation, Khandpur.R.S, Tata McGraw –Hill, 1987

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18MB4246 – ENTREPRENEURSHIP
(OPEN ELECTIVE - III)

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisites: None

Course Objectives:
Develop ability to
1. Understand the mindset of the entrepreneurs.
2. Analyze the financial aspects of establishing an enterprise.
3. Learn entrepreneurial activities and determine strategies for launching.
4. Identify the challenges of entrepreneurship and develop an idea on the entrepreneurial
5. framework.
6. Apply strategic perspectives in entrepreneurship.

Course Outcomes (COs):
At the end of the course, student would be able to
CO1: Explore and identify the entrepreneurial traits.
CO2: Identify various funding agencies and role of IPR.
CO3: Imagine and identify opportunities to launch new ventures.
CO4: Address entrepreneurial challenges.
CO5: Develop strategies for bringing stability and growth in business.

UNIT I
Introduction to entrepreneurship: meaning, importance, entrepreneurship characteristics, women entrepreneurs, classifications of entrepreneurs, myths of entrepreneurship, qualities of entrepreneurship, competencies, attitude function and nature of forms of entrepreneurship.

UNIT II
Promotion and financial aspects of entrepreneurship: Idea generation- opportunities-SWOT analysis, patents and trademark, intellectual property rights, source of capital, debt capital, seed capital, venture capital- informal agencies in financing entrepreneurs. Government grants and subsidies, types of investors and private offerings.

UNIT III
Launching entrepreneurial ventures: opportunities identification- entrepreneurial imagination and creativities – the nature of the creativity process innovation and entrepreneurial- methods to initiate venture creating, new ventures-acquiring and established entrepreneurial venture, franchising hybrid-disadvantage of franchising.

UNIT IV
Legal challenges of entrepreneurship: Intellectual property protection patents, copy rights-trademarks and trade secret. Avoiding pitfalls-formulation of the entrepreneurial plan-the challenges of new venture startups-poor financial understanding-critical factors for new venture development, the evaluation process, feasibility criteria approach.

UNIT V

Strategic perspectives in entrepreneurship: Strategic planning-strategic actions-strategic positioning-business stabilization-building the adoptive firms-understanding the growth stage unique managerial concern of growing ventures.

TEXT BOOK(S)

1. Entrepreneurship- A South - Asian Perspective, D F Kuratko and T V Rao, Cengage
2. Learning, 1/e, 2012.
3. Small Scale industries and entrepreneurship, Vasanth Desai, Himalaya Publishing 2012.

REFERENCE BOOK(S)

1. Entrepreneurship Development: Text and Cases, Excel Books, B. Janakiram and M. Rizwana, 2011.
2. Effectual Entrepreneurship, Stuart Read, Routledge, 2013.
3. Fundamentals of Entrepreneurship, Nandan H, PHI, 2013.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
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Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

18MB4202 - PROJECT MANAGEMENT AND FINANCE

IV Year. B.Tech. (IT) – II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objective:
Develop ability to
1. To understand the Fundamentals of Project Management and Financial considerations involved in it.

Course outcomes (COs):
At the end of the course, the student would be able to
- CO1: Project Management process, project selection methods based on financial criteria.
- CO2: Estimate project duration and completion time, estimate the cost and develop a project plan.
- CO3: Risk management process.
- CO4: Financing of project.
- CO5: Concept of Venture capital.

UNIT I
Introduction to Project Management and Selection Criteria: Project definition, Program, Portfolio, Project life cycle cum phases. Importance of Project management. Project management process and classification. Project selection- Project Portfolio Management system, selection methods.

UNIT II
Estimating times and cost: Factors influencing quality of estimates, estimation methods, types of cost, developing network, constructing project network, activity on node, network computation. PERT.

UNIT III
Managing Risk: Risk management process- contingency planning, change control. Project risk management, resource allocation. Analysis of project risks, Market risk, Firm risk.

UNIT IV
Financing of Projects: Capital structure, methods of offering, equity capital, preference capital, debenture. Methods of offering term loans, working capital advances. Project financing structure.

UNIT V
Financing infrastructure projects and Venture capital: Typical project configuration, key project parties. Project contracts, infrastructure financing scenario in India. Venture capital investor, venture capital investment, raising venture capital.

TEXT BOOK(S)

1. Project management- The managerial process, Clifford F Gray, Erik W Larsom, Gautam V. Desai, 4ed, THM
2. Project- Planning, analysis, selection , financing, implementation and review, Prasanna Chandra, 6ed, TMH
3. Project Management- Achieving completitive advantage, Jeffrey K Pinto, 1st ed, PHP