Academic Regulations

Program Structure & Detailed Syllabus

For

Under Graduate Programme (B.Tech)

COMPUTER SCIENCE & ENGINEERING

(Applicable For Batches Admitted From 2020 – 2021)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

DUVVADA - VISAKHAPATNAM – 530 049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUK, Kakinada, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

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ACADEMIC REGULATIONS
(VR 20)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)
VISAKHAPATNAM

ACADEMIC REGULATIONS for B. Tech. (Regular)
(Applicable for the batches admitted 2020-21 onwards)

The Admission of students into B. Tech. course shall be as per the Govt. of Andhra Pradesh rules.

1. Award of B. Tech. Degree

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

a. Pursue a program of study for not less than four academic years and not more than eight academic years.
b. For lateral entry scheme admission: Pursue a program of study for not less than three academic years and not more than six academic years.
c. For the award of a degree, regular candidate has to register for 160 credits and shall secure 160 credits.
d. Lateral entry candidate has to register for 121 credits from second year onwards and shall secure 121 credits

2. Courses of Study

The following courses of study are offered at present for specialization in the B. Tech. Course.

S. No.	Course Code	Programme & Abbreviation
01	01	Civil Engineering (CE)
02	02	Electrical and Electronics Engineering (EEE)
03	03	Mechanical Engineering (ME)
04	04	Electronics and Communication Engineering (ECE)
05	05	Computer Science and Engineering (CSE)
06	12	Information Technology (IT)
07	19	Electronics and Computer Engineering (E. Com E)
08	54	Artificial Intelligence and Data Science (AI&DS)

And any other Course as approved by the authorities of the Institute from time to time.

3. Registration: A student shall register for courses in each semester as per the courses offered by the concerned department.

4. Curricular Program:
The Curriculum of the four-year B. Tech course has been designed to achieve a healthy balance between theory & lab hours, industry orientated and to develop technical skills, Interdisciplinary skills etc.,

5. Distribution and Weightage of Marks

i. The performance of a student in each semester shall be evaluated course -wise with a maximum of 100 marks for theory courses and 50 marks for practical course. The project work shall be evaluated for 200 marks.

ii. For theory course the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Semester Examinations. Distribution of marks for theory course, practical course and Design/Drawing is detailed below:

5.1. Internal 30 marks for theory course shall be awarded as follows:

i) MID exams -18marks
ii) Continuous assessment - 10 marks
iii) Attendance - 2 marks

MID marks shall be calculated with 80% weightage for best of the two MIDs and 20% weightage for other MID exam.

5.2. For practical courses (Laboratory): There shall be continuous evaluation during the semester. Each Lab exam is evaluated for 50 marks. 20 marks shall be awarded for internal examination and 30 marks shall be awarded for external examinations.

5.2.1. Internal marks shall be awarded as follows

i) Day to day assessment including record– 10 Marks
ii) Internal laboratory exam– 10 Marks

5.2.2. The semester end examinations shall be conducted by the faculty concerned and external examiner

5.3. For the courses having design and/or drawing, (Such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation.

5.3.1. Internal marks shall be awarded as follows:

i) 18 marks for Mid exams
   - Day-to-day assessment - 8 marks
   - Internal exam - 10 marks
ii) Continuous assessment - 10 marks
iii) Attendance - 2 marks

There shall be two internal examinations in a semester and the internal marks shall be calculated with 80% weightage for best of the two internals and 20% weightage for other internal exam.

5.3.2. External examination shall be conducted for 70 marks.

5.4. Special Courses:

5.1.1. **Engineering Exploration (EE) course:**

EE course is evaluated for 50 marks.
i) Internal 20 marks shall be awarded based on the day-to-day performance of the activities.

ii) External evaluation shall be conducted for 30 marks.

- Project submission – 20 marks
- Viva-Voce – 10 marks

5.1.2. **Games, Sports & Yoga:** Though this course has no credits, it is mandatory to satisfy minimum attendance of 80%.

5.5. Mini project (EPICS): It is to be carried out during the second year. Students have an option to choose their own area of interest related to problems impacting the society. It is evaluated for 50 marks.

i) Internal assessment - 20 marks ii) Project submission and Viva-Voce - 30 marks

5.6. Evaluation of the summer internships:

It shall be completed in collaboration with local industries, Govt.Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme.

The minimum duration of this course shall be at least 4-6 weeks.

A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship.

After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate from industry / skill development centre shall be included in the report. It shall be evaluated for 50 external marks at the end of the semester. The technical report and the oral presentation shall carry 20 marks and 30 marks respectively. There shall be no internal marks for Summer Internship. In case, if a student fails, he /she shall reappear as and when semester supplementary examinations are conducted.

5.7. Job – oriented skill courses

The job-oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the list skills learned. If the student completes job- oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record/report: 20 marks and viva-voce/exam: 30 marks) along with laboratory end examinations in the presence of external and internal examiner (course instructor or mentor). There are no internal marks for the job-oriented skill courses.

5. 8. Audit courses: All audit courses will be "Pass/Fail" type with no credit points allotted. The result of the student in the audit course will be notified in the marks memo. A student must pass all the audit courses registered to be eligible for the award of B. Tech. degree. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these subjects.

List of audit courses will be notified from time to time. An indicative list of courses is as shown below.

a) Professional ethics & Universal Human Values b) Constitution of India c) Life skillsd) Environmental science e) Entrepreneurship development f) IPR & Patents g) Gender sensitization for women empowerment h) Game, sports and yoga

5.9. MOOCs: It is an online course (Minimum of 12 weeks) to promote advanced knowledge suitable for placement and research.

To award credits, the student should get certificate after they have registered for written exam and successfully passed

(Or)

College will conduct the written examination/Viva-voce and award the credits and grades.

In case a student fails in any online course, he/she may be permitted to register for the same course or an alternate course decided by the department committee. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of MOOCs course remains same as general theory course.

Note: The registered course must not be same as any of the courses listed in the program structure of their regulation till final year including electives.

5.10.Main Project *(*Project - Project work, seminar and internship in industry):

In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated by external examiner.

Evaluation: The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15marks, Seminar: 15marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner and is evaluated for 140marks.

5.11 Integrated theory lab:

a. The integrated course is in the ratio of 2:1 (total credit: 3).
b. Attendance shall be counted for both in theory as well as lab. Minimum attendance shall be required individually in theory and lab as per institute norms
c. Student has to attend the internal examination and external examination conducted by the institution as per the regulations.

d. Student has to pass individually both the external examinations (Theory for 100 marks and Lab for 50 marks)
e. If the student fails in either theory or laboratory, the final result is FAIL only.
f. The student has to pass separately both in the external theory examination and external lab examination

6. Attendance Requirements:

a. It is desirable for a candidate to have 100% attendance in the class in all the courses. However, a candidate shall be permitted to appear for the end semester examination if he/she has a minimum of 75% aggregate attendance in the semester. Student will not be permitted to write Mid examination if the attendance percentage is less than 75 % during the stipulated instruction duration. However, Academic Committee shall review the situation and take appropriate decision.
Note: Special cases for students having extraordinary performance at National and International level will be considered by the Academic Committee.

b. Condonation of shortage of attendance may be considered on Medical grounds maximum up to 10%, if the student provides the medical certificate to the HOD immediately after he / she recovers from the illness. Medical Certificate submitted afterwards shall not be permitted. Shortage of attendance equal to or above 65% and below 75%will be condoned on payment of fee as fixed by the competent authority and the student concerned will be permitted to take the end semester examination. ***This privilege is given only three times for regular student and only two times for lateral entry student during the entire program of study***.

c. Shortage of attendance may be considered for the students who participate in prestigious sports, co and extra-curricular activities if their attendance is in the minimum prescribed limit.

d. A student will be promoted to the next semester if satisfies attendance and credits requirement.

7. Academic Requirements:

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

For any course, student is considered to be passed upon securing minimum 40% marks in the external examination alone and minimum 50% marks from both internal and external examination put together

8. Promotion Policy:

a) Astudentshallbepromotedfromfirstyeartosecondyearifhefulfillstheminimum attendance requirements.
b) To promote to III year, a student has to secure minimum 40% of total credits from I &II-year courses
c) To promote to IV year, a student has to secure minimum 40% of total credits from I, II &III-year courses
d) In case of Lateral entry students, to promote to IV year, a student has to secure minimum 40% of total credits from II & III-year courses

9. GAP Year: Gap year concept is introduced after completion of the I/II/III year to give the opportunity to explore entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at Institute level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing Gap year.

10. Supplementary examinations: Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even semester and vice versa. In case a student fails in online courses/ industrial lecture(s), he/she may be permitted to register for another course/lecture(s).

11. Examinations and Evaluation

a. General guidelines

i. All the semester end examinations are conducted for duration of three hours
ii. External examination shall be conducted for 70 marks consist of five questions of internal choice carrying 14 marks each.
iii. For laboratory examinations, the evaluation is done by internal examiner and an external examiner.

b. Revaluation

There is a provision for revaluation of theory courses if student fulfils the following norms.

The request for revaluation must be made in the prescribed format duly recommended by the Chief Superintendent of Examinations through Additional Controller along with the prescribed revaluation fee.

12. Grading System:

CGPA

Marks Range (in %)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥80 to <90	A	Excellent	9
≥70 to <80	B	Very Good	8
≥60 to <70	C	Good	7
≥50 to <60	D	Satisfactory	6
<50	F	Fail	0
	AB	Absent	-1
	WH	Withheld	-2
	MP	Malpractice	-3
	CP	Completed	

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average. (SGPA) and Cumulative Grade Point Average (CGPA):

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

SGPA (Si) = Σ(Ci x Gi) / ΣCi

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

Computation of CGPA

- The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$CGPA = \Sigma(Ci \times Si) / \Sigma Ci$$

Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

Conversion of CGPA to Percentage:

Equivalent Percentage = (CGPA – 0.75) X 10

13. Award of Class

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

Regular:

Class Awarded	**CGPA to be secured**	**From the CGPA secured from160 Credits.**
First Class with Distinction	≥ 7.75 with no failures	
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	

Lateral- entry scheme

Class Awarded	**CGPA to be secured**	**From the CGPA secured from121 Credits from II Year to IV Year**
First Class with Distinction	≥ 7.75 with no failures	
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	

14. General Instructions

i. Where the words ‘he’, ‘him’, ‘his’, occur, they imply ‘she’, ‘her’, ‘hers’, also.

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 Chairman, Academic Council is final.

iv. The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institution.

15. Transitory Regulations

i. The student has to continue the course work along with the regular students of the respective semester in which the student gets re-admission.

ii. The student has to register for Substitute / Compulsory courses offered in place of courses studied earlier.

iii. The mode of internal evaluation and end-semester examinations shall be on par with the regular students, i.e., the student has to follow the mode of internal evaluation and the then question paper model for the end-semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and end-semester examinations will be pro-rated in accordance with the regulations under which the student was first admitted.

iv. For the courses studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as the one in which the student took examination during previous regulations.

v. The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

vi. All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

vii. The decision of the Principal is final on any other clarification in this regard.

viii. Transcripts: After successful completion of the entire program of study, a transcript containing performance of all academic years will be issued as a final record. Partial transcript will also be issued up to any point of study to a student on request, after payment of requisite fee.

16. Minimum Instruction Days

The minimum instruction days for each semester shall be 16 weeks

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

17. Withholding of Results

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

Note: All other regulations including attendance requirements related to four year B. Tech Regular program will be applicable for B.Tech. Lateral Entry Scheme.

18. Malpractices Rules

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

S. No	Nature of Malpractices/ Improper conduct	Punishment
1 (a)	If the candidate 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.
(b)	If the candidate 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 will be handed over to the police and a case is registered against him.
2	If the candidate 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	If the candidate 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 imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the candidate 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	If the candidate 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	If the candidate 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 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 will be handed over to the police and a police case is registered against them.

	in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7	If the candidate 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	If the candidate possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses 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 college, 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. Person(s) who do not belong to the College will be handed over to police and. a police case will be registered against them.
10	If the candidate comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses 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.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Academic committee of the Institute for further action to award suitable punishment.	

19. UGC RECOMMENDED PUNISHMENT FOR RAGGING

i. Suspension from attending classes and academic privileges
ii. Withholding/withdrawing scholarships/fellowship and other benefits.
iii. Debarring from appearing in any test/examination or other evaluation process
iv. Withholding results
v. Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.
vi. Suspension/expulsion from the hostel
vii. Cancellation of admission
viii. Rustication from the institution for period ranging from 1 to 4 semesters.
ix. Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.
x. Fine may extend up to Rs. 2.5 lakh.

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VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)
VISAKHAPATNAM

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Guidelines B. Tech Minors in Engineering
(Applicable from the Academic Year 2020-21 (VR20))
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Award of B. Tech. (Minor): A student has to acquire 20 more credits, in addition to 160 credits required, for the award of the minor. The department concerned will determine the required courses for award of minor. The subjects in minor programme would be a combination of mostly core and some electives.

Registering for Minor is optional.

I. OBJECTIVES

The objectives of initiating the minor certification are:

(a) To diversify the knowledge of the under graduates.
(b) To make the undergraduates more employable.
(c) To have more educational and professional skills after the completion of his undergraduate courses.
(d) To give a scope to specialize students in other streams of engineering in addition to the ones they are currently pursuing.

II. Applicability and Enrolment

(a) To all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology
(b) There shall be no limit on the number of programs offered under Minor. The minor programs in emerging technologies based on expertise in the respective departments may be offered and minor can also be offered in collaboration with the relevant industries/agencies.
(c) Total number of seats offered for a minor programme shall be a maximum of 35% of sanctioned intake of major degree programme.
(d) If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
(e) The allotment of seat into minor is based on the percentage of marks obtained in the major degree programme. Percentage of marks shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students
(f) In the event of any tie during the seat allotment for a minor, the concerned major degree department offering minor shall conduct a test/interview on the prerequisite subjects of minor and final decision shall be taken.
(g) For applicability of minor, both regular B Tech and minor courses shall be successfully completed with specified SGPA/CGPA
(h) A student shall report the concerned Principal of the college, if he/she is not interested to pursue/continue the minor programme.
(i) Transfer of credits from a particular minor to regular B. Tech or another major degree and vice-versa shall not be permitted

III. Entry level

(a) The B. Tech students (both Regular and Lateral Entry) pursuing a major degree programme can register for minor at their choice in any other department offering minor from III semester on wards.
(b) Students registering for minor shall select the subjects from other branches. For example, if a student pursuing major degree in Electrical & Electronics Engineering shall select the subjects specified for minor in Civil Engineering and he/she will get major degree of Electrical & Electronics Engineering with minor of Civil Engineering.
(c) Student pursuing major degree in any engineering branch is eligible to register for

minor in any other engineering branch. However, students pursuing major degree in a particular Engineering are not allowed to register for minor in the same engineering branch.

(d) Only those students, who have a CGPA of 7.75 or above, without any backlog, will be permitted to register for a minor.

(e) An SGPA or CGPA in excess of 7.75 has to be maintained in the subsequent semesters in major as well as minor without any backlogs in order to keep the minor registration active.

(f) Should both the SGPA and CGPA fall below 7.75 at any point after registering for the minor; the minor registration will cease to be active.

(g) A student registered for minor in a discipline must register and pass in all subjects with a minimum GPA of 7.75 that constitute requirement for award of minor.

(h) Separate CGPA shall be shown on semester and final transcripts of regular B. Tech and minor.

(i) Students shall not be permitted to register for minor after completion of VI semester.

(j) Students shall be permitted to select a maximum of two subjects per semester from the list of subjects specified for minor.

(k) The students shall complete minor without supplementary appearance within stipulated period for the completion of regular major B. Tech programme.

(l) Minor shall not be awarded at any circumstances without completing the regular major
B. Tech programme in which a student got admitted

(m) If a student is detained due to lack of attendance, he/she shall not be permitted to register the courses of minor

(n) If a student failed in any registered course of the minor, he/she shall not be eligible to continue the B.Tech minor. However, the additional credits and grades thus far earned by the student shall be included in the grade card but shall not be considered to calculate the CGPA.

(o) The subjects completed under minor programme shall not be considered as equivalent subjects in case the student fails to complete the major degree programme

(p) Students completed their degree shall not be permitted to register for minor

IV. Structure of Minor in B. Tech

(a) The student shall earn at least 20 credits for award of minor from other branch/department/discipline registered for major degree.

(b) Students can complete minor courses either in the college or in online from platforms like NPTEL/SWAYAM etc.

(c) The overall attendance in each semester of regular B. Tech courses and minor courses shall be computed separately

(d) A student shall maintain an overall attendance of 75% in all registered courses of minor to be eligible for attending semester end examinations. However, condonation for shortage of attendance between 65-75% may be given as per norms. On the recommendations of College Academic Council, the student concerned will be permitted to take the semester end examinations, on payment of condonation fee.

(e) Student having less than 65% attendance in minor courses shall not be permitted for end semester examinations.

(f) A student detained due to lack of attendance in regular B. Tech programme shall not be permitted to continue minor programme

(g) The teaching, examinations (internal and external) and evaluation procedure of

minor courses offered in offline is similar to regular B. Tech courses

(h) The students may choose theory or practical courses to fulfil the minimum credit requirement.

(i) The students may be allowed to take maximum two subjects per semester pertaining to their minor

(j) The students are permitted to opt for only a single minor course in his/her entire tenure of B.Tech(Engineering)

(k) The students registered for B. Tech (Honors) shall not be permitted to register for minor

(l) The student is not permitted to take the electives courses from the parent department fulfil the minimum credit requirement.

V. Credits requirement

(a) A Student will be eligible to get minor along with major degree engineering, if he/she completes an additional 20 credits. These may be acquired either in offline or online like NPTEL/SWAYAM

(b) Of the 20 additional credits to be acquired, 16 credits shall be earned by undergoing specified courses of minor, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two NPTEL, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.

(c) The colleges offering minor courses shall be ready teach the courses in offline at their college in the concerned departments. Curriculum and the syllabus of the courses shall be approved by the Board of Studies

(d) The online NPTEL/SWAYAM subjects selected by a student shall be approved by concerned BOS. The duration of courses shall be a minimum of 14weeks.

(e) The teaching and evaluation procedure of minor courses offering in offline mode shall be similar to that of regular B. Tech courses

(f) Students shall produce a certificate issued by the NPTEL/SWAYAM conducting agency as a proof of credit attainment

(g) The assessment and certification of the NPTEL shall be as per the prescribed norms of the NPTEL.

(h) After successful completion of all major and minor courses with specified CGPA the Institute will award both major and minors

(i) If a student fails to complete a course offered in online/offline, he/she will not be permitted to continue the minor

VI. Procedure to Applying for the Minor

(a) The department offering the minor will announce specialization and courses before the start of the session.

(b) The interested students shall apply through the HOD of his/her parent department.

(c) The concerned department will announce the list of the selected students for the minor.

(d) The whole process should be completed within one week before the start of every session.

(e) Selected students shall be permitted to register the courses for minor.

VII. Registering for minor courses

(a) Each department offering the minor will submit the final list of selected students to the principal.

(b) The selected students shall submit a joining letter to the Principal through the concerned HOD offering the minor. The student shall inform same to the HOD of his/her parent department.

(c) Both parent department and department offering minor shall maintain the record of student pursing the minor
(d) With the approval of Principal and suggestion of advisor, students can choose courses from the approved list and shall register the courses within a week as per the conditions laid down in the structure for the minor.
(e) Each department shall communicate the minor courses registered by the students to the time table drafting committee and accordingly time table will be drafting. Time table drafting committee shall see that no clash in timetables.
(f) If the student wishes to withdraw/change the registration of subject/course, he/she shall inform the same to advisor, subject teacher, HODs of minor department and parent department and Principal within two weeks after registration of the course.

VIII. Procedure for Monitoring the Progress of the Scheme

The students enrolled in the minor courses will be monitored continuously at par with the prevailing practices and examination standards. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.

IX. Allocation of seats for minor

(a) The Institute will notify the number of the seats for minor in the concerned department well in advance before the start of the semester
(b) Total number of seats offered for a minor programme shall be a maximum of 35% of sanctioned intake of major degree programme.
(c) The list of the elective for minor will be offered from the list of running majors in the concerned subjects. Each department of concerned institute will notify the seats for the minor well before the start of each session as per the following Table

S. No	Name of the course	Sanction seats of major degree programme	Seats offered for minor	Courses offered	Credits for each course

X. Course Fees for registration of subjects in Minor degree

There is no fee for registration of subjects for minor degree programme offered in offline at the respective colleges.

XI. Examinations

(a) The examination for the minor courses offered in offline shall be conducted along with regular B. Tech programme.
(b) The examinations (internal and external) and evaluation procedure of minor courses offered in offline is similar to regular B. Tech courses.
(c) A separate transcript shall be issued for the minor subjects passed in each semester
(d) There is no supplementary examination for the failed subjects in a minor programme.

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)
VISAKHAPATNAM

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Guidelines for B. Tech Honors - B. Tech (Honors)

(Applicable from the Academic Year 2020-21 (VR20))
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Award of B. Tech. (Honors): All the students pursuing regular B.Tech with prerequisite CGPA are eligible to the register Honors degree course. A student has to acquire 20 more credits, in addition to 160 credits required, for the award of the B.Tech Honors degree. The additional courses shall be advanced subjects in the concerned department/discipline. The department concerned will determine required courses for award of Honor degree. The subjects in the Honor degree would be a combination of core (theory and lab) and some electives.

I. OBJECTIVES

The objectives of initiating the B. Tech (Honors) degree certification are:

a) To encourage the undergraduates towards higher studies and research
b) To prepare the students to specialize in core Engineering streams
c) To attain the high-level competence in the specialized area of Under Graduate programme
d) To learn the best educational and professional skills in the specialized area after the completion of his undergraduate courses.
e) To provide the opportunity to learn the post graduate level courses in the specified undergraduate programme

II. Applicability and Enrolment

a) To all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology
b) The department offering Honors shall have at least one M. Tech in concerned stream, for B. Tech (Honors) registration.
c) Total number of seats offered for a minor programme shall be a maximum of 35% of sanctioned intake of major degree programme.
d) The allotment of seat into Honors degree is based on the percentage of marks obtained in the major degree programme. Percentage of marks shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students
e) In the event of any tie during the seat allotment for a Honors degree, the concerned major degree department offering minor shall conduct a test/interview on the prerequisite subjects of Honors degree and final decision shall be taken.
f) For applicability of Honors degree, both regular B Tech and Honors degree courses shall be successfully completed with specified SGPA/GCPA
g) A student shall report the concerned Principal of the college, if he/she is not interested to pursue/continue the Honors degree programme. Transfer of credits from a particular minor to regular B. Tech or another major degree and vice-versa shall not be permitted

III. Entry level

(a) The B. Tech students (both Regular and Lateral Entry) pursuing a major degree programme can register for Honors degree at their choice in any same department offering major degree from III semester onwards
(b) Students registering for Honors degree shall select the subjects from same branches/department based on the recommendations of BOS committee. For example, if a student pursuing major degree in Electrical & Electronics Engineering shall the selects subjects in Electrical & Electronics Engineering only and he/she will get major and Honors degree in Electrical & Electronics Engineering
(c) Only those students, who have a CGPA of 8.0 or above, without any backlog, will

be permitted to register for a Honors degree

(d) An SGPA or CGPA in excess of 8.0 has to be maintained in the subsequent semesters in major as well as Honors degree without any backlogs in order to keep the Honors degree registration active.

(e) Should both the SGPA and CGPA fall below 8.0 at any point after registering for the Honors; the Honors degree registration will cease to be active.

(f) A student registered for Honors degree in a discipline must register and pass in all subjects with a minimum GPA of 8.0 that constitute requirement for award of Honors degree.

(g) Separate SGPA/CGPA shall be shown on semester and final transcripts of regular B. Tech and minor.

(h) Students shall not be permitted to register for Honors degree after completion of VI semester.

(i) Students shall be permitted to select a maximum of two subjects per semester from the list of subjects specified for Honors degree.

(j) The students shall complete Honors degree without supplementary appearance within stipulated period as notified by JNTUK for the completion of regular major B. Tech programme.

(k) Honors degree shall not be awarded at any circumstances without completing the regular major B. Tech programme in which a student got admitted

(l) If a student is detained due to lack of attendance, he/she shall not be permitted to register the courses for Honors degree

(m) If a student failed in any registered course of the Honors, he/she shall not be eligible to continue the B. Tech Honors. However, the additional credits and grades thus far earned by the student shall be included in the grade card but shall not be considered to calculate the CGPA.

(n) The subjects completed under Honors degree programme shall not be considered as equivalent subjects in case the student fails to complete the major degree programme

(o) Students completed their degree shall not be permitted to register for Honors degree

IV. Structure of Honors in B.Tech

(a) The student shall earn at least 20 credits for award of Honors degree from same branch/department/discipline registered for major degree

(b) Students can complete Honors degree courses either in the college or online from platforms like NPTEL/SWAYAM etc.

(c) Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses list in the departments, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two NPTEL, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.

(d) The overall attendance in each semester of regular B. Tech courses and Honors degree courses shall be computed separately

(e) A student shall maintain an overall attendance of 75% in all registered courses of Honors to be eligible for attending semester end examinations. However, condonation for shortage of attendance between 65-75% may be given as per norms. On the recommendations of College Academic Council, the student concerned will be permitted to take the semester end examinations, on payment of condonation fee

(f) Student having less than 65% attendance in Honors courses shall not be permitted

for semester end examinations.

(g) A student detained due to lack of attendance in regular B. Tech programme shall not be permitted to continue Honors programme

(h) The teaching, examinations (internal and external) and evaluation procedure of Honors degree courses offered in offline is similar to regular B. Tech courses

(i) Students may choose theory or practical courses to fulfil the minimum credit requirement.

(j) Students shall be allowed to take maximum two subjects per semester pertaining to their Honors degree

(k) The students registered for minor shall not be permitted to register for B. Tech(Honors)

V. Credits requirement

(a) A Student will be eligible to get B. Tech (Honors), if he/she completes an additional 20 credits. These may be acquired either in offline or online like NPTEL/SWAYAM

(b) The colleges offering Honors degree courses shall be ready teach the courses in offline at their college in the concerned departments. Curriculum and the syllabus of the courses shall be approved by the Board of Studies

(c) The online NPTEL/SWAYAM subjects selected by a student shall be approved by concerned BOS. The duration of courses shall be a minimum of 14weeks.

(d) The assessment and certification of the NPTEL shall be as per the prescribed norms of the NPTEL.

(e) Students shall produce a certificate issued by the NPTEL/SWAYAM conducting agency as a proof of credit attainment.

(f) The teaching and evaluation procedure of Honors courses offering in offline mode shall be similar to that of regular B. Tech courses

(g) After successful completion of all major and Honors degree courses with specified CGPA the Institute will award B. Tech(Honors)

(h) If a student fails to complete a course offered in online/offline, he/she will not be permitted to continue the Honors degree

VI. Procedure to Applying for Honors degree

(a) The department offering the Honors will announce courses required before the start of the session.

(b) The interested students shall apply for the Honors course to the HOD of the concerned department

(c) The concerned department will announce the list of the selected students for the minor.

(d) The whole process should be completed within one week before the start of every session.

(e) Selected students shall be permitted to register the courses for Honors degree.

VII. Joining in Honor courses in B.Tech

(a) Each department offering the Honors degree shall submit the final list of selected students to the principal.

(b) The selected students shall submit a joining letter to the Principal through the concerned HOD.

(c) The department offering Honors shall maintain the record of student pursing the Honors degree

(d) With the approval of Principal and suggestion of advisor/mentor, students can

choose courses from the approved list and shall register the courses within a week as per the conditions laid down in the structure for the Honor degree.

(e) Each department shall communicate the Honors courses registered by the students to the time table drafting committee and accordingly time table will be drafting. Time table drafting committee shall see that no clash in timetables.

(f) If the student wishes to withdraw/change the registration of subject/course, he/she shall inform the same to advisor/mentor, subject teacher, HODs of minor department and parent department and Principal within two weeks after registration of the course.

VIII. Procedure for Monitoring the Progress of the Scheme

The students enrolled in the Honor courses will be monitored continuously at par with the prevailing practices and examination standards. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.

IX. Allocation of seats for Honors degree

(a) The Institute will notify the number of the seats for Honors degree in each department well in advance before the start of the semester

(b) Total number of seats offered for Honors degree shall be a maximum of 35% of sanctioned intake of major degree programme.

(c) Each department of concerned institute will notify the seats for the Honors well before the start of each session as per the following Table

S. No	Name of the course	Sanction seats of major degree programme	Seats offered for Honors	Courses offered	Credits for each course

X. Course Fees for registration of subjects in Major degree

There is no fee for registration of subjects for major degree programme offered in offline at the respective colleges.

XI. Examinations

(a) The examination for the Honors degree courses offered in offline shall be conducted along with regular B. Tech programme.

(b) The examinations (internal and external) and evaluation procedure of Honors degree courses offered in offline is similar to regular B. Tech courses.

(c) A separate transcript shall be issued for the minor subjects passed in each semester

(d) There is no supplementary examination for the failed subjects in a Honors degree programme.

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY: VISAKHAPATNAM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
PROGRAM STRUCTURE – VR-20

I Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1000201100	Mathematics-I	3	0	0	3
2	1005201100	Problem Solving and Programming using C	3	0	0	3
3	1003201101	Engineering Drawing	1	0	4	3
4	1000201102	Technical English Communication	3	0	0	2
5	1000201105	Applied Chemistry	3	0	0	3
6	1000201110	Technical English Communication Lab	0	0	3	1.5
7	1005201110	Problem Solving and Programming using C Lab	0	0	3	1.5
8	1000201113	Applied Chemistry Lab	0	0	3	1.5
9	1000201160	Engineering Exploration Lab	0	0	2	1
10	1000201120	Game, Sports and Yoga	0	0	4	0
Total Credits						**19.5**

I Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1.	1005201200	Object Oriented Programming through C++	3	0	0	3
2.	1005201201	Computer Organization	3	0	0	3
3.	1005201202	Web Design	3	0	0	3
4.	1000201104	Mathematics-II	3	1	0	3
5.	1000201204	Applied Physics	3	0	0	3
6.	1005201210	Object Oriented Programming through C++ Lab	0	0	3	1.5
7.	1000201212	Applied Physics Lab	0	0	3	1.5
8.	1005201211	Web Design Lab	0	0	3	1.5
9.	1000201121	Constitution of India	2	0	0	0
Total Credits						**19.5**

Total Credits (I Year – I&II Sem) = 39

II Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005202100	Java Programming	3	0	0	3
2	1000202100	Discrete Mathematical Structures	3	1	0	3
3	1005202101	Operating Systems	3	0	0	3
4	1005202102	Essentials for Competitive Programming	3	0	0	3
5	1005201203	Data Structures	3	0	0	3
6	1005202110	Java Programming Lab	0	0	3	1.5
7	1005202111	Operating Systems Lab	0	0	3	1.5
8	1005201212	Data Structures Lab	0	0	3	1.5
9	1000202180	Digital English	0	0	4	2
10	1000202121	Environmental Science	2	0	0	0
Total Credits						**21.5**

II Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005202200	Database Management Systems	3	0	0	3
2	1005202201	Advanced Data Structures	3	0	0	3
3	1005202202	Formal Languages and Automata Theory	3	1	0	3
4	1000202102	Probability and Statistics	3	1	0	3
5	1005202103	Software Engineering	3	0	0	3
6	1005202210	Database Management Systems Lab	0	0	3	1.5
7	1005202211	Advanced Data Structures Lab	0	0	3	1.5
8	1005202112	Unified Modelling Language Lab	0	0	3	1.5
9	1005202280	Java Script	0	0	4	2
10	1005202260	Mini Project (EPICS)	0	0	2	1
11	1000202120	Life Skills	2	0	0	0
Total Credits						**22.5**
MANDATORY SUMMER INTERNSHIP						
12		**Honors / Minor Courses**	**4**	**0**	**0**	**4**

Total Credits (II Year – I&II Sem) = 44

III Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005203100	Advanced Web Technologies	3	0	0	3
2	1005202203	Design and Analysis of Algorithms	3	0	0	3
3	1005202104	Programming Essentials in Python	3	0	0	3
4	**Open Elective-I**					
	1001202140	Industrial Waste and Waste Water Management	3	0	0	3
	1003203140	Green Engineering Systems				
	1004203141	Data Communications				
	1000202103	Statistics for Data Science-II				
5	**Professional Elective-I**					
	1005203130	Agile Methodologies	3	0	0	3
	1005203131	Computer Graphics				
	1005203132	Advanced Computer Architecture				
	1005203133	Unix and Shell Programming				
	1005203134	Compiler Design				
6	1005203110	Advanced Web Technologies Lab	0	0	3	1.5
7	1005202212	Algorithms Lab	0	0	3	1.5
8	1005202113	Programming Essentials in Python Lab	0	0	3	1.5
9	1020202100	Employability Readiness Program	2	0	0	2
10	1099203120	Entrepreneurship Development	2	0	0	0
11	1005203160	Summer Internship	0	0	0	1.5
Total Credits						23
12		**Honors/Minor Courses**	**4**	**0**	**0**	**4**

III Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005202204	Data Warehousing and Data Mining	3	1	0	3
2	1012203100	Computer Networks	3	0	0	3
3	1099202100	Managerial Economics and Financial Analysis	3	0	0	3
4	**Professional Elective-II**					
	1005203230	Software Project Management	3	0	0	3
	1005203231	Distributed Systems				
	1005203232	Advanced Python Programming				
	1005203233	Big Data Analytics				
	1054202200	Artificial Intelligence				
5	**Open Elective-II**					
	1054203232	Evolutionary Computation	3	0	0	3
	1003203240	Optimization and Reliability				
	1004203236	Digital Image Processing				
	1019203240	Introduction to Embedded Systems				
6	1012203110	Computer Networks Lab	0	0	3	1.5
7	1005203210	NoSQL Databases Lab	0	0	3	1.5
8	1005203280	Devops	0	0	4	2
9	1099203220	Professional Ethics and Universal Human Values	2	0	0	0
Total Credits						**20**
INDUSTRIAL/RESEARCH INTERNSHP						
10		**Honors/Minor Courses**	**4**	**0**	**0**	**4**

Total Credits (III Year – I&II Sem) = 43

IV Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	**Professional Elective-III**					
	1005204130	Soft Computing	3	0	0	3
	1005204131	Advanced Computer Networks				
	1012203200	Cryptography and Network Security				
	1005203137	Human Computer Interaction				
	1005203140	Software Testing Methodologies				
2	**Professional Elective-IV**					
	1005204132	Software Quality Assurance	3	0	0	3
	1005204133	Digital Forensics				
	1005204134	Social Networking and Semantic Web				
	1054203100	Machine Learning				
	1005204170	MOOCS				
3	**Professional Elective-V**					
	1005204135	Pattern Recognition	3	0	0	3
	1005204136	Artificial Neural Networks				
	1005204137	Software Architecture and Design Patterns				
	1005204138	Cloud Computing				
	1005204171	MOOCS				
4	**Open Elective-III**		3	0	0	3
	1003204132	Additive Manufacturing				
	1019203200	IoT and its Applications				
	1054204131	Business Analytics				
	1001202240	Environmental Pollution and Control				
5	**Open Elective-IV**					
	1003202242	Industrial Robotics	3	0	0	3
	1004204140	Speech Processing				
	1054204136	Information Retrieval Systems				
	1054204130	Predictive Analytics				
6	1099203200	Management Science	3	0	0	3
7	1005204180	Amazon Web Services	0	0	4	2
8	1099204120	IPR and Patents	2	0	0	0
9	1005204160	Industrial / Research Internship	0	0	0	2
Total Credits						22
10		**Honors/Minor Courses**	**4**	**0**	**0**	**4**

IV Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005204260	Main Project	0	0	0	12
SEMESTER LONG INTERNSHIP						
Total Credits						**12**

Total Credits (IV Year – I&II Sem) = 34

GRAND TOTAL CREDITS: (I Y + IIY +III Y + IV Y) = 39+44+43+34 = 160

PROGRAM STRUCTURE
FOR
I - B. Tech
I & II SEMESTER

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAM STRUCTURE

I Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1000201100	Mathematics-I	3	0	0	3
2	1005201100	Problem Solving and Programming using C	3	0	0	3
3	1003201101	Engineering Drawing	1	0	4	3
4	1000201102	Technical English Communication	3	0	0	2
5	1000201105	Applied Chemistry	3	0	0	3
6	1000201110	Technical English Communication Lab	0	0	3	1.5
7	1005201110	Problem Solving and Programming using C Lab	0	0	3	1.5
8	1000201113	Applied Chemistry Lab	0	0	3	1.5
9	1000201160	Engineering Exploration Lab	0	0	2	1
10	1000201120	Game, Sports and Yoga	0	0	4	0
Total Credits						**19.5**

I Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1.	1005201200	Object Oriented Programming through C++	3	0	0	3
2.	1005201201	Computer Organization	3	0	0	3
3.	1005201202	Web Design	3	0	0	3
4.	1000201104	Mathematics-II	3	1	0	3
5.	1000201204	Applied Physics	3	0	0	3
6.	1005201210	Object Oriented Programming through C++ Lab	0	0	3	1.5
7.	1000201212	Applied Physics Lab	0	0	3	1.5
8.	1005201211	Web Design Lab	0	0	3	1.5
9.	1000201121	Constitution of India	2	0	0	0
Total Credits						**19.5**

Total Credits (I Year – I&II Sem) = 39

DETAILED SYLLABUS FOR

I-B. Tech

I-SEMESTER

I Year – I Semester	MATHEMATICS -I	L	T	P	C
1000201100		3	1	0	3

COURSE OBJECTIVES:

Course Objectives:

1. Utilize mean value theorems to find the characteristics of the function and acquire the knowledge maxima and minima of functions of two variables.
2. To discuss higher order differential equations.
3. To discuss Laplace Transform and its properties.
4. To apply Inverse Laplace transform to different types of functions and to solving initial value problems.
5. To construct partial differential equations by eliminating arbitrary constants and functions and to solve first order partial differential equations.

COURSE OUTCOMES:

COs	At the end of the course, the student will have the ability to:
CO1	**Understand** the mean value theorems and evaluate maxima and minima of functions of two variables without constraints.
CO2	**Understand** different analytical methods to solve higher order linear differential equations
CO3	**Understand** Laplace transform technique to solve initial and boundary value problems arising in engineering stream.
CO4	**Understand** solution of first order linear partial differential equations

UNIT-1 **[10 HOURS]**

Mean Value Theorems: Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's Mean value Theorem. Functions of several variables – Partial derivatives – Total derivatives – Chain rule-Jacobian – Functional dependence – Maxima and Minima of functions of two variables without constraints.

UNIT-11 **[8 HOURS]**

Linear Differential Equations of Higher Order: Non-homogeneous linear differential equations of second and higher order with constant coefficients with non-homogeneous terms of the type e^{ax},sin ax, cos ax, x^k, method of variation of parameters.

UNIT- III **[10 HOURS]**

Laplace Transforms: Introduction - Laplace transforms of standard functions – Shifting Theorems - Transforms of derivatives and integrals - multiplication by t^n - division by t –

Unit step/Heaviside's function - Dirac'sDelta Function (or Unit Impulse Function) - Laplace Transform of Periodic Function.

UNIT- IV **[10 HOURS]**

Inverse Laplace Transforms –Introduction - Properties – Inverse Laplace by using partial fractions and Convolution theorem - solving initial and boundary value problems by using Laplace Transform.

UNIT- V **[10 HOURS]**

Partial Differential Equations of first order: Introduction -Solutions of first order linear (Lagrange) equation and nonlinear (standard type $f(p,q)=0, f(z,p,q)=0, f(x,p)=g(y,q)$& Claruks) equations

Text Books:

1. Higher Engineering Mathematics by H.K. Dass, S. Chand Publications.
2. Higher Engineering Mathematics 2e, B. V. Ramana, Tata McGraw Hill Publishing Co. Ltd.

REFERENCE BOOKS

1. Engineering Mathematics, Greenburg, 2nd Ed, Pearson education.
2. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.
3. A Text book of Engineering Mathematics, N.P. Bali, Laxmi Publications (P) Ltd.
4. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley Student Edition.

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I Year – I Semester	PROBLEM SOLVING AND PROGRAMMING USING C	L	T	P	C
1005201100		3	0	0	3

COURSE OBJECTIVES:

1. To understand computer programming and its roles in problem solving.
2. To understand and develop well-structured programs using C language.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Write compile and debug Programs in C language
CO2	Use operators, data types and write programs
CO3	Select the best loop construct for a given problem
CO4	Design and implement C programs

UNIT- I

Introduction to computers: Computer systems, computer Languages, computer number systems.

Introduction to C programming: Background and characteristics of C, Flow Charts, algorithms and pseudo code. Structure of a C Program, Input/output Statements in C, writing C programs, compiling and executing C programs. **[6 Hours]**

UNIT- II

Programming Style: Tokens of C, Keywords, Variables, Constants and rules to form variables and constants, Data Types, Declaration of Variables and initialization, Operators, Operator precedence and associativity. Type conversions

Flow of Control: Selection: Two way selection, multi-way selection

Repetition and Unconditional Control Statements: concept of loop ,pre test and post test loops, initialization and updating loops ,while statement, do-while statement, for statements, nested loops, break ,continue, goto. **[10 Hours]**

UNIT- III

Arrays and Strings:

Arrays: One-Dimensional Arrays, Declaration, Array Initialization, Input and Output of Array Values, Two-Dimensional Arrays.

Strings: String Fundamentals, String Input and Output, String manipulation functions. **[8 Hours]**

UNIT- IV

Modular Programming:

Function and Parameter Declarations: Function definition, types of functions, declaration and definition of user defined functions, its prototypes and parameters, calling a function. Arrays as Function Arguments, Variable Scope, storage class, recursive functions. .

[7Hours]

UNIT- V

Pointers, Structures, Unions and files:

Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, address arithmetic, pointers to pointers, Pointers and arrays, Array of Pointers, parameter passing techniques. Dynamic memory allocation.

Structures and Unions: Structures declaration, Initialization of structures, accessing structures, unions.

Files: Declaring, Opening and closing file streams, Reading from and writing to text files.

[10 Hours]

Text Books:

1. Programming in C, ReemaThareja, and Oxford.
2. The C programming Language, Brain W.kernighan, Dennis Ritchie,2e,pearson
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage. Pub. Programming with C, Bichkar, Universities Press.

Reference Books:

1. ANSIC Programming garyJ.Bronson. Cengage learning.
2. Let us 'C' by yashwantkanethkar, BPB Publications, 16 edition.

I Year – I Semester	ENGINEERING DRAWING	L	T	P	C
1003201101		1	0	4	3

COURSE OBJECTIVES:

To introduce the use and the application of drawing instruments and to make the students construct the polygons and curves. To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.To make the students draw the projections of the plane and solids inclined to one planes.To make the students draw isometric views of simple objects

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the use of drawing instruments to construct the polygons and curves
CO2	Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.
CO3	Draw the various types of planes and solids its views in different Positions
CO4	Draw isometric views of simple objects

UNIT- I

INTRODUCTION TO ENGINEERING DRAWING [10 Hours]

Polygons– Construction of regular polygons
Curvesused in Engineering Practice– Ellipse (General method and oblong Method only),Parabola& Hyperbola(General method only)
Introduction to Scales– Vernier & Diagonal Scales.

UNIT- II

ORTHOGRAPHIC PROJECTIONS [10 Hours]

Projections of points– Projections of straight line– Line parallel to one plane and perpendicular to other plane– parallel to both the planes.
Projections of straight lines– parallel to one plane and inclined to the other plane.
Straight lines inclined to both the planes.

UNIT- III

PROJECTIONS OF PLANES [10 Hours]

Regular planes perpendicular/parallel to one plane and inclined to the other reference
Plane inclined to both the reference planes.

UNIT- IV

PROJECTIONS OF SOLIDS **[10 Hours]**

Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the plane only

UNIT- V

ISOMETRIC PROJECTIONS **[10 Hours]**

Conversion of Isometric Views to Orthographic Views
Conversion of Orthographic Views to Isometric Views.

Text Books:

1. Engineering Drawing, N. D. Bhatt, Chariot Publications.

2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers

3.Engineering Drawing and Graphics by K Venugopal,New Age international publications .

Reference Books:

1. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers.

2. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age.

I Year – I Semester	TECHNICAL ENGLISH COMMUNICATION	L	T	P	C
1000201102		2	0	0	2

COURSE OBJECTIVES:

- To introduce students to the specific use of English for Technical Communication.
- To develop the overall English proficiency of students and enable them to function effectively in different professional contexts.
- To strengthen student skills in the areas of reading, writing, listening and speaking and enable them to function effectively in their professional sphere

COURSE OUTCOMES:

CO	At the end of the course, the student will have the ability to:
CO1	Read, understand and interpret material on Environment, Science and Technology, tourism, Energy Sources, Social Awareness
CO2	Analyze the functions of language and grammar in spoken and written forms.
CO3	Write effectively on various domains.
CO4	Prepare and exhibit oral presentation skills by using ICT. (Individual/Team)

UNIT- I **No. of lecture hours: 10**

Reading: 1) How to Regain Green Cover 2) Solution to Plastic Pollution

Writing: Functional grammar [articles, prepositions of time, place, direction and movement, verb-tense, subject-verb agreement]

Listening: TED Talk on Water Harvesting (LC) –Answering comprehension-based Qs ~ Listening to improve pronunciation

Speaking: Functional English (LC) ~ Introducing oneself

Activities: Reading Comprehension- Note making while reading 1&2,Letter Writing

UNIT-II **No. of lecture hours: 10**

Reading Texts: 1) The Hubble Telescope 2) Genesis of ISRO

Writing: Writing formal letters ~ Functional grammar ~Modals - Paraphrasing

Listening: Listening to a debate on " Colonizing the Moon" (LC) ~ Note Taking

Speaking: (LC) Making mini presentations on general topics

Activities:

- Reading Comprehension
- Letter Writing-Formal

UNIT-III **No. of lecture hours: 10**

Reading Texts: 1) Southern Splendour 2) Tourism in India: Role in Conflict and Peace

Writing: Paragraph writing ~ Functional grammar [relative pronouns, comparative adjectives, adverbs]
Listening: (LC) Listening comprehension ~ Listening for global meaning ~ Listening for getting at the nuances and the mood of the speaker

Speaking: (LC) Telephonic Skills ~ participating in an interactive video and teleconferencing
Activities:
Reading Comprehension
Paragraph writing
Essay writing

UNIT-IV **No. of lecture hours: 10**

Reading Texts: 1) Wind Energy 2) How pertinent is the nuclear option

Writing: Writing a formal E-mail

Speaking: Group Discussion (LC)

Listening: Listening to an Interview (LC) related to the text ~ listening critically for understanding the attitude/tone of the speaker

Activities: Reading Comprehension, Email Writing

UNIT-V **No. of lecture hours: 10**

Reading Texts: 1) The Evolution of Media 2) The Top Ten Developments in Journalism in the 2000s

Writing: Interpret graphic tools [tables, pie & bar charts ~ writing an abstract ~ Leveraging ICT for communication ~ Preparing a PPT(LC)

Speaking: Making short presentations [individual/team] with the aid of PPT

Listening: Listening to Situation/Scene ~ Sub skills: Listening to understand one's viewpoint ~Listening to understand speaker's intention ~Listening for local understanding.

Activity:

Information Transfer

Suggested Books:

- Elango, K et.al 2014. *Mindscapes: English for Technologists and Engineers*, Orient Blackswan, Hyderabad.

Reference Books:

- Balasubramanian M. 1985. *Business Communication*. Vani Educational Books, New Delhi
- Balasubramanian T. 1989. *A Text book of Phonetics for Indian Students*. Orient Longman, New Delhi.

- Krishnaswamy, N and Sriraman, T. 1995. *Current English for Colleges*. Macmillan India Ltd. Madras.
- Mohan Krishna and Meera Banerjee. 1990. *Developing Communication Skills*. Macmillan India Ltd. New Delhi.
- Narayanaswamy V R. 1979. *Strengthen your Writing*. Orient Longman, New Delhi.
- Naterop, Jean, B. and Rod Revell. 1997. *Telephoning in English.* Cambridge University Press, Cambridge

I Year – I Semester	APPLIED CHEMISTRY	L	T	P	C
1000201105		3	0	0	3

COURSE OBJECTIVES:

To introduce various polymers and identify their functionalities. Understanding the concepts of batteries & green methodologies for the preparation of advanced materials. Developing ideas in protecting precious metals from corrosive atmospheres.

COURSE OUTCOMES:

COs	At the end of the course, the student will gain the ability in:
CO1	Identification of different polymers and their functionalities
CO2	Determination of structure to many compounds and apply the basic knowledge in construction of cell and its applications
CO3	Analysis of corrosive environments and protection of precious metal
CO4	Adoption of different green methodologies for preparation of advanced materials

UNIT- I

POLYMER CHEMISTRY **[8 Hours]**

Introduction to polymers, Classification of polymers, Types of Polymerizations (Addition, Condensation & copolymerization) with examples, properties of polymers (physical and mechanical).
Plastics - Thermoplastics and Thermosetting plastics, compounding of plastics, Moulding Techniques (Compression & Blow moulding), Preparation, properties and applications of – PVC and Bakelite.

UNIT- II

STRUCTURE AND BONDING MODELS **[10 Hours]**

Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of H_2, C_2, N_2, $O_2$and CO, etc. calculation of bond order, shapes of d orbitals, crystal field theory – salient features – Crystal field splitting in octahedral environments, Crystal field stabilization Energy (CFSE) for high spin and low spin octahedral complexes.

UNIT- III

ELECTROCHEMISTRY AND APPLICATIONS **[10 Hours]**

Construction and working of Galvanic cell, Electrode potential, Reference electrodes -

Standard hydrogen electrode, Electrochemical series & its applications, pH meter and applications (acid-base titrations), concept of conductivity - conductometric titrations (acid-base titrations)

UNIT- IV

CORROSION [8 Hours]

Introduction to corrosion, dry corrosion with mechanism, electrochemical theory of corrosion with mechanism.

Types of Electrochemical corrosion (differential aeration corrosion, galvanic corrosion, pitting corrosion & stress corrosion), protection – cathodic protection, corrosion inhibitors, Cathodic & Anodic coatings, Galvanizing & Tinning.

UNIT- V

CHEMISTRY OF ADVANCED ENGINEERING MATERIALS & BIO MOLECULES [10 Hours]

Nanomaterials: Introduction - Carbon nanotubes: Types, preparation (Electric Arc discharge, Laser ablation and CVD techniques), properties and applications, Fullerenes – structure and applications.

Composites - Fiber reinforced materials – CFRP & GFRP

Biodegradable polymers and its applications

Green Chemistry: 12 Principles only

Nucleic acids: DNA & RNA – Structure & their functions.

Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai PublicatingCo.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015edition.
   Physics of Semiconductor Devices by S. M. Sze, John Wily & Sons, New Delhi. (2012)

Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., LatestEdition
4. Applied Chemistry by H.D. Gesser, SpringerPublishers

Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar andothers, University Press,IIM

I Year – I Semester	TECHNICAL ENGLISH COMMUNICATION LAB	L	T	P	C
1000201110		0	0	3	1.5

COURSE OBJECTIVES:

- To introduce students to the specific use of English for Technical Communication.
- To develop the overall English proficiency of students and enable them to function effectively in different professional contexts.
- To strengthen student skills in the areas of reading, writing, listening and speaking and enable them to function effectively in their professional sphere.

COURSE OUTCOMES:

COs	At the end of the course, the student will have the ability to:
CO1	Analyze the functions of language and grammar in spoken and written forms.
CO2	Write effectively on various domains.
CO3	Prepare and exhibit oral presentation skills by using ICT.(Individual/Team)

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Just A Minute –Tell about oneself	Speaking
2	Note Taking	Listening & Writing
3	Interactions	Listening &Speaking
4	Mini Presentation	Speaking
5	Letters and Sounds- Some pronouncing Patterns	Speaking
6	Telephonic Skills	Speaking &Listening
7	Group Discussion	Team work, leadership Speaking
8	Mock-Interview	Speaking
9	Impromptu individual presentations	Speaking
10	Information Transfer	Writing

Text Books: Speak Well-Maruthi Publications

Reference Books: Interact –Orient Blackswan

I Year – I Semester	PROBLEM SOLVING AND PROGRAMMING USING C LAB	L	T	P	C
1005201110		0	0	3	1.5

COURSE OBJECTIVES:

1. To understand computer programming and its roles in problem solving.
2. To understand and develop well-structured programs using C language.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Write compile and debug Programs in C language
CO2	Use operators, data types and write programs
CO3	Select the best loop construct for a given problem
CO4	Design and implement C programs

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1** a) Write a C program to compute perimeter and area of rectangle b) Write a C program to calculate distance between points c) Write a C Program to Simulate 3 Laws of Motion	Input/Output
2.	**Exercise – 2** a) Write a C Program to convert Celsius to Fahrenheit and vice versa b) Write a C program to find maximum of three numbers using conditional operator.	Input/Output
3.	**Exercise – 3** a) Write a C Program to find Whether the Given Year is a Leap Year or not. b) Write a C Program to find grade of student. c) Write a menu driven program to compute area of different geometrical shapes	Control Statements
4.	**Exercises –4** a) Write a C Program to Find Whether the Given Number is i)Strong number ii)perfect number b) Write a C Program to print the following between 1 to n i)Prime Number ii) Armstrong Number	Loops and Control Statements

5.	**Exercise -5** Demonstration of arrays& Strings a) Write a C program to perform Linear Search b) Write a C program to perform transpose of two matrices c) Write a C program to perform multiplication of two matrices d) Implementation of string manipulation operations with and **without** library function. i)copy ii) concatenate iii)length iv)compare	Arrays and Strings
6.	**Exercise -6** a) Write a C program to find cube of any number using function. b) Write a c program to find area and volume of geometric shapes using functions. c) Write a C program to check whether a number is even or odd using functions.	Functions
7.	**Exercise -7** a) Write a C Program illustrating Fibonacci, Factorial using recursion b) Write a C program to find power of any number using recursion. c) Write a C program to find GCD and LCM using recursion	Recursive Functions
8.	**Exercise -8** a) Write a C Program to Access Elements of an Array Using Pointer b) Write a C Program to find the sum of numbers with arrays and pointers. c) Write a c program to illustrate parameter passing techniques	Pointers
9.	**Exercise -9** a) Write a C Program to Store Information of a student Using Structures b) Write a C program to create memory for int, char and float variable at run time.	Structures
10.	**Exercise -10** a) Write a program in C to copy a file in another name b) Write a C program to append multiple lines at the end of file	Files

Text Books:

1. Programming in C, ReemaThareja, and Oxford.
2. The C programming Language, Brain W.kernighan, Dennis Ritchie,2e,pearson
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage. Pub. Programming with C, Bichkar, Universities Press.

Reference Books:

1. ANSIC Programming garyJ.Bronson. Cengage learning.
2. Let us 'C' by yashwantkanethkar, BPB Publications, 16 edition.

I Year – I Semester	APPLIED CHEMISTRY - LABORATORY	L	T	P	C
1000201113		0	0	3	1.5

COURSE OBJECTIVES:

To acquaint the students with the basic phenomenon/concepts of titrations and element analysis in Chemistry. Design the synthetic methods to prepare polymers and nano materials.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Analyze & generate experimental skills
CO2	Enhance the thinking capabilities pertaining modern trends in engineering & technology
CO3	Select and use a suitable instrumental technique for the quantitative estimation and analyze the data obtained
CO4	Learn safety rules during the practice of laboratory investigation

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Total Hardness	Determination of Hardness of a ground water sample**.**
2	Total alkalinity	Determination of alkalinity of Water.
3	Complexometric Titration	Determination Copper using standard EDTA solution.
4	Precipitation Titration	Determination of Zinc (II) by ferrocyanide method.
5	Iron permanganate redox titration	Determination of Iron (II) by using standard $KMnO_4$solution
6	pH metry titration	Determination of the Concentration of HCl using Sodium Hydroxide (by pH - metry method).
7	Conductometric Titration	Determination of the Concentration of strong acid vs strong base (by conductometric method)
8	Iron dichromate redox titration	Determination of Iron (II) by using standard $K_2Cr_2O_7$solution.
9	Bakelite – A Thermosetting polymer	Preparation of a polymer (phenol-formaldehyderesin).
10	Nanomaterial Synthesis	Preparation of Nano materials (Demonstrationonly)
11	Electrochemical Cell	Construction of Galvanic cell (Virtuallab).
12	Acid – Base titration	Determination of strength of an acid in Pb-Acidbattery.

Text Books:

1. Arthur Vogel and G. Svehla, Qualitative Inorganic Analysis, Pearson Education India.
2. Thompson &Atteshlis, Advanced Practical Chemistry & Resource Pack, John Murray Publications.

Reference Books:

1. Hill & Holman, Chemistry in Context Laboratory, Nelson Publications.

I Year – I Semester	ENGINEERING EXPLORATION	L	T	P	C
1000201160		0	0	2	1

COURSE OBJECTIVES:

To understand the importance of multi-disciplinary Engineering knowledge in the current world, for making any project. To learn Engineering design process for creating any new product/system. To learn the fundamental practical knowledge for starting any inter-disciplinary project.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Realize the purpose/Role of Engineer for solving social problems
CO2	Learn to Design a component/system in an engineering way
CO3	Learn to use mechanisms, Arduino, sensors, motors.
CO4	Integrating different systems (mechanical/Electrical/computer) to work as a unit

UNIT- I

INTRODUCTION TO ENGINEERING AND ENGIENERING STUDY [6 Hours]

Introduction to Engineering, Difference between science and engineering, scientist and engineer, needs and wants various disciplines of engineering, some misconceptions of engineering, Role of engineers in solving social problems, Graduate Attributes.

Activity theme: Activities aimed to understand Engineering

Activities:

1. Identifying Various Engineering disciplines involved in projects/systems

2. Listing down various social problems in the world &Finding how engineering can solve these social problems.

UNIT- II

ENGINEERING DESIGN [10 Hours]

Engineering Design Process, Multidisciplinary facet of design, Generation of multiple solution, Introduction to Mechatronics systems, Motor and Battery Sizing concepts, Introduction to PCB design.

Activity theme: Activities based on the designing & making of models

Activities:

1. Making of a Popsicle sticks prototype bridge

2. Conversion of AC to DC using bridge rectifier
3. Creation of Mobile App using MIT App Inventor
4. Creating a Full adder circuit using Logic gates with IC's

UNIT- III

MECHANISMS [6 Hours]

Basic Components of a Mechanism, Degrees of Freedom (Mobility of a Mechanism), 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

Activity theme: Creating a model which illustrate any mechanism

Activities:

1. Determining the number of Degrees of freedom for a given mechanism
2. Assembly of scissors mechanism

UNIT- IV

PLATFORM BASED DEVELOPMENT [8 Hours]

Introduction to platform-based development (Arduino) programming and its essentials, Introduction to sensors, transducers and actuators and its interfacing with Arduino.

Activity theme: To Program Arduino to control lights, Motors, Sensors etc.

Activities:

1. Blinking LEDs using Arduino interface
2. Identifying the objects with Infrared sensor
3. Usage of different sensors using Arduino Interface

UNIT- V

DATA ACQUISITION AND ANALYSIS [8 Hours]

Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of Microsoft Excel tool for descriptive statistics, Data Acquisition using Sensors interfaced with Arduino, exporting acquired data to Microsoft Excel and analysis using visual representation.

Activity theme: Acquiring data from sensors using Arduino

Activities:

1. Data analysis of Ultrasonic sensor with Arduino as interface
2. Data analysis of DHT sensor with Arduino as interface

DETAILED SYLLABUS FOR

I-B. Tech

II-SEMESTER

I Year – II Semester	OBJECT ORIENTED PROGRAMMING THROUGH C++	L	T	P	C
1005201200		3	0	0	3

COURSE OBJECTIVES:

3. To understand how C++ improves C with object-oriented features
4. To learn the syntax and semantics of the C++ programming language.
5. To learn how containment and inheritance promote code reuse in C++.
6. To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
7. To learn how to design and implement generic classes with C++ templates

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Articulate the principles of object-oriented programming and Outline the essential features and elements of the C++ programming language.
CO2	Apply the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading, and polymorphism.
CO3	Apply virtual and pure virtual function in complex programming situations
CO4	To use template classes and the STL library in C++ and to incorporate exception handling in object oriented concepts

UNIT- I

INTRODUCTION TO C++

Difference between C and C++- Evolution of C++- The Object Oriented Technology- Disadvantage of Conventional Programming- Key Concepts of Object Oriented Programming- Advantage of OOP- Object Oriented Language. **[6 Hours]**

UNIT- II

CLASSES AND OBJECTS &CONSTRUCTORS AND DESTRUCTOR

Classes in C++ - Declaring Objects- Access Specifiers and their Scope- Defining Member Function Overloading Member Function- Nested class. Introduction to Constructors and Destructor- Characteristics of Constructor and Destructor-Types of Constructor - Anonymous Objects. **[8 Hours]**

UNIT- III

PERATOR OVERLOADING AND TYPE CONVERSION & INHERITANCE

The Keyword Operator- Overloading Unary Operator- Operator Return Type- Rules for Overloading Operators, Overloading Assignment Operator (=). Inheritance, Types of Inheritance. Virtual Base class, object as class member, abstract classes. [8Hours]

UNIT- IV

POINTERS & BINDING POLYMORPHISMS AND VIRTUAL FUNCTIONS

Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++ - Virtual Functions- Rules for Virtual Function- Virtual Destructor. **[8Hours]**

UNIT- V

GENERIC PROGRAMMING WITH TEMPLATES & EXCEPTION HANDLING

Generic Programming with Templates, Need for Templates- Definition of class Templates- Normal Function Templates- Overloading of Template Function-Bubble Sort Using Function Templates. Introduction to Standard Template Library: list-set-vector-map-deque. Introduction to Exception Handling: keywords try, throw and catch, multiple catch statements specifying exceptions. **[10 Hours]**

Text Books:

1. Programming in C++, Ashok N Kamathane, Pearson 2nd Edition.
2. The Complete Reference C++, Herbert Schildt, TMH.

Reference Books:

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learing.
3. Computer Programming with C++,kunalPimparkhede, cambridge

I Year – II Semester	COMPUTER ORGANIZATION	L	T	P	C
1005201201		3	0	0	3

COURSE OBJECTIVES:

To make students gain knowledge of the basic organization, design, programming of a simple digital computer and to provide an intuition of computer arithmetic, instruction set design, micro programmed control unit, pipelining, vector processing, memory organization and I/O systems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Implement computer arithmetic, like addition, subtraction, division and multiplication.
CO2	Design and analyze combinational and sequential circuits.
CO3	Understand the instruction cycle and the Interrupt cycle.
CO4	Understand micro program and implement it

UNIT- I

Digital Components and Data Representation: Number Systems, Conversions, BCD, Gray Code, Excess-3 Code, Parity and Hamming Code

Boolean algebra and minimization: Boolean expressions and their minimization using algebraic identities; Karnaugh map representation and minimization. **[10 Hours]**

UNIT- II

Combinatorial Circuits: Design Procedure, Adder, Subtractor, BCD Adder, Multiplexers, De-multiplexers, Encoders and Decoders.

Sequential Switching Circuits: Latches, Flip-Flops, Introduction to Register and Counter. **[8 Hours]**

UNIT- III

Computer Arithmetic: Data representation, Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt. **[10Hours]**

UNIT- IV

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit. **[10 Hours]**

UNIT- V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory. Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access. **[10 Hours]**

Text Books:

1. Digital Logic and Computer Design, Moriss Mano, 11th Edition, Pearson Education.
2. Computer System Architecture, 3rd edition, M. Morris Mano, PHI
3. Microprocessor and Interfacing –Douglas V. Hall, 3rd edition, TMH

Reference Books:

1. Digital Logic and Computer Design, Moriss Mano, 11th Edition, Pearson Education.
2. Computer System Architecture, 3rd edition, M. Morris Mano, PHI
3. Microprocessor and Interfacing –Douglas V. Hall, 3rd edition, TMH

I Year – II Semester	WEB DESIGN	L	T	P	C
1005201202		3	0	0	3

COURSE OBJECTIVES:

1. To understand computer programming and application software, package/ suites.
2. Design static web application development and Students will gain the skills and front designs.
3. Able to get project based experience needed for entry into web application and development careers.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the various applications and computer programming languages purpose.
CO2	Describe the basic concepts of client server application and WWW
CO3	Describe the basic concepts of HTML & CSS to design web pages and web site
CO4	Analyze a given problem and apply requisite appropriate tools for designing interactive web applications

UNIT- I

INTRODUCTION **[8 Hours]**

Types of computer applications (Console, Window, web based mobile and cloud applications).Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards. About Client and server process.

Introduction to HTML: History of HTML, What are HTML Tags and Attributes? HTML Tag vs. Element, HTML Attributes. Basic Syntax, Standard HTML Document Structure

UNIT- II

HTML Tags: **[10 Hours]**

Basic Text Markup, Text formatting tags, Heading types, font tag, Images, image map, Hypertext Links, navigating web pages. What is Lists and various types of list, design the Tables using table tag.

UNIT- III

USER INTERACTIVE WEB PAGE **[10 Hours]**

Form tag, user interactive components, Text box, lable, text area, check box, radio button, drop down box, submit and reset. **Frames:** Importance of frames, divide the web browser window into different sections.Introduction to HTML5.

UNIT- IV

Cascading Style Sheets: **[8 Hours]**

Creating Style Sheet ,CSS Properties, Types of CSS, CSS Styling(Background, Text Format, Controlling Fonts) Working with block elements and objects, Working with Lists and Tables, CSS Id and Class.

UNIT- V

Scripting Languages: **[10 Hours]**

Introduction to Client side and server side scripting languages.

Java Script: Variables, arrays, decision control and loop statements, Functions.

Introduction to PHP script and working with get and post methods.

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

Reference Books:

1. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

I Year – II Semester	MATHEMATICS - II	L	T	P	C
1000201104		3	0	0	3

COURSE OBJECTIVES:

1. To familiarize the students with numerical methods of solving the non-linear equations, Interpolation, Numerical differentiation and integration.
2. Course will illuminate the student in the standard concepts of Linear algebra.
3. Methods to solving system of linear equations and compute Eigen values & Eigen vectors of a real matrix.
4. To apply mathematical statements, ideas and results, with the correct use of mathematical definitions.

COURSE OUTCOMES:

COs	At the end of the course, the student will have the ability to:
CO1	***Compute*** approximate roots of an equation by using different numerical methods.
CO2	***Explain*** difference operators and find the relation among operators and apply forward and backward formulas for compute interpolating polynomial.
CO3	***Apply*** different numerical methods to solve integrations and ordinary differential equations.
CO4	***Understand*** to solve the system of Linear equations by direct and iteration methods, and compute eigen values and eigen vectors of a matrix and study the nature of Quadratic form.

UNIT- I

Numerical Solution of Algebraic and Transcendental Equations: [8 Hours]

Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

UNIT- II

Interpolation: **[8 Hours]**

Introduction– Forward Difference, Backward difference, Central difference operators – Newton's formulae for interpolation – Gauss' Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT- III

Numerical Integrations &Differential Equations: [8 Hours]

Numerical Integration: – Trapezoidal rule – Simpson's $1/3^{rd}$ Rule –Simpson's $3/8^{th}$ Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series method - Euler's method - Modified Euler's method- Runge-Kutta Method of 4^{th} order.

UNIT- IV

Linear system of equations: [8 Hours]

Introduction-Rank-Echelon Form- Normal Form - System of Linear equations - Homogeneous and Non-Homogeneous , Consistency of system of Linear equations - Gauss elimination - Gauss Seidel method.

UNIT- V

Eigen values, Eigen vectors: [10 Hours]

Introduction - Eigen values - Eigen vectors - Properties - Cayley Hamilton theorem (without proof) - Inverse and power of a matrix by using Cayley Hamilton theorem, Reduction of Quadratic form to canonical form by using orthogonal reduction – Rank, index, signature and Nature of quadratic form.

TEXT BOOKS

1. Higher Engineering Mathematics by H.K. Dass, S. Chand Publications.
2. Higher Engineering Mathematics 2e, B. V. Ramana, Tata McGraw Hill Publishing Co. Ltd.

REFERENCE BOOKS

1. Engineering Mathematics, Greenburg, 2nd Ed, Pearson education.
2. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.
3. A Text book of Engineering Mathematics, N.P. Bali, Laxmi Publications (P) Ltd.
4. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley Student Edition.

I Year – II Semester	APPLIED PHYSICS	L	T	P	C
1000201204		3	0	0	3

COURSE OBJECTIVES:

To introduce the basic concepts of physical optics phenomenon such as interference, diffraction and polarization. Understanding of the concepts found in Lasers, fiber optics, semiconductor physics and provide an insight into semiconductor devices.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Describe the wave phenomena and formation of Newton's rings.
CO2	Make use of the concepts of pumping and total internal reflection to set up lasers and optical fibers.
CO3	Apply basic knowledge of energy bands in crystalline solids to understand semiconductor physics.
CO4	Identify the importance of semiconductor physics for construction and working of diode, transistors and logic gates.

UNIT- I

INTEREFERENCE [8 Hours]

Introduction-Principle of Superposition – Interference-Conditions for sustained interference– Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – Applications of interference.

UNIT- II

DIFFRACTION & POLARIZATION [10 Hours]

Introduction – Difference between interference and diffraction – Difference between Fresnel and Fraunhofer diffraction - Fraunhofer diffraction at single slit- cases – Diffraction grating and grating equation.

Introduction to polarization-Double refraction – Types of Polarization -Quarter wave plate - Half Wave plate.

UNIT- III

LASERS & FIBER OPTICS [10 Hours]

Introduction-Characteristics of laser light – stimulated absorption, spontaneous and stimulated emission of radiation – population inversion (2-level, 3-level and 4–level schemes) - Einstein coefficients and significance– basic components of laser - Ruby laser – He- Ne laserand applications of lasers.

Introduction and principle of optical fiber – acceptance angle - numerical aperture - Applications of optical fibers.

UNIT- IV

SEMICONDUCTOR PHYSICS& DEVICES [10 Hours]

Introduction - bond formation in intrinsic semiconductors and extrinsic semiconductors (P-type and N-type) – intrinsic electrical conductivity – Drift & Diffusion –Einstein's equation – Hall effect in semiconductors – Applications of Hall effect.

Introduction to Diodes: p-n junction diode – Volt- ampere characteristics of p-n junction diode – Zener diode – Volt- ampere characteristics of Zener diode – Zener diode as voltage regulator-Solar Cell (qualitative).

UNIT- V

INTRODUCTION TO DIGITAL ELECTRONICS [10 Hours]

Logic gates (OR gate, AND gate, NOT gate, NAND gate, NOR gate, XOR gate), Two level implementations: And Or Inverter (AOI), Or And Inverter (OAI), Demorgan's theorems, Boolean Expressions with Truth Tables, Product of literals (Min term), Sum of literals (Max term), Sum of products, Product of sums, Laws of Boolean algebra, Half adder and Full adder circuits with truth tables.

Text Books:

1. L.M. Pedrotti, Introduction to Optics, Prentice-Hall International, Inc. (1993)
2. Arthur Beiser, Concepts of Modern Physics, McGraw-Hill Science (2003)
3. Resnick , Halliday, Krane,Physics Vol 1& 2 (5ed), Wiley, Fifth edition (2007)
4. A.P. Malvino, D.P. Leach, Digital Principles and Applications, Tata McGraw Hill Education Pvt. Ltd. (1995)

A. J. Dekker, Solid State Physics, Macmillan India Pvt. Ltd., (2011)

B. Kittel, Introduction to Solid State Physics, Wiley indiaPvt. Ltd, (2012)

5. S. M. Sze,Physics of Semiconductor Devices, 3rd edision, John Wiley & Sons, (2007)
6. M. A. Wahab,Solid State Physics: Structure And Properties Of Materials, Narosa Publishing House Pvt. Ltd. (2005)
7. Joseph Lindmayer, Charles Y. Wrigly, Fundamentals of Semiconductor Devices, Litton Educational Publishing Inc.(1966)
8. Physics of Semiconductor Devices by S.M.Sze, John Wily & Sons, New Delhi. (2012)

Reference Books:

1. Dr. M. N. Avadhanulu and Dr. P. G. KshiraSagar, A Text Book of Engineering Physics, S.Chand& Company Ltd., (2014).
2. David J. Griffiths · Darrell F. Schroeter,Introduction to Quantum Mechanics, Cambridge University Press; 3 edition, (2018).
3. David. J. Giffiths, Introduction to Electrodynamics, Pearson Education India Learning Private Limited; 4 edition (2015).
4. A.K. Sharma, Semiconductor Electronics ,New Age International (P) Limited
    a. Publisher, New Delhi. (2011)

I Year – II Semester	OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB	L	T	P	C
1005201210		0	0	3	1.5

COURSE OBJECTIVES:

1. To strengthen problem solving ability by using the characteristics of an object-oriented approach.
2. To design applications using object oriented features
3. To handle Exceptions in programs.
4. To teach the student to implement object oriented concepts

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Create simple programs using classes and objects in c++ and implement object oriented programs in c++
CO2	Implement object oriented programs using templates and exception handling mechanisms
CO3	Implement programs using STL

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1 (Basics)** a) Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user b) Write a C++ program to find both the largest and smallest number in a list of integers **c)** Write a C++ program to find the sum of individual digits of a positive integer	Input/output
2.	**Exercise – 2** a) Write a program to implement call by value and call by reference using reference variable. b) Write a program to illustrate scope resolution, new and delete Operators.	Parameter passing techniques, Dynamic Memory Allocation
3.	**Exercise – 3** **a)** Write a program illustrating Inline Functions b) Write a program illustrates function overloading. Write 2 overloading functions for power. c) Write a program illustrates the use of default arguments for simple interest function.	Functions
4.	**Exercises –4** a) Write a program for illustrating Access Specifiers public, private, protected b) Write a program implementing Friend Function	Access Specifiers

	c) Write a program to illustrate this pointer	
5.	**Exercise -5** a) Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function. b) Write a c ++ program to implement the overloading assignment = operator	Operator Overloading
6.	**Exercise -6** a) Write C++ Programs and incorporating various forms of Inheritance i) Single Inheritance ii) Hierarchical Inheritance iii) Multiple Inheritances iv) Multi-level inheritance v) Hybrid inheritance b) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance	Inheritance
7.	**Exercise -7** a) Write a program to illustrate runtime polymorphism b) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.	Polymorphism
8.	**Exercise -8** a) Write a C++ Program to illustrate template class b) Write a Program to illustrate class templates with multiple parameters c) Write a Program to illustrate member function templates	Templates
9.	**Exercise -9** a) Write a Program to implement List and List Operations. b) Write a Program to implement Vector and Vector Operations. c) Write a Program to implement Deque and Deque Operations. d) Write a Program to implement Map and Map Operations. e) Write a Program to implement set and set Operations.	STL
10.	**Exercise -10** a) Write a Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly. b) Write a Program to Demonstrate the Catching of All Exceptions.	Exception Handling

Text Books:

1. The Complete Reference C++, Herbert Schildt, TMH.
2. Programming in C++, Ashok N Kamathane, Pearson 2nd Edition.

Reference Books:

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learing.
3. Computer Programming with C++,kunalPimparkhede,cambridge

I Year – II Semester	APPLIED PHYSICS LABORATORY	L	T	P	C
1000201212		0	0	3	1.5

COURSE OBJECTIVES:

To study the interference, diffraction patterns and characteristics of PN, Zener, thermistor, laser, optical fiber, solar cells and semiconductors. Apply the analytical techniques and graphical analysis to the experimental data.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Demonstrate the formation Newton's rings, diffraction pattern using grating
CO2	Analyze the voltage vs. current characteristics of PN, Zener diode and solar cell
CO3	Study the characteristics of Laser, optical fiber and thermistor
CO4	Identify the type of semiconductor and estimation of carrier concentration

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	Newton's rings	Determination of radius of curvature of the lens
2	Interference by wedge shaped film using thin wire	Determination of thickness of a thin wire
3	diffraction by grating	Determination of wavelength of light
4	Laser light diffraction by grating	Determination of wavelength of laser light
5	Laser beam divergence	Determination of laser beam divergence and spot size
6	Numerical aperture of optical fiber	Determination of numerical Aperture of optical fiber
7	Bending losses of Optical fibers	Determination of bending losses of optical fiber
8	Hall effect	Identification of semiconductor type and determination of Hall coefficient and carrier concentration
9	Thermistor characteristics	Determination of temperature coefficient of given thermistor
10	pn junction diode	Study of V-I characteristics of pn junction diode
11	Zener diode	Determination of breakdown voltage of Zener diode
12	solar cell	Study of V-I characteristics of solar cell

Text Books:

1. C.L. Arora, Practical physics, S. Chand Publication

2. B.L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House

Reference Books:

1. P.K. Mittal, N. H. Ayachit, Engineering Physics: With Laboratory Manual, Wiley India.

I Year – II Semester	WEB DESIGN LAB	L	T	P	C
1005201211		0	0	3	1.5

COURSE OBJECTIVES:

1. To understand computer programming and application software, package/ suites.
2. Design static web application development and Students will gain the skills and front designs.
3. Able to get project based experience needed for entry into web application and development careers.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the usage and designing of web pages using HTML &CSS
CO2	Able to design the user interactive pages and web page layouts
CO3	Analyze a given problem and apply requisite appropriate tools for designing interactive web applications

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1** Design Web page to illustrate the following • Title of web page • Heading styles • Various Text formatting tags	Web Page Design
2.	**Exercise – 2** Design Web page to illustrate the following • Apply font tag to the text • Upload and resize the image • Implement Image maps	Web Page Design
3.	**Exercise – 3** Design Web page to illustrate the following • Various List types • Display the class time table using table tag	Web Page Design
4.	**Exercise – 4** Design Web page to illustrate the following • Web page navigation (self and new page) • Implement image as web page navigation	Web Page Design
5.	**Exercise – 5**	CSS

	Implement the various CSS • Inline CSS • Internal CSS • External CSS	
6.	**Exercise – 6** Design the Login and Registration forms and apply CSS	Web Page Design
7.	**Exercise – 7** Java script to implement decision control and loop statements	Web Page Design
8.	**Exercise – 8** Java script to implement functions concepts	Scripting
9.	**Exercise – 9** Login form validation using java script	Validation
10.	**Exercise – 10** Working with get and post method mechanism to interact server using PHP script	Web Page Design

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

Reference Books:

1. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
2. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

I Year – II Semester	Audit Course-I	L	T	P	C
1000201121	CONSTITUTION OF INDIA	2	0	0	0

COURSE OBJECTIVES:

To provide basic information about Indian constitution. To identify individual role and ethical responsibility towards society. Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the importance of constitution, fundamental rights and duties
CO2	Understand the structure of executive, legislature and judiciary
CO3	Understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
CO4	Understand the central and state relation financial and administrative.

UNIT- I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties

LEARNINGOUTCOMES: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT- II

.Union Government and its Administration Structure of the Indian Union. President: Role, power and position, PM and Council of ministers, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High course

UNIT- III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat

- Differentiate between structure and functions of state secrateriate

UNIT- IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role - CEO of Municipal Corporation PachayatiRaj: Functions ZilaPanchayat, CEO ZilaPanchayat

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT- IV

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:,

LEARNING OUTCOMES:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission

Evaluate various commissions of viz SC/ST/OBC and women

Text Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government andPolitics Hans
7. J. Raj IndianGovernment and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt.Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E Resources

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details

www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

PROGRAM STRUCTURE

FOR

II-B. Tech

I & II SEMESTERS

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
PROGRAM STRUCTURE

II Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005202100	Java Programming	3	0	0	3
2	1000202100	Discrete Mathematical Structures	3	1	0	3
3	1005202101	Operating Systems	3	0	0	3
4	1005202102	Essentials for Competitive Programming	3	0	0	3
5	1005201203	Data Structures	3	0	0	3
6	1005202110	Java Programming Lab	0	0	3	1.5
7	1005202111	Operating Systems Lab	0	0	3	1.5
8	1005201212	Data Structures Lab	0	0	3	1.5
9	1000202180	Digital English	0	0	4	2
10	1000202121	Environmental Science	2	0	0	0
Total Credits						**21.5**

II Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005202200	Database Management Systems	3	0	0	3
2	1005202201	Advanced Data Structures	3	0	0	3
3	1005202202	Formal Languages and Automata Theory	3	1	0	3
4	1000202102	Probability and Statistics	3	1	0	3
5	1005202103	Software Engineering	3	0	0	3
6	1005202210	Database Management Systems Lab	0	0	3	1.5
7	1005202211	Advanced Data Structures Lab	0	0	3	1.5
8	1005202112	Unified Modelling Language Lab	0	0	3	1.5
9	1005202280	Java Script	0	0	4	2
10	1005202260	Mini Project (EPICS)	0	0	2	1
11	1000202120	Life Skills	2	0	0	0
Total Credits						**22.5**
MANDATORY SUMMER INTERNSHIP						
12		**Honors / Minor Courses**	**4**	**0**	**0**	**4**

Total Credits (II Year – I&II Sem) = 44

DETAILED SYLLABUS FOR

II-B. Tech

I-SEMESTER

II Year – I Semester		L	T	P	C
1005202100	JAVA PROGRAMMING	3	0	0	3

COURSE OBJECTIVES:

1. Implementing program for user interface and application development using core java principles.
2. Comprehension of java programming constructs, control structures in java.
3. Implementing object-oriented constructs such as various class hierarchies, interfaces and exception handling.
4. Understanding of thread concepts and I/O in java.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Use the Java programming language for various programming technologies.
CO2	Develop software in the Java programming language.
CO3	Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.
CO4	Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.

UNIT- I

INTRODUCTION TO OOPS

Introduction to object-oriented programming -principles of object-oriented languages -procedural languages Vs. OOPs -applications of OOPs -java features - JVM -program structures -Variables -primitive data types –identifiers -naming conventions –keywords –literals –operators –binary -unary and ternary –expression -precedence rules and associativity -primitive type conversion and casting, flow of control. **[6 Hours]**

UNIT-II

PROGRAMMING CONSTRUCTS

Arrays-one dimensional and multidimensional -command line arguments. Introducing classes –class fundamentals –methods -objects -constructors –this keyword –-garbage collection-Nested Classes – Polymorphism. **[8 Hours]**

UNIT-III

INHERITANCE, INTERFACE AND EXCEPTIONS

Types of inheritance-Super and Final -Interface-Abstract Classes- Interface vs Abstract classes -Packages-Creating Packages -access protection - Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions. [**8 Hours]**

UNIT-IV

MULTITHREADING AND I/O

Threads -Thread Life Cycle-Thread priority –multithreading –Synchronization -suspending and resuming threads -communication between threads. Java I/O streaming –filter and pipe streams. **[8 Hours]**

UNIT-V

COLLECTION FRAMEWORKS

Collection Framework in Java –Introduction to Java Collections, Overview of Java Collection frame work, Generics, commonly used Collection classes–Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties. **[10 Hours]**

Text Books:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

Reference Books:

1. Head First Java, Author – Kathy Sierra & Bert Bates,Latest Edition – 2nd Edition,Publisher – Shroff/O'Reilly
2. Effective Java,Author – Joshua Bloch,Latest Edition – 3rd Edition,Publisher – Addison Wesley
3. Core Java: An Integrated Approach, New: Includes All Versions upto Java 8 Paperback – 1 January 2016by R. Nageswara Rao

E-Books:

https://docs.oracle.com/en/java/

NPTEL/MOOC:

https://nptel.ac.in/courses/106/105/106105191/
https://onlinecourses.nptel.ac.in/noc20_cs85/preview

II Year – I Semester	DISCRETE MATHEMATICAL STRUCTURES	L	T	P	C
1000202100	(Common for CSE, IT and AI&DS)	3	1	0	3

COURSE OBJECTIVES:

1. To introduce the algorithmic approach to the solution of problems, which is fundamental in discrete mathematics and this approach reinforces the close ties between this discipline and the area of computer science.
2. To introduce basic logical connectives and inference theory.
3. To Familiarize closed form solution of linear recurrence relations by various methods.
4. To perform the operations associated with sets, functions and relations.
5. To Bring awareness of basic concepts of graphs and explaining related algorithms.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	**Develop** reasoning skills using Mathematical Logic concepts.
CO2	**Evaluate** the solutions for various problems using recurrence relations.
CO3	**Construct** Hasse diagrams and Understandthe concept of Algebraic Structures.
CO4	**Apply** the concepts of graph theory for a given problem.

UNIT- I

MATHEMATICAL LOGIC [12 HOURS]

Propositional Logic: Connectives- negation, conjunction, disjunction, conditional and bi-conditional,well-formed formulae, tautologies, equivalence of formulae, tautological implications, Disjunctive and Conjunctive normal forms, Rules of inference and examples, Consistency of premises.

Predicative Logic.; Statement Functions, Variables and Quantifiers, Free and Bounded variables, Inference theory for predicative logic.

UNIT- II

RECURRENCE RELATIONS [8 HOURS]

Recurrence relations: Recurrence relations, solving homogeneous linear recurrence relations by characteristic roots method, solving non-homogeneous linear recurrence relations.

UNIT- III

SETS, RELATIONS AND ALGEBRAIC STRUCTURES[12 Hours]

Sets: Sets, Operations on Sets, Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application

Relations: Definition, representation, types of relations: equivalence relation, equivalence class, partial order, HasseDiagram and total order relations.
Functions: Definition, types of functions: surjective, injective and bijective.
Algebraic Structures: Binary operations, Algebraic structures, Group, Abelian Group, Subgroups, Lagrange's theorem on finite groups.

UNIT- IV
GRAPH THEORY **[10 HOURS]**
Graph theory: Definitions, finite and infinite graphs, incidence and degree, isolated and pendant vertices, isomorphism, sub graphs, connected and disconnected graphs, simple graph, complete graph, bipartite graph, complete bipartite graph, planar graph, Isomorphic Graphs, Euler formula (without proof) and Graph colouring, Walk, path and circuit, Euler graph, Hamiltonian Graph.

UNIT- V
TREES **[10 HOURS]**
Trees: Some properties of trees, rooted and binary trees, spanning trees, BFS & DFS Algorithms, Minimal spanning trees, Kruskal's algorithm.

TEXTBOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997.
2. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.
3. Joe L. Mott, Abraham Kandel and T. P. Baker, Discrete Mathematics forcomputer scientists& Mathematicians, 2/e, Prentice Hall of India Ltd, 2012.

REFERENCE BOOKS:

1. S. Santha and E. V. Prasad Mathematical Foundation for Computer Science, Cengage,2017.
2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby,Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011.
4. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw.

II Year – I Semester		L	T	P	C
1005202101	OPERATING SYSTEMS	3	0	0	3

COURSE OBJECTIVES:

1. Study the basic concepts and functions of operating systems.
2. Understand the structure and functions of OS.
3. Learn about Processes, Threads and Scheduling algorithms.
4. Understand the principles of concurrency and Deadlocks.
5. Learn various memory management schemes.
6. Study I/O management and File systems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Summarize various concepts of Operating Systems
CO2	Implement and Apply Process Scheduling Algorithms
CO3	Illustrate concepts of Paging, Segmentation and Apply Concurrency, Deadlock Mechanisms in real world
CO4	Analyze the concepts of file systems in operating systems

UNIT- I

INTRODUCTION TO OPERATING SYSTEM CONCEPT

Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types. **[8 Hours]**

UNIT-II

PROCESS MANAGEMENT

Process concept, The process, Process State Diagram ,Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Inter process Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms. **[8 Hours]**

UNIT-III

MEMORY MANAGEMENT

Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation.

VIRTUAL MEMORY MANAGEMENT

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing **[10 Hours]**

UNIT-IV

CONCURRENCY

Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples.

PRINCIPLES OF DEADLOCK

System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock **[8 Hours]**

UNIT-V

FILE SYSTEM INTERFACE

The concept of a file, Access Methods, Directory structure, File system mounting, files sharing, protection. File System implementation- File system structure, allocation methods, free-space management Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers. Introduction to Dockers. [10 Hours]

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second 2016.

Reference Books:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley,2001.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.

II Year – I Semester		L	T	P	C
1005202102	ESSENTIALS FOR COMPETITIVE PROGRAMMING	3	0	0	3

COURSE OBJECTIVES:

1. To improve logical and analytical skills
2. To improve programming patterns like recursion

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Apply bit manipulation techniques to solve problems
CO2	Apply the modular programming techniques to simplify the programs.
CO3	Able to solve problems using strings

UNIT- I

BIT MANIPULATIONS:
Bitwise operators, check if an integer is even or odd, detect if two integers have opposite signs or not, Swap two numbers without using any third variable, count set bits, check kth bit is set or not, check if a positive integer is a power of 2 without using any branching or loop. Find the number that has odd occurrences in array. Power Set of a given Set using bitwise operators, Find the absolute value of an integer without branching, convert given number to binary, Count number of bits to be flipped to convert A to B, Find one extra character in a string, Toggle all even bits of a number, types of errors in competitive coding. [10 Hours]

UNIT-II

NUMBER THEORY:
GCD: Binary GCD algorithm, Using prime factorizations, Fermat's Theorem, Euclidean algorithm, Modular Arithmetic, Binary Exponentiation, Modular Exponentiation, Modular multiplicative inverse.
Factorial, Fibonacci Numbers, properties of Fibonacci numbers, Fibonacci divisibility and GCD
Prime numbers: Primality Test, Miller–Rabin, Sieve of Eratosthenes, Sieve of Eratosthenes with Linear Time Complexity, Segmented sieve, prime factors, smallest prime factors. **[8 Hours]**

UNIT-III

RECURSIONS:
Recursion: The nature of recursion, tracing a recursive function, Linear Recursion, Mutual recursion, Recursive Mathematical functions, comparing recursion and iteration.

Problems: Factorial, Fibonacci, GCD, LCM, permutations of a given string, Generate all strings of n bits of binary digits, TOWERS of HANOI, N queens problem, sum of digits of a number. **[6 Hours]**

UNIT-IV

ARRAYS:

Array Problems: Maximum possible difference of two subsets of an array, Program for array rotation, Find the minimum element in a sorted and rotated array, Find Second largest element in an array, Find the largest K elements in an array, First element that appears even number of times in an array, count the number of subarray for a given array , Count Strictly Increasing Subarrays, Count subarrays with same even and odd elements, Elements of an array that are not divisible by any element of another array, Kadane's Algorithm :maximum sum contiguous subarray. **[8 Hours]**

UNIT-V

STRING MANIPULATIONS:

String Problems: Caesar cipher encryption, count vowels and consents and special characters of string, counting consecutive vowels from string, String with maximum number of unique characters in a given set of strings, Anagrams, Panagrams, Generate all Subsequences of a String, KMP Algorithm: Longest Prefix Suffix, Rabin-Karp Algorithm for pattern Matching. **[8 Hours]**

Text Books:

1. Problem Solving and Program Design in C, Jeri R. Hanly, Ellot B. Koffman, 7th Edition, Pearson.
2. 101 Programming puzzle problems solved: High School Junior to Seniors Join us to win Informatics Olympiad, N.B.Venkateswarlu, Feb, 2015.

Reference Books:

1. Programming in C, PradipDey, Manas Ghosh, 2nd Edition, OxfordUniversityPress.
2. How to Solve it by Computer- R.G.Dromey,PHI.

E-Books:

https://graphics.stanford.edu/~seander/bithacks.html

NPTEL/MOOC:

https://onlinecourses.nptel.ac.in/noc21_cs99/preview

II Year – I Semester		L	T	P	C
1005201203	DATA STRUCTURES	3	0	0	3

COURSE OBJECTIVES:

1. Basics of data structures including their fundamentals building blocks: arrays and linked list.
2. To solve problems using linear data structures such as linear lists, stacks, queues.
3. To solve problems using searching and sorting techniques.
4. To be familiar with non-linear data structures such as trees.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Apply the C language Concepts: Pointers, Structures, Unions and recursion to solve the problems
CO2	Implement Standard Data Structures like Stack, Queue, List, Trees and Graphs
CO3	Choose appropriate data structure while building new application
CO4	Explain the need for data structuring techniques

UNIT- I

ARRAYS AND LINKED LISTS

The Abstract Data Type (ADT), Dynamic allocation of Arrays, Representation of multidimensional Arrays.

Single Linked List, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Sparse Matrices, Sparse Matrix Representation, Doubly Linked Lists. **[8 Hours]**

UNIT-II

STACKS AND QUEUES

The Stack, Stacks using Dynamic Arrays, Recursion, Linked Stacks, The Queue, Linked Queues, Circular Queues using Dynamic Arrays, De-queue. Application of stacks and queues, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix, Towers Of Hanoi Problem. **[8 Hours]**

UNIT-III

SEARCHING AND SORTING

Searching: Linear Search, Binary Search.

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort **[8 Hours]**

UNIT-IV

TREES:

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversals: Inorder Traversal, Preorder Traversal, Postorder Traversal, Binary Search Trees: Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree . **[10 Hours]**

UNIT-V

GRAPHS:

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation- Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees- Kruskal's Algorithm, Prim s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination, All-Pairs Shortest Path. **[10 Hours]**

Text Books:

1. Fundamentals of Data Structures in C, Ellis Horowtiz, S.Sahni, Andrews Freed, University Press (India). Second Edition.
2. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.

Reference Books:

1. Classic Data Structures, Debasis Samantha, PHI. (Second Edition)
2. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Data Structures using C, Reema Thareja, Oxford Home Publications, Second Edition

E-Books:

1. https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf
2. https://vardhaman.org/wp-content/uploads/2018/12/Data%20Structures.pdf
3. https://www.ncertbooks.guru/data-structures/

NPTEL/MOOC:

https://nptel.ac.in/courses/106/102/106102064/

II Year – I Semester		L	T	P	C
1005202110	JAVA PROGRAMMING LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. Implementing program for user interface and application development using core java principles.
2. Comprehension of java programming constructs, control structures in java.
3. Implementing object-oriented constructs such as various class hierarchies, interfaces and exception handling.
4. Understanding of thread concepts and I/O in java
5. To understand computer programming and application software, package/ suites.

CO's	At the end of the course, the student will have the ability to:
CO1	Use the Java programming language for various programming technologies.
CO2	Develop software in the Java programming language.
CO3	Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.
CO4	Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1 (Basics)** a) Write a JAVA program to display default value of all primitive data type of JAVA b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root. c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers. d) Write a case study on public static void main (250 words)	Basic Programming

2.	**Exercise – 2** a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism. b) Write a JAVA program to sort for an element in a given list of elements using bubble sort. c) Write a JAVA program to sort for an element in a given list of elements using merge sort. d) Write a JAVA program using String Buffer to delete, remove character.	Sorting
3.	**Exercise – 3** a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method. b) Write a JAVA program to implement constructor	Constructor
4.	**Exercises –4** a) Write a JAVA program to implement constructor overloading. b) Write a JAVA program implements method overloading.	Constructor Overloading
5.	**Exercise -5** a) Write a JAVA program to implement Single Inheritance b) Write a JAVA program to implement multi-level Inheritance c) Write a java program for abstract class to find areas of different shapes	Inheritance
6.	**Exercise -6** a) Write a JAVA program give example for "super" keyword. b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?	Programming using "super" Keyword
7.	**Exercise -7** a) Write a JAVA program that describes exception handling mechanism b) Write a JAVA program Illustrating Multiple catch clauses	Exception Handling

8.	**Exercise -8** a) Write a JAVA program that implements Runtime polymorphism b) Write a Case study on run time polymorphism, inheritance that implements in above problem	Runtime Polymorphism
9.	**Exercise -9** a) Write a JAVA program for creation of Illustrating throw b) Write a JAVA program for creation of Illustrating finally c) Write a JAVA program for creation of Java Built-in Exceptions d) Write a JAVA program for creation of User Defined ExceptionWrite a Program to implement set and set Operations.	Exceptions
10.	**Exercise -10** a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable) b) Write a program illustrating is Alive and join c) Write a Program illustrating Daemon Threads.	Threads
11.	**Exercise -11** a) Write a JAVA program for Producer Consumer Problem b) Write a case study on thread Synchronization after solving the above producer consumer problem	Synchronization
12.	**Exercise -12** a) Write a JAVA program illustrates class path b) Write a case study on including in class path in your os environment of your package. c) Write a JAVA program that import and use the defined your package in the previous Problem	Package

13.	**Exercise -13** a) What is the difference between List and Set? Implement a Program to show the differences. b) What is the difference between HashSet and TreeSet? Implement a Program to show the differences. c) What is the difference between Set and Map? Implement a Program to show the differences.	Set and Map

Text Books:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

Reference Books:

1. Head First Java, Author – Kathy Sierra & Bert Bates,Latest Edition – 2nd Edition,Publisher – Shroff/O'Reilly
2. Effective Java,Author – Joshua Bloch,Latest Edition – 3rd Edition,Publisher – Addison Wesley
3. Core Java: An Integrated Approach, New: Includes All Versions upto Java 8 Paperback – 1 January 2016by R. Nageswara Rao

II Year – I Semester		L	T	P	C
1005202111	OPERATING SYSTEMS LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. To provide an understanding of the design aspects of operating system.
2. To provide practical knowledge on the different concepts of operating systems.
3. To familiarize students with the Linux environment.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Stimulate CPU scheduling algorithms in operating system.
CO2	Evaluate memory management techniques in operating system.
CO3	Implement page replacement algorithms in operating system
CO4	Implement file allocation strategies used in operating system.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise -1** Study of Unix/Linux general purpose utility command list man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.	Unix/Linux Commands
2.	**Exercise – 2** Simulate the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority	CPU Scheduling
3.	**Exercise – 3** Simulate MVT and MFT	Multi Programming
4.	**Exercise – 4** Simulate Bankers Algorithm for Dead Lock Avoidance	Dead Lock Avoidance
5.	**Exercises –5** Simulate Bankers Algorithm for Dead Lock Prevention	Dead Lock Prevention
6.	**Exercise -6** Simulate all page replacement algorithms. a) FIFO b) LRU c) LFU	Page Replacement

7.	**Exercise -7** Simulate all File allocation strategies a) Sequenced b) Indexed c) Linked	File Allocation
8.	**Exercise -8** C program to emulate the UNIX ls –l command.	ls –l command
9.	**Exercise -9** C program that illustrates how to execute two commands concurrently with a command pipe.	Command Pipe
10.	**Exercise -10** C program that illustrates two processes communicating using shared memory	Shared Memory

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second 2016.

Reference Books:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley,2001.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, TataMc Graw-Hill Education, 2007.

II Year – I Semester		L	T	P	C
1005201212	DATA STRUCTURES LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. To develop skills to design and analyze simple linear and non-linear data structures
2. To Strengthen the ability to identify and apply the suitable data structure for the given real-world problem
3. To gain knowledge in practical applications of data structures

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Implement the programs on arrays and linked lists
CO2	Implement Standard Data Structures like Stacks and Queue
CO3	Analyze the time and space efficiency of the data structure be capable to identity the appropriate data structure for given problem
CO4	Have practical knowledge on the application of data structures

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1** a)Write a program to implement dynamic arrays b) Write a program to implement sparse matrices using arrays	Arrays
2	**Exercise – 2** Write a program to implement a Single Linked List and its operations.	Single Linked List
3.	**Exercise – 3** Write a program to implement a Doubly Linked List and its operations.	Doubly Linked List
4.	**Exercise – 4** Write a program to implement the following using arrays and linked list a) Stack b) Queue	Linear Data Structures
5.	**Exercise – 5** Write a program to do the following a) Infix to postfix conversion. b) Evaluation of postfix expression.	Applications of Stack

6.	**Exercise – 6** Write a program to implement: a)Linear Search b)Binary Search	Searching Strategies
7.	**Exercise – 7** Develop a Program to find number of comparisons and swapping for a given list of numbers a) Bubble Sort b) Selection Sort	In-Place Sorting techniques
8.	**Exercise – 8** Write a program for the following a) Merge Sort b) Quick Sort	Divide and Conquer
9.	**Exercise – 9** a) Write a program that use non-recursive functions to traverse the given binary tree in i. Pre-order ii. In-order iii. Post-order. b) Implementation of Binary Search trees.	Trees
10.	**Exercise – 10** Write a program for the following modules a) To implement Prim's algorithm to generate a min-cost spanning tree. b) To implement Kruskal's algorithm to generate a min-cost spanning tree. c) To implement Dijkstra's algorithm to find shortest path in the graph. d) Implement Depth First Search	Graphs

Text Books:

1. Fundamentals of Data structures in C, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition,Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd.,Second Edition

Reference Books:

1. Classic Data Structures, Debasis Samantha, PHI. (Second Edition)
2. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Data Structures using C, Reema Thareja, Oxford Home Publications, Second Edition.

II Year – I Semester	SKILL ORIENTED COURSE - I	L	T	P	C
1000202180	DIGITAL ENGLISH	0	0	4	2

COURSE OBJECTIVES:

The student will be able to:

1. Practice professional writing skills and upload the articles in digital media
2. Access digital platforms and create blog.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Write effectively by using proper vocabulary
CO2	Prepare cover letter and resume properly and upload in LinkedIn and other platforms
CO3	Create articles and upload in digital media

LIST OF EXPERIMENTS / PROGRAMS / ACTIVITIES

S.No.	Name of the experiment / List of Programs / List of Activities (hands-on)	Skill
1	Professional Email Writing	Professional writing
2	Cover Letter and Resume Preparation	Professional writing
3	Writing Blogs	Creativity and Writing
4	Creative Writing	Creativity and Writing
5	Abstract Writing	Professional writing

Reference Books:

1. How to Write Great Blog Posts that Engage Readers (Better Blog Booklets Book 1) by Steve Scott.

2. Content Writing Step-By-Step: Learn How To Write Content That Converts And Become A Successful Entertainer Of Online Audiences-Joseph Robinson.

3. Resumes Cover Letters: How to Write a Cover Letter: Step-by-Step Tips- Razaq Adekunle.

II Year – I Semester	AUDIT COURSE - II	L	T	P	C
1000202121	ENVIRONMENTAL SCIENCE	2	0	0	0

COURSE OBJECTIVES:

1. Classify, describe and explain the concepts of Ecosystems and environmental Studies.
2. Overall understanding of different types of natural resources and its conservation.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impacts of developmental activities and the importance of environmental management.
5. Awareness on the social issues, environmental legislations and global treats.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
CO2	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities.
CO3	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.

UNIT I **[8 Hours]**

Multidisciplinary nature of Environmental Studies:
Definition Scope and its importance, Multidisciplinary nature of Environmental science.
Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Energy flow in the ecosystem – Ecological pyramids - Ecological succession.
Social Issues and the Environment: Impacts of microbial toxins on human health. Urban problems related to energy- Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions. Climate change, Global warming, Acid rain, Ozone layer depletion.

UNIT II **[8 Hours]**

BIODIVERSITY AND ITS CONSERVATION: Definition: genetic, species and ecosystem diversity –Value of biodiversity, Hot-spots of biodiversity, Threats to biodiversity, Endangered and endemic species of India – Conservation of biodiversity.

UNIT III **[8 Hours]**

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources

UNIT IV **[8 Hours]**

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Noise pollution
e. Nuclear hazards

Role of an individual in prevention of pollution – Pollution case studies

Environmental Laws: Wildlife Protection Act 1972 –Water pollution prevention and control Act 1974 - Forest Conservation Act 1980n –Air pollution prevention and control Act 1981. Environmental Protection Act 1986 and 2006 - – Public awareness

SOLID WASTE MANAGEMENT: Causes**,** effects and control measures of urban and industrial wastes.

Sustainable Development: Goals of Sustainability, Conferences, Carbon credits and carbon footprints.

UNIT V **[4 Hours]**

Environmental Management:

EIA and EA: Introduction, definition, scope, objectives and methodology.

Disaster management: Definition, floods, earthquake, cyclone and landslides.

Ecotourism: Definition, principles, advantages and disadvantages

Environmental Diary

Field Trip

Field work/Environmental Visit: Visit to a local area to document environmental assets – reserve forest/ eco-tourist spot : Visit to a local polluted site - Study of local environment - common plants, insects, birds - Study of simple ecosystems –pond, river, hill slopes etc - Visit to industries/water treatment plants/effluent treatment plants.

Text Books:

1. Text book of Environmental Studies for Undergraduate courses by ErachBharuncha for University Grants Commission, Universities Press.

2. Environmental Studies by Palaniswamy – Pearson Education.

3. Environmental Studies by Dr. S. Azeem Unnisa, Academic Publishing Company

Reference Books:

1.Textbook of Environmental Science by Deeksha Dave and E. Sai Baba Reddy, Cengage Publications.

2. Text of Environmental Sciences and Technology by M. Anji Reddy, BS Publications.

3. Comprehensive Environmental studies by J.P Sharma, Laxmi Publications.

4. Environmental sciences and Engineering – J Glynn Henry and Gary W Heinke – Prentice hall of India Private Limited.

5. A textbook of Environmental Studies by G.R Chatwal, Himalaya Publishing house.

6. Introduction to Environmental engineering and science by Gilbert M Masters and Wendell P Ela – Prentice hall of India private limited.

DETAILED SYLLABUS

FOR

II-B. Tech

II-SEMESTER

II Year – II Semester		L	T	P	C
1005202200	DATABASE MANAGEMENT SYSTEMS	3	0	0	3

COURSE OBJECTIVES:

1. Provide students with theoretical knowledge and practical skills in the use of database and database management systems in information technology applications.
2. The logical design, physical design and implementation of relational databases are covered.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Describe ER model and normalization for database design.
CO2	Create, maintain and manipulate a relational database using SQL.
CO3	Design and build database system for a given real world problem.
CO4	Examine issues in data storage and query processing and can formulate appropriate solutions.

UNIT- I

Introduction to Database Systems, File System Vs DBMS, Advantages of DBMS, Structure of DBMS, Levels of Data Abstraction (Data Independence), Database Users and Administrators, Different Data Models.

E-R Model: Overview of Database Design, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model **[8 Hours]**

UNIT-II

Introduction to the Relational Model, Relational model constraints over relations. Relational Algebra and calculus **[8 Hours]**

UNIT-III

SQL Queries: The Form of Basic SQL Query, Union, Intersect and Except-Nested Queries-Aggregative Operators- Group By and Having Clauses-Null Values-Outer Joins.

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF),De-normalization.

[**8 Hours]**

UNIT-IV

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. **[8 Hours]**

UNIT-V

Query processing, Transaction Management, Concurrency Control and Crash recovery Transactions: Acid Properties of Transaction - Transaction States - Schedule: Serial Schedule Concurrent Schedules - Anomalies Associated With Concurrent Schedules (RW WR - and WW Conflicts) -Serializability – Conflict Serializability - and View Serializability. Introduction to Lock Management-Lock Based Concurrency Control: 2pl-Strict 2pl Concurrency without Locking, Timestamp–Based Concurrency Control – Optimistic Concurrency Control. Introduction to ARIES - The Log - The Write-Ahead Log Protocol Check Pointing. **[8 Hours]**

Text Books:

1. Database System Concepts. 6/e Silberschatz, Korth, TMH
2. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA

Reference Books:

1. Introduction to Database Systems, 8/e C J Date, PEA
2. The Database book principles & practice using Oracle/MySqlNarainGehani, University Press.
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

II Year – II Semester		L	T	P	C
1005202201	ADVANCED DATA STRUCTURES	3	0	0	3

COURSE OBJECTIVES:

1. To be familiar with hashing and various overflow handling techniques
2. To emphasize the importance of dictionaries and Hashing for the faster retrieval
3. Develop effective digital search using tries
4. To implement M-way trees like B- Trees and B+ trees

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Implement Hashing and its collision resolution mechanisms.
CO2	Implement heaps, queues, binomial queues and their operations
CO3	Implement variants of Binary Search Trees like AVL, Red-Black Tree and Multiway search Trees
CO4	Illustration of tries which share some properties of table look up, various issues related to the design of file structures

UNIT- I

HASHING:

Dictionary ADT, Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic Hashing. **[8 Hours]**

UNIT-II

PRIORITY QUEUES:

Priority Queue ADT, Model, Simple Implementation, Binary Heap, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Heap Sort, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation- Implementation of Binomial Queues. **[8 Hours]**

UNIT-III

EFFICIENT BINARY SEARCH TREES:

Binary Search Tree, AVL Tree, Insertion into a AVL Tree, Deletion from a AVL Tree, Red-Black Trees, Definition, Representation of a Red- Black Tree, searching a Red-Black Tree, Inserting into a Red Black Tree, Deletion from a Red Black Tree. **[10 Hours]**

UNIT-IV

MULTIWAY SEARCH TREES:

M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion

from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree. **[8 Hours]**

UNIT-V

DIGITAL SEARCH STRUCTURES:

Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie- Sampling Strategies- Insertion into a Trie- Deletion from a Trie- Keys with Different Length- Height of a Trie- Space Required and Alternative Node Structure- Prefix Search and Applications- Compressed Tries- Compressed Tries With Skip Fields- Compressed Tries With Labelled Edges- Space Required by a Compressed Tries. **[10 Hours]**

Text Books:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. Fundamentals of DATA STRUCTURES in C: 2nded, , Horowitz , Sahani, Anderson-freed, Universities Press
3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson

Reference Books:

1. Classic Data Structures, Debasis Samantha, PHI. (Second Edition)
2. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Data Structures using C, Reema Thareja, Oxford Home Publications, Second Edition
4. File Structures :An Object oriented approach with C++, 3rded, Michel J Folk, Greg Riccardi, Bill Zoellick
5. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu& EV Prasad, S Chand, 2010.

E-Books:

1. https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf
2. https://vardhaman.org/wp-content/uploads/2018/12/Data%20Structures.pdf
3. https://www.ncertbooks.guru/data-structures/
4. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
5. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
6. http://lcm.csa.iisc.ernet.in/dsa/dsa.html
7. http://utubersity.com/?page_id=878

NPTEL/MOOC:
https://nptel.ac.in/courses/106/102/106102064/

II Year – II Semester		L	T	P	C
1005202202	FORMAL LANGUAGES AND AUTOMATA THEORY	3	1	0	3

COURSE OBJECTIVES:

1. Introduce the student to the concepts of Theory of computation in computer science
2. The students should acquire insights into the relationship among formal languages, formal Grammars and automata.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Employ finite state machines to solve problems in computing.
CO2	Classify machines by their power to recognize languages.
CO3	To Design PDA for solving computational Problems.
CO4	To design Turing Machine for arithmetic Operations.

UNIT- I

Computation, Finite State Machine, Components of Finite State Automata, Elements of Finite State System, Mathematical representation of Finite State Machine Formal Language Theory-Symbols, Alphabets and Strings, Operations on Strings, Operations on Languages, types of formal languages,Finite Automata: Introduction, Deterministic Finite Automata(DFA), Design of DFAs, Non Deterministic Finite Automata(NFA). **[8 Hours]**

UNIT-II

Non-Deterministic Automata with Є-moves, Design of NFA- Є s, NFA Versus DFA, Equivalent Automata: Equivalence of NFA and DFA, Equivalence of NFA with Є moves to NFA without Є - moves. Minimization / Optimization of DFA.

Transducers:

Moore Machine, Mealy Machine, Difference between Moore and Mealy Machines, Properties / Equivalence of Moore and Mealy Machines. **[8 Hours]**

UNIT-III

Regular Expressions and Languages: Regular languages, Regular expressions, Properties of Regular Expressions, Uses of Regular Expressions, Finite Automata and Regular Expressions: Regular Sets and Regular Languages, Arden's Theorem, Equivalence of Finite Automata and Regular Expressions, Equivalence of DFA and Regular Expression, Equivalence of NFA and Regular Expression, Relation between Regular Grammar and Finite Automata, Noam Chomsky's Classification of Grammar and Finite Automata. **[10 Hours]**

UNIT-IV

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Elimination of Є Productions and Unit Productions, Normal Forms for Context Free Grammars: Chomsky Normal Form and Greibach Normal Form.
PDA: Definition of PDA and Design of PDA, types of PDA. **[10 Hours]**

UNIT-V

Introduction, Components of Turing Machine, Description of Turing Machine, Elements of TM, Moves of a TM, Language accepted by a TM, Role of TM's , Design of TM's, TM Extensions and Languages: TM Languages, Undecidable Problem, P and NP Classes of Languages. **[10 Hours]**

Text Books:

1. Elements of Theory of Computation, Harry R Lewis, Papadimitriou, PHI
2. Introduction to theory of computation, 2nd ed, Michel sipser, CENGAGE
3. A Text Book on Automata Theory, Nasir S.F.B, P.K. Srimani, Cambridge university Press
4. Introduction to Automata Theory, Formal languages and computation, Shamalendukandar, Pearson.

Reference Books:

1. Formal Languages and automata theory, C.K. Nagpal, OXFORD
2. Theory of Computation , aproblem solving approach, kavi Mahesh, Wiley
3. Automata, computability and complexity, Theory and applications, Elaine rich, PEARSON
4. Theory of Computation, Vivekkulkarni, OXFORDAttachments area
5. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.MotwaniAnd J.D.Ullman, 3rd Edition, Pearson, 2008.

II Year – II Semester	PROBABILITY AND STATISTICS	L	T	P	C
1000202102	(Common for ECM, CSE & IT)	3	0	0	3

COURSE OBJECTIVES:

1. To explain fundamental concepts of probability theory and random variables.
2. To develop an understanding of the role of discrete and continuous probability distributions in science and engineering.
3. The basic ideas of statistical methods of studying data samples.
4. To impart statistical methods in various applications Engineering

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	**Explain** the notion of random variable and **evaluate** the expected value and probability of random variables.
CO2	**Apply** Binomial, Poisson, Normal, gamma and Weibull distributions for real data to **compute** probabilities, theoretical frequencies.
CO3	**Evaluate** the confidence levels and maximum error for large and small samples, **Apply** the concept of hypothesis testing for large and small samples in real life situations to draw the inferences and estimate the goodness of fit.
CO4	**Examine** correlation for the bi-variate data and fit the different curves using principle of least squares and to **predict** the regression analysis.

UNIT- I

RANDOM VARIABLES: **[8 Hours]**

Review on Probability, Random experiment, sample space, events, Random variable, Discrete and Continuous variables, mathematical expectation and properties of Moment generating Functions (Without proof).

UNIT- II

DISTRIBUTIONS: **[10 Hours]**

Binomial, Poisson distributions (MGF, Mean and Variance without proofs), Normal distribution (MGF, area and symmetric properties without proofs) -related properties, Gamma and Weibull distributions.

UNIT- III

SAMPLING DISTRIBUTIONS: **[10 Hours]**

Introduction, Population and samples, Sampling distribution of mean for large and small samples (with known variance), proportion - Point and interval estimators for means and proportions (for large and small samples), Maximum error.

UNIT- IV

TESTING OF HYPOTHESIS [14 Hours]

Introduction, Null and alternative hypothesis, Type I and Type II errors, one tail, two-tail tests, Level of Significance. Tests concerning means, proportions and their differences using Z-test. Student's t-test, F-test and χ^2 test of goodness of fit and independence of attributes.

UNIT- V

CORRELATION & CURVE FITTING [10 Hours]

Introduction, simple correlation, regression, fitting of straight-line, second-degree curves, exponential and power curves by method of least squares.

TEXTBOOKS:

1. Probability & Statistics for Engineers, Miller& John E. Freund, Prentice Hall of India.
2. Probability& statistics for Engineers and Scientists; R.E.Walpole, S.L.Myeres Pearson

REFERENCE BOOKS:

1. Fundamentals of Applied Statistics;S.C.Gupta&V.K.KapoorS.Chand& Sons, Cengage.

II Year – II Semester		L	T	P	C
1005202103	SOFTWARE ENGINEERING	3	0	0	3

COURSE OBJECTIVES:

1. To understand the software life cycle models.
2. To understand the software requirements and SRS document.
3. To understand the importance of modeling and modeling languages.
4. To design and develop correct and robust software products.
5. To understand the quality control and how to ensure good quality software.
6. To understand the planning and estimation of software projects.
7. To understand the implementation issues, validation and verification procedures.
8. To understand the maintenance of software

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Apply the appropriate process models for the application development of SDLC
CO2	Understand the phases of SDLC from requirement gathering phase to design phase via Analysis Phase
CO3	Analyzing the strategies for coding and testing phase in Software product development
CO4	Apply the knowledge about estimation and maintenance of software systems and modeling the software project by using CASE tools

UNIT- I

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths, Professional and ethical responsibility.

Process Models and Agile Development: Generic Process Models like Waterfall Models, Evolutionary Process Model, V-Model, Agile Model, etc. Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process. Agile process-Extreme programming Process. **[10 Hours]**

UNIT-II

Requirements Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterize of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design. **[8 Hours]**

UNIT-III

Function-Oriented Software Design: Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.
User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.
Coding And Testing: Coding, Code Review, Software Documentation, Testing and Test Case, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing. **[10 Hours]**

UNIT-IV

Software Reliability And Quality Management: Software Reliability, Statistical Testing,Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.
Computer Aided Software Engineering: Case and its Scope, Case Environment, Case Supportin Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment **[9 Hours]**

UNIT-V

Software Maintenance: Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management, Devops.
Software Reuse: what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level. **[8 Hours]**

Text Books:

1. Software engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition Mc GrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

Reference Books:

1. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

II Year – II Semester		L	T	P	C
1005202210	DATABASE MANAGEMENT SYSTEMS LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
2. To familiarize the participant with the nuances of database environments towards information oriented data-processing oriented framework.
3. To give a good formal foundation on the relational model of data
4. To present SQL and procedural interfaces to SQL comprehensively
5. To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies
CO2	Design and implement a database schema for a given problem-domain
CO3	Normalize a database
CO4	Populate and query a database using SQL DML/DDL commands.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1** Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.	Creating Tables
2.	**Exercise – 2** Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.	Queries
3.	**Exercise – 3** Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.	Queries

4.	**Exercise – 4** Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc,round, to_char, to_date)	Queries using conversion functions
5.	**Exercise – 5** Creation of a simple PL/SQL program which includes declaration section, executable section and exception – Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found).	PL/SQL Programs
6.	**Exercise – 6** Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.	Commit and Rollback
7.	**Exercise – 7** Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.	Programs using Case
8.	**Exercise – 8** Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.	Programs using Loops
9.	**Exercise – 9** Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.	Procedures
10.	**Exercise – 10** Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.	Stored Functions
11.	**Exercise – 11** Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.	Package
12.	**Exercise – 12** Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR,WHERE CURRENT of clause and CURSOR variables.	Cursors
13.	**Exercise – 13** Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggersand INSTEAD OF Triggers.	Triggers

14.	**Exercise – 14** For a given set of relation tables perform the following: a. Creating Views b. Dropping Views c. Selecting from a View	Views

Text Books:

1. Database System Concepts. 6/e Silberschatz, Korth, TMH
2. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA

Reference Books:

1. Introduction to Database Systems, 8/e C J Date, PEA
2. The Database book principles & practice using Oracle/MySqlNarainGehani, University Press.
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

II Year – II Semester		L	T	P	C
1005202211	ADVANCED DATA STRUCTURES LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
2. Analyse the space and time complexity of the algorithms studied in the course.
3. Identify different solutions for a given problem; analyse advantages and disadvantages to different solutions

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	To understand graph representations, Minimum Spanning Trees and traversals
CO2	Understand dictionaries, hashing mechanism which supports faster retrieval.
CO3	Implement heaps, queues and their operations, B Trees and B+ Trees
CO4	Illustration of tries which share some properties of table look up, various issues related to the design of file structures

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	a) Implementation of Static Hashing (Use Linear probing for collision resolution) b) Implement Huffman coding.	Hashing
2.	Write a program to implement AVL tree operations	Balanced BST
3.	Write a program to implement Red- Black tree operations	Balanced BST
4.	Write a program to implement Binomial queues	Binomial Queue
5.	Write a program to implement Heap Sort	Heap Sort
6.	Write a program to implement B- Tree	B-Tree
7.	Write a program to implement B+ Trees	B+ Tree
8.	Construct Tries for the implementation of English Dictionary and Perform Searching of a word in dictionary.	Tries

Text Books:

1. Fundamentals of Data structures in C, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition,Universities Press, Pvt. Ltd.

2. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd.,Second Edition

Reference Books:

1. Classic Data Structures, Debasis Samantha, PHI. (Second Edition)
2. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Data Structures using C, Reema Thareja, Oxford Home Publications, Second Edition.

II Year – II Semester		L	T	P	C
1005202112	UNIFIED MODELING LANGUAGE LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. To provide a snapshot of the instances in a system and the relationships between the instances.
2. To portray and understand functional requirements of a system

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Create UML Diagrams
CO2	Create State Chart Diagrams
CO3	Create Interaction Diagrams

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	Demonstration of Rational Rose 98, ARGO UML and IBM RSA tools.	Environment Overview
2.	Draw Class diagram and Use Case Diagram of Library Management System	Design of UML Diagrams
3.	Draw Class diagram and Use Case Diagram of Online Book Shop.	Design of UML Diagrams
4.	Draw Class diagram and Use Case Diagram of Railway Reservation System	Design of UML Diagrams
5.	Draw Class diagram and Use Case Diagram of Banking System	Design of UML Diagrams
6.	Draw Class diagram and Use Case Diagram for Hotel Management system	Design of UML Diagrams
7.	Draw State Chart Diagram for Point Sale System.	Design of UML Diagrams
8.	Draw State Chart Diagram for Library Management System.	Design of UML Diagrams
9.	Draw State Chart Diagram for Hospital Management System.	Design of UML Diagrams
10.	Draw Interaction Diagrams for Railway Reservation System.	Design of UML Diagrams

Text Books:

1. Software Engineering with UML Book by Bhuvan Unhelkar
2. Object-oriented software engineering Textbook by Bernd Bruegge

Reference Books:

1. The Unified Modeling Language User Guide by Grady Booch et All.

II Year – II Semester	SKILL ORIENTED COURSE - II	L	T	P	C
1005202280	JAVA SCRIPT	0	0	4	2

Prerequisites:

- Some familiarity with **HTML and CSS**

COURSE OBJECTIVES:

1. Develop familiarity with the JavaScript language.
2. Learn to use best-practice idioms and patterns.
3. Understand advanced language features such as prototypical inheritance.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Write and deploy Javascript code to solve practical web design problems.
CO2	Describe what Javascript frameworks are and how they can be utilized to save time when writing custom Javascript code.
CO3	Describe the general landscape of current web technologies and how they can be utilized to solve real-life web development problems.
CO4	Create an app for digital applications on a website.

Brief Introduction about the Course:

JavaScript is a cross-platform, object-oriented scripting language used to make webpages interactive (e.g., having complex animations, clickable buttons, popup menus, etc.). There are also more advanced server side versions of JavaScript such as Node.js, which allow you to add more functionality to a website than downloading files (such as realtime collaboration between multiple computers). Inside a host environment (for example, a web browser), JavaScript can be connected to the objects of its environment to provide programmatic control over them.

LIST OF EXPERIMENTS / PROGRAMS / ACTIVITIES

S.No.	Name of the experiment / List of Programs / List of Activities (hands-on)	Skill
1.	Write a javascript program to illustrate the use of arithmetic and logical operators.	Java Script – Logical Operators
2.	Write a javascript program to illustrate the use of control and looping statements.	Java Script – Control & Looping Statements
3.	Write a javascript program to print n prime numbers and run it inside html using following ways. a) Write your program in script tag and use console.log to output b) Write your program in a separate file and include it using src in the script tag.	Programs using Java Script

4.	Write a javascript program to get data from various tags like headings, text area, input, paragraph.	Java Script - Tags
5.	Write a javascript program to create tags and insert data into it, and update existing tags like headings, text area, input, paragraph.	Java Script - Tags
6.	Write a javascript program to dynamically add divisions with h1 tags by clicking a button and taking data for h1 tag from input tag.	Java Script - Tags
7.	Create a basic user registration form with required fields and validate it using javascript.	Java Script
8.	Define various databases present in web browsers like local storage, session storage, web sql, cookies and illustrate the use of them by writing a javascript program.	Java Script
9.	Create a Todo Web Application, where in one page you take text and time as input and store it in your database(pick any type of database from the previous program) and show every todo which is created in a separate page and add delete option for each todo item. NOTE: You can add an update option also as an optional task.	Java Script
10.	Fetch JSON data from any global api using fetch api and show it in html by adding respective division and heading tags.	Java Script

Text Books:

1. JavaScript: The Good Parts by Douglas Crockford
2. JavaScript: The Definitive Guide by David Flanagan
3. Head First JavaScript Programming: A Brain-Friendly Guide by Elisabeth Freeman and Eric Freeman
4. JavaScript: The Definitive Guide: Master the World's Most-Used Programming Language by David Flanagan

Reference Books:

1. Eloquent JavaScript: A Modern Introduction to Programming by MarijnHaverbeke
2. Dive Into HTML5 by Mark Pilgrim
3. Learning Advanced Javascript by John Resig
4. Mastering HTML, CSS &Javascript Web Publishing by Lemay Laura, BPB Publications.

II Year – II Semester	MINI PROJECT (EPICS)	L	T	P	C
1005202260		0	0	2	1

INTRODUCTION

1. Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development

2. Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

3. Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

OBJECTIVE

1. To sensitize the students to the living conditions of the people who are around them,

2. To help students to realize the stark realities of the society.

3. To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability

4. To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.

5. To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.

6. To help students to initiate developmental activities in the community in coordination with public and government authorities.

7. To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

1. Positive impact on students' academic learning

2. Improves students' ability to apply what they have learned in "the real world"

3. Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development

4. Improved ability to understand complexity and ambiguity

Personal Outcomes

1. Greater sense of personal efficacy, personal identity, spiritual growth, and moral development

2. Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

Social Outcomes

1. Reduced stereotypes and greater inter-cultural understanding

2. Improved social responsibility and citizenship skills

3. Greater involvement in community service after graduation

Career Development

1. Connections with professionals and community members for learning and career opportunities

2. Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

Relationship with the Institution

1. Stronger relationships with faculty
2. Greater satisfaction with college
3. Improved graduation rates

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for students. It is highly expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

Implementation Procedure:

1. A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

2. The Community Service Project is a twofold one –

a) First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.

b) Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Horticulture
5. Herbal plants
6. Marine products
7. Aqua culture
8. Nutrition
9. Traditional health care methods
10. Air pollution
11. Water pollution
12. Soil protection
13. Renewable energy
14. Organic farming
15. Access to safe drinking water
16. Blood groups and blood levels
17. Internet Usage in Villages
18. Android Phone usage by different people
19. Utilization of free electricity to farmers and related issues
20. Natural disaster management

EVALUATION PROCEDURE:

1. Preliminary survey report - 20 M
2. Final Presentation – 10M
3. Final report submission & Final demo module – 20 M

For each student's batch, a separate attendance record should be kept in the preliminary survey report and final report, which should be counter signed by the teacher-mentor, HOD, and Principal.

Reports should include photographs that have a geotag.

II Year – II Semester	AUDIT COURSE - III LIFE SKILLS	L	T	P	C
1000202120		2	0	0	0

COURSE OBJECTIVE:

The students will be able to build self-confidence, encourage critical thinking, foster independence and help people to communicate more effectively.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Build Self Confidence and Interpersonal and Intrapersonal relationships.
CO2	Practice Emotional Competency while communicating with others
CO3	Gain Intellectual Competency by practicing ethics and morals

UNIT1

LIFE SKILLS: Positive Attitude and Positive Work Ethics, Time Management, Goal Setting: Short term, Long Term. (Activity has to be conducted)

UNIT2

EMOTIONAL INTELLIGENCE: Self Awareness through Johari Window and SWOT analysis (Activity has to be conducted)

UNIT3

PROBLEM SOLVING SKILLS: Critical Thinking and Brain Storming, Creative Thinking, Conflict Management. (Activity has to be conducted)

UNIT4

PUBLIC SPEAKING: Body Language, presentation skills, impromptu presentation, interviewing others. (Activity has to be conducted**)**

UNIT 5

NPTEL Course/ Coursera /Any relevant Certificate Course has to be done

Assessment: In order to clear internal assessment, the student has to submit Project Report and give Presentation on all the activities he/she has done during the course. The student has to do a certificate course also. (Presentation, Project Report and Certificate in total will be the criteria for the assessment)

References:

1. Barun K. Mitra; (2011), “Personality Development & Soft Skills”, First Edition; Oxford Publishers.
2. Kalyana; (2015) “Soft Skill for Managers”; First Edition; Wiley Publishing Ltd.
3. Larry James (2016); “The First Book of Life Skills”; First Edition; Embassy Books.
a. Shalini Verma (2014); “Development of Life Skills and Professional Practice”; First
b. Edition; Sultan Chand (G/L) & Company
4. John C. Maxwell (2014); “The 5 Levels of Leadership”, Centre Street, A division of
a. Hachette Book Group Inc.

PROGRAM STRUCTURE
FOR
III - B. Tech
I & II SEMESTER

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
PROGRAM STRUCTURE

III Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005203100	Advanced Web Technologies	3	0	0	3
2	1005202203	Design and Analysis of Algorithms	3	0	0	3
3	1005202104	Programming Essentials in Python	3	0	0	3
4	**Open Elective-I**					
	1001202140	Industrial Waste and Waste Water Management	3	0	0	3
	1003203140	Green Engineering Systems				
	1004203141	Data Communications				
	1000202103	Statistics for Data Science-II				
5	**Professional Elective-I**					
	1005203130	Agile Methodologies	3	0	0	3
	1005203131	Computer Graphics				
	1005203132	Advanced Computer Architecture				
	1005203133	Unix and Shell Programming				
	1005203134	Compiler Design				
6	1005203110	Advanced Web Technologies Lab	0	0	3	1.5
7	1005202212	Algorithms Lab	0	0	3	1.5
8	1005202113	Programming Essentials in Python Lab	0	0	3	1.5
9	1020202100	Employability Readiness Program	2	0	0	2
10	1099203120	Entrepreneurship Development	2	0	0	0
11	1005203160	Summer Internship	0	0	0	1.5
Total Credits						23
12		**Honors/Minor Courses**	**4**	**0**	**0**	**4**

III Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005202204	Data Warehousing and Data Mining	3	1	0	3
2	1012203100	Computer Networks	3	0	0	3
3	1099202100	Managerial Economics and Financial Analysis	3	0	0	3
4	**Professional Elective-II**					
	1005203230	Software Project Management	3	0	0	3
	1005203231	Distributed Systems				
	1005203232	Advanced Python Programming				
	1005203233	Big Data Analytics				
	1054202200	Artificial Intelligence				
5	**Open Elective-II**					
	1054203232	Evolutionary Computation	3	0	0	3
	1003203240	Optimization and Reliability				
	1004203236	Digital Image Processing				
	1019203240	Introduction to Embedded Systems				
6	1012203110	Computer Networks Lab	0	0	3	1.5
7	1005203210	NoSQL Databases Lab	0	0	3	1.5
8	1005203280	Devops	0	0	4	2
9	1099203220	Professional Ethics and Universal Human Values	2	0	0	0
Total Credits						**20**
INDUSTRIAL/RESEARCH INTERNSHP						
10		**Honors/Minor Courses**	**4**	**0**	**0**	**4**

Total Credits (III Year – I&II Sem) = 43

DETAILED SYLLABUS FOR

III-B. Tech

I-SEMESTER

III Year – I Semester		L	T	P	C
1005203100	Advanced Web Technologies	3	0	0	3

COURSE OBJECTIVES:

1. To understand computer programming and application software, package/ suites.
2. Design static web application development and Students will gain the skills and front designs
3. Able to get project based experience needed for entry into web application and development careers.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand basic concepts of HTML & CSS to design web pages and web site
CO2	Able to Develop dynamic web pages using JavaScript.
CO3	Implementing the Node and React Js in web development
CO4	Analyze a given problem and apply requisite appropriate tools for designing interactive web applications

UNIT- I

HTML5:

New standard for HTML, XHTML, and the HTML DOM, New Features, Browser Support, New Elements in HTML5, New Markup Elements, New Media Elements, The Canvas Element, New Form Elements, New Input Type Attribute Values, Video on the Web, Video Formats. **[10 Hours]**

UNIT- II

HTML5 – Audio and Canvas:

Audio on the Web, Audio Formats, How It Works, All <audio> Attributes, HTML5 Canvas, What is Canvas? Create a Canvas Element, Draw With JavaScript, Understanding Coordinates, More Canvas Examples, HTML5 Web Storage, Storing Data on the Client, The local Storage Object, The session Storage Object, HTML5 Input Types, HTML5 New Input Types, Browser Support, Input Type – email, Input Type – url, Input Type – number, Input Type – range, Input Type - Date Pickers, Input Type – search, Input Type – color.

[10 Hours]

UNIT- III

Introduction to CSS3:

What is CSS3? Differences between CSS3 and earlier CSS, Specifications How browsers are handling CSS3? CSS3 Selectors: Selectors Overview Explore specific selectors, Designing and Developing with CSS3: Background and color, Typography,CSS3 Box Model, Page layout, Media Queries, Implementing CSS3, Advantages and limitations of working with CSS.

Introduction to Bootstrap, design of responsive WebPages **[10 Hours]**

UNIT- IV

Introduction to JQUERY, selectors and events

Node JS: Node js - Basics and Setup, Node js Console, Node js Command Utilities, Node js Modules, Node js Concepts, Node js Events, Node js with Express js, Node js Database Access. **[8 Hours]**

UNIT- V

React JS:

Why React JS, React JSX, React JS components, State, Props, React Component API and Life cycle, Forms and Events. **[10 Hours]**

Text Books:

1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dream Tech Black Book
2. React. Js Book: Learning React JavaScript Library from Scratch, Book by Greg Sidelnikov
3. Node.js in Action, by Alex Young , Bradley Meck , Mike Cantelon , Tim Oxley , Marc Harter , T.J. Holowaychuk , Nathan Rajlich
4. React in Action 1st Edition by Mark Tielens Thoma

Reference Books:

1. Build Your Own Website The Right Way Using HTML & CSS, 3rd Edition by ge The WordPress Anthology
2. The Principles of Beautiful Web Design, 2nd Edition by Jason Beair

III Year – I Semester		L	T	P	C
1005202203	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3

COURSE OBJECTIVES:

This course introduces different techniques to design algorithms using Divide and Conquer, Greedy Approach, Dynamic Programming, Randomized techniques, Multi-Threading, Backtracking and Branch and Bound. It also focuses on how to measure the time and space complexities of algorithms.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Analyze the asymptotic performance of algorithms.
CO2	Apply the divide-and-conquer and dynamic programming paradigms
CO3	Compare the shared memory allocations between serial and parallel algorithms
CO4	Extend the backtracking and branch-and-bound techniques for state space tree algorithms

UNIT- I

Foundations of Algorithm: Algorithm, Algorithm Specification, Recursive Algorithm, **Analysis:** Space Complexity and Time Complexity, Asymptotic Notations, Amortized Analysis, **Sorting in linear time:** Counting sort. **[8 Hours]**

UNIT-II

Divide and Conquer: General method, Masters Theorem with proof, Applications: Binary search, Defective Chessboard, Finding the Maximum and Minimum, Quick sort, Merge sort, Matrix multiplication: Block and Strassen's matrix multiplication, Randomized Quicksort. **[10 Hours]**

UNIT-III

Greedy method: General method, Applications: Job sequencing with deadlines, knapsack problem, Single source shortest path problem, Optimal Merge Patterns.

Multithreaded Algorithms: Basics of dynamic multithreading, multithreaded matrix multiplication, multithreaded merge sort. **[8 Hours]**

UNIT-IV

Dynamic Programming: General method, Applications: Matrix chain multiplication, 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, String Editing, Reliability design. **[12 Hours]**

UNIT-V

Backtracking: General method, Applications: n-queen problem, sum of subsets problem.

Branch and Bound: Control Abstraction for LC-Search, FIFO & LIFO Branch-and-Bound techniques, 15-Puzzle Problem.
Introduction to NP-Hard and NP- Completeness. **[10 Hours]**

Text Books:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharam, Universities Press.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd.
3. The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer.
4. Design and Analysis of Algorithms, S. Sridhar, OXFORD UNIVERSITY PRESS.
5. Introduction to the Design and Analysis of Algorithms, Anany Levi, PEA

Reference Books:

1. Design and Analysis of Computer Algorithms, First Edition, V. AHO, Pearson
2. Design and Analysis of Algorithms, ParagHimanshu Dave, HimansuBalachandra Dave, Pearson Education.
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGrawHill.
4. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
5. Algorithms: Fourth Edition, Robert Sedgewick, Addison-Wesley, 2008

E-Books:

1. https://kailash392.files.wordpress.com/2019/02/fundamentalsof-computer-algorithms-by-ellis-horowitz.pdf
2. https://web.ist.utl.pt/~fabio.ferreira/material/asa/clrs.pdf

NPTEL/MOOC:

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://nptel.ac.in/courses/106/101/106101060/

III Year – I Semester		L	T	P	C
1005202104	PROGRAMMING ESSENTIALS IN PYTHON	3	0	0	3

COURSE OBJECTIVES:

1. To learn about Python programming language syntax, semantics, and the runtime environment.
2. To be familiarized with universal computer programming concepts like data types, containers.
3. To be familiarized with general computer programming concepts like conditional execution, loops & functions.
4. To be familiarized with general coding techniques and object-oriented programming

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Create the environment and run basic programs by make use of fundamental concepts
CO2	Apply knowledge of Python constructs for developing programs/applications.
CO3	Import packages to the current working environment and create user defined modules.
CO4	Implement object oriented concepts and handle exceptions and files

UNIT- I

INTRODUCTION TO PYTHON:

History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation. Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations. Control Flow-: if, if-elif-else, for, while, break, continue, pass. **[6 Hours]**

UNIT- II

STRINGS and DATA STRUCTURES:

Strings: Strings and text files, String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers, Data Structures: Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

[8 Hours]

UNIT- III

FUNCTIONS:
Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Modules: Creating modules, import statement, from, name spacing, Python packages Introduction to PIP, Installing Packages via PIP, Using Python Packages. **[8 Hours]**

UNIT- IV

INTRODUCTION TO OOPS:
Classes and Objects: Introduction, classes and objects, class method and self-argument, init() method, class and object variables, del() method, other special methods, public and private data members, private methods, calling a class method from another class method, built-in class attributes, garbage collection, class and static methods, Inheritance: Introduction, inheriting classes in python, types of inheritance, composition/containership/complex objects, abstract classes and interfaces, Meta class. **[8 Hours]**

UNIT- V

OPERATOR OVERLOADING AND EXCEPTION HANDLING
Operator Overloading: Introduction, implementing operator overloading, reverse adding, overriding__getitem__() and __setitem__() methods, overriding the in operator, overriding miscellaneous functions,overriding the _call__() method.
Error and Exception Handling: Introduction to errors and exceptions, handling exceptions, multipleexcept blocks, multiple exceptions in a single block, except block without exception, the else clause, raisingexceptions, built-in and user-defined exceptions, the finally block.
[10 Hours]

Text Books:

1. ReemaThareja,"Python ProgrammingUsing Problem Solving Approach", Oxford University Press,2019.
2. Zed Shah, "Learn PythonThe Hard Way", Third edition, Addison-Wesley, 2013.

Reference Books:

1. Charles Severance, " Python for Informatics- Exploring Information", 1st edition Shroff Publishers,2017.
2. John V. Guttag, "Introduction to Computation and Programming Using Python", The MIT Press,
3. W.Chun , "Core Python Programming", 2nd Edition, Prentice Hall, 2006.
4. Core Python Programming - Covers Fundamentals to Advanced Topics Like OOPS, Exceptions, Data Structures, Files, Threads, Networking, GUI, DB Connectivity and Data Science Second Edition (English, Paperback, Rao R. Nageswara)

E-Books: https://www.python.org/doc/

NPTEL/MOOC:

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://nptel.ac.in/courses/106/106/106106145/

III Year – I Semester	OPEN ELECTIVE-I	L	T	P	C
1001202140	INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT	3	0	0	3

COURSE OBJECTIVES:

This course will give the student knowledge about Industrial waste water along with managing and treatment methods required for these waste water.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation
CO2	Impart knowledge on selection of treatment methods for industrial wastewater.
CO3	Describe the common methods of treatment in different industries
CO4	Explain operational problems of common effluent treatment plant

UNIT- I

INDUSTRIAL WATER QUALITY ANALYSIS [8 Hours]

Wastewater Quality characterization - Physical, Chemical and Biological; unit operations and processes used in water and waste water treatment.

UNIT- II

MISCELLANEOUS TREATMENT [10 Hours]

Introduction to Advanced water treatments - Adsorption - Ion Exchange - Reverse Osmosis - Electro dialysis - Micro, Ultra & Nano filtration - Chemical oxidation process.

UNIT- III

BASIC THEORIES AND INDUSTRIAL WASTEWATER MANAGEMENT [10 Hours]

Measurement of industrial wastewater flow - Industrial wastewater sampling and preservation of samples for analysis - Toxicity of industrial effluents due to Heavy metals - Volume and Strength reduction -Neutralization - Equalization, Stabilization and proportioning.

UNIT- IV

INDUSTRIAL WASTEWATER DISPOSAL MANAGEMENT [12 Hours]

Discharges into Streams, Lakes and oceans and associated problems - Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges.

UNIT- V

PROCESS AND TREATMENT OF SPECIFIC INDUSTRIES [12 Hours]

Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Paper and Pulp industries, Tanneries, Sugar Mills, Distillers, Dairy and food processing industries, Fertilizers, Textiles, Steel plants, Pharmaceutical Plants.

Text Books:

1. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, New Delhi.
2. Industrial Wastewater Treatment by KVSG Murali Krishna.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning, Delhi
4. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc- GrawHill, Third Edition

Reference Books:

1. Wastewater Engineering by Metcalf and Eddy Inc., Tata McGrawhill Co., New Delhi
2. H. S Peavy, D. R. Rowe and George Tchobanoglous, Environmental Engineering, McGraw-Hill International Ed., 1985.
3. Wastewater Treatment- Concepts and Design Approach by G.L. Karia & R.A. Christian, Prentice Hall of India.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition.

III Year – I Semester	OPEN ELECTIVE-I	L	T	P	C
1003203140	GREEN ENGINEERING SYSTEMS	3	0	0	3

COURSE OBJECTIVES:

The course aims to highlight the significance of alternative sources of energy, green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmentally friendly.

COURSE OUTCOME:

COs	At the end of the course, the student will have the ability to:
CO1	Understanding various types of solar thermal collectors
CO2	Describe the working of a photovoltaic system and wind energy conversion system
CO3	Analyze the operation of fuel cells and biomass conversion technologies
CO4	Elaborate on ocean, geothermal, electrical and Mechanical systems

UNIT-I

INTRODUCTION: SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sunshine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT – II

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT – III

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT –IV

ENERGY EFFICIENT SYSTEMS:

ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps**.**

UNIT-V

ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

GREEN BUILDINGS: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings. Energy management.

Text Books:

1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/TMH
2. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006
3. Green Manufacturing Processes and Systems, Edited / J. Paulo Davim/Springer 2013

References:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao/New age international
2. Principles of Solar Engineering / D.YogiGoswami, Frank Krieth& John F Kreider / Taylor & Francis
3. Non-Conventional Energy / Ashok V Desai /New Age International (P) Ltd
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa
5. Non conventional Energy Source/ G.D Roy/Standard Publishers
6. Renewable Energy Resources-2nd Edition/ J.Twidell and T. Weir/ BSP Books Pvt.Ltd
7. Fuel Cell Technology –Hand Book / Gregor Hoogers / BSP Books Pvt. Ltd.

III Year – I Semester	OPEN ELECTIVE-I	L	T	P	C
1004203141	DATA COMMUNICATIONS	3	0	0	3

Course Overview:
This course gives complete knowledge about various data communication techniques and various communication systems. In this course students can also study various error detection and correction methods.

Course Objectives:
1. To understand the basic concepts of data communication, OSI layered architecture model
2. Discuss the various communication systems.
3. To understand the various error correction and detection methods.

Course Outcomes:

COs	At the end of the course, the student will have the ability to:
CO1	Understand the network layer architecture
CO2	Learn about various digital modulation techniques.
CO3	Apply various errors correction and detection codes to digital data.
CO4	Learn about electromagnetic properties.,

Unit-I:
Introduction to Data Communications and Networking
Standards Organizations for Data Communications, Layered Network Architecture. Serial and parallel Data Transmission, Open Systems Interconnection Model, Data Communications Circuits, Data communications Networks.
Signal Analysis, Electrical Noise, Signal-to-Noise Ratio, information Capacity, Bits, Bit Rate, Baud rate.

Unit-II: Metallic Transmission Lines, Transverse Electromagnetic Waves
Characteristics of Electromagnetic Waves, Advantages & Disadvantages of Optical Fiber cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light through an Optical fiber Cable, Optical Fiber Modes and Classifications.

Unit-III: Digital Modulation
Digital communication block diagram, Pulse code Modulation, Companding.
Multiplexing: Frequency division multiplexing and time division multiplexing.

Unit-IV:
Types of transmission media: Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching
Electromagnetic Polarization
Electromagnetic Radiation, Optical Properties of Radio Waves, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves.

Unit-V:

Data Communications Character Codes

Bar Codes, Error Control, Error Detection and Correction.

Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Routing Algorithms, Distance Vector Routing, Link State Routing

Text Books:

1. Data Communications & Networking – 5th Edition- B A Forouzan- Tata McGraw-Hil.
2. Data and Computer Communications- 8th Edition- William Stallings- Pearson Education.

References:

1. Data Communications and Networks- 2nd edition -Achyut S Godbole- and AtulKahate Tata McGraw-Hill.
2. Computer Networks- 4th Edition- Andrew S Tanenbaum- Pearson-Prentice Hall.
3. Data and Computer Communications- 8th Edition- William Stallings- Pearson Education.

III Year – I Semester	OPEN ELECTIVE-I	L	T	P	C
1000202103	STATISTICS FOR DATA SCIENCE-II	3	0	0	3

COURSE OBJECTIVES:

- ✓ To understand basic theoretical knowledge about fundamental principles for statistical inference**.**
- ✓ To understand different statistical test applied to samples to infer conclusions**.**

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Conduct hypothetical testing for large samples and small samples
CO2	Calculate, and interpret, the correlation coefficient and regression models
CO3	Interpret production or service quality by using different quality control charts.
CO4	Analyze the time series data using different techniques

Unit-I

Test of Hypothesis-I: **[8 Hours]**

Concept and definition of statistical hypothesis, Type I and Type II errors. One tail, two-tail tests, level of significance, P –Values in Decision Making, confidence intervals.

Large sample tests: Hypothesis testing of means, proportions and difference between means and proportions.

Unit-II

Test of Hypothesis-II: **[10 Hours]**

Small Sample tests: Students' t-distribution: single mean, difference of means, paired t-test for difference of means, F-distribution and X^2X^2 test. Test of independence of attributes - ANOVA for one-way and two-way classified data.

Unit-III

Correlation and Regression: **[10 Hours]**

The method of least squares – Inferences based on the least square's estimations, Regression: definition, linear regression, multiple regression and curve linear regression, Correlation: definition, correlation coefficient, rank correlation and correlation for bivariate distributions

Unit-IV

Statistical Quality Control methods: **[9 Hours]**

Introduction, types of control charts: control charts for variables and attributes, Methods for preparing control charts and distribution curve.

Unit-V

Statistical Methods in Time series Analysis data: [10 Hours]

Introduction, importance of Time series analysis, Methods in time series data analysis

Text Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta and V.K. Kapoor
2. Probability and Mathematical statistics by Prasanna Sahoo
3. Introduction to Time Series and Forecasting, Second Edition, by Peter J. Brockwel Richard A. Davis

Reference Books:

1) Yanchang Zhao, "R and Data Mining: Examples and Case Studies", Elsevier, 1st Edition, 2012

III Year – I Semester	PROFESSIONAL ELECTIVE-I	L	T	P	C
1005203130	AGILE METHODOLOGIES	3	0	0	3

COURSE OBJECTIVES:

1. Gain knowledge in agile development
2. To emphasize the importance of Agile Practice and Testing
3. Gain knowledge about lifecycle of agile methods

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	List out various software development techniques.
CO2	Outline about Agile method and its tools.
CO3	Implement Scrum model.
CO4	Design and test project using agile methodology.

UNIT- I

Iterative Evolutionary: Iterative Development, Risk-Driven and Client-Driven Iterative Planning, Time boxed Iterative Development, Evolutionary and Adaptive Development, Evolutionary Requirements Analysis, Evolutionary and Adaptive Planning, Incremental Delivery, Evolutionary Delivery, The Most Common Mistake, Specific Iterative Evolutionary Methods.. **[8 Hours]**

UNIT-II

Agile: Agile Development, Classification of Methods, the Agile Manifesto and Principles, Agile Project Management, Embrace Communication and Feedback, Empirical vs. Defined & Prescriptive Process, Principle-Based versus Rule-Based, Sustainable Discipline: The Human Touch, Team as a Complex Adaptive System, Agile Hype. **[8 Hours]**

UNIT-III

Motivation: The Facts of Change on Software Projects, Key Motivations for Iterative Development, Meeting the Requirements Challenge Iteratively, Problems with the Waterfall. **Evidence:** Research Evidence, Early Historical Project Evidence, Standards-Body Evidence, Expert and Thought Leader Evidence, A Business Case for Iterative Development, The Historical Accident of Waterfall Validity. **[10 Hours]**

UNIT-IV

Scrum: Method Overview: Lifecycle, Work products, Roles, and Practices, Values, Common Mistakes and Misunderstandings, Sample Projects, Process Mixtures, Adoption Strategies, Fact versus Fantasy, Strengths versus Other, History. **[8 Hours]**

UNIT-V

Agile Practicing and Testing: Project management – Environment – Requirements – Test – The agile alliances –The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams. **[8 Hours]**

Text Books:

1. Agile and Iterative Development – A Manager's Guide, Craig Larman, Pearson Education – 2004.
2. Agile Testing, Elisabeth Hendrickson, Quality Tree Software Inc, 2008.

Reference Books:

1. Agile Software Development, Wikipedia.
2. Agile Software Development Series, Cockburn, Alistair, 2001.

E-Resources:

1. www.agileintro.wordpress.com/2008
2. http://nptel.ac.in/courses/106101061/26
3. https://www.versionone.com/agile-101/agile-methodologies/
4. https://www.coursera.org/learn/agile-software-development
5. https://www.smartsheet.com/understanding-agile-software-development-lifecycle-and-process-workflow

III Year – I Semester	PROFESSIONAL ELECTIVE-I	L	T	P	C
1005203131	COMPUTER GRAPHICS	3	0	0	3

COURSE OBJECTIVES:

This course focuses on giving introduction about computer graphics, its wide range of application areas. Also gives information about the graphics hardware, working of hardware and software which are needed for producing graphics. It gives information about basic scan conversion algorithms, 2D, 3D transformations and viewing mechanisms, clipping algorithms, color models and Animation techniques.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Make use of general software architecture programs to create 2D and 3D graphics
CO2	Implement procedures through recall of graphics pipeline, frame buffers and graphics accelerators /co-processors.
CO3	Create 2D graphics through hardware system architecture for computer graphics.
CO4	Estimate models for lighting/shading color, ambient light, distant and light with sources, various shading models.

UNIT- I

INTRODUCTION: Application areas of computer graphics, overview of graphics systems, video-display devices and raster-scan systems, random scan systems.

SCAN CONVERSION: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm;(algorithms & applications only) , scan line polygon fill algorithm, boundary fill algorithm, flood fill algorithm. **[8 Hours]**

UNIT- II

2D - GEOMETRICAL TRANSFORMS: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear

2D –VIEWING : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland– Hodgeman polygon clipping algorithm (algorithms & applications only) **[10 Hours]**

UNIT- III

3D - OBJECT REPRESENTATION: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves.

3D - GEOMETRIC TRANSFORMATIONS: Translation, rotation, scaling, reflection and shear transformations, composite transformations. **[10 Hours]**

UNIT- IV

COLOR MODELS – Intuitive colour concepts – RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model; Colour selection.

COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications. **[8 Hours]**

UNIT- V

VISIBLE SURFACE DETECTION METHODS: Classification, back-face detection, depth-buffer, ray tracing method, depth sorting, BSP tree methods. **[10 Hours]**

Text Books:

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,"Computer Graphics: Principles and Practice", , 3rd Edition, Addison- Wesley Professional,2013. .
2. Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007

Reference Books:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

III Year – I Semester	PROFESSIONAL ELECTIVE-I	L	T	P	C
1005203132	ADVANCED COMPUTER ARCHITECTURE	3	0	0	3

COURSE OBJECTIVES:

To make students gain knowledge of the Computer Architectures and concepts of parallel computer models and to provide an intuition of Scalable Architectures, Pipelining, Superscalar processors and multiprocessors.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Analyze concepts of parallelism in hardware/software.
CO2	Implement the Hardware for Arithmetic Operation
CO3	Distinguish the performance of pipelining and non pipelining environment in a processor
CO4	Analyze the performance of different scalar Computers

UNIT- I

THEORY OF PARALLELISM:

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multi computers, Multi vector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties. **[8 Hours]**

UNIT- II

PRINCIPALS OF SCALABLE PERFORMANCE:

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology. **[8 Hours]**

UNIT- III

Bus Cache and Shared memory: Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared- Memory Organizations, Sequential and weak consistency models.

Pipelining and superscalar techniques: Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, super scalar pipeline design. **[8 Hours]**

UNIT- IV

PARALLEL AND SCALABLE ARCHITECTURES:

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multi vector and SIMD computers, Vector Processing Principals. **[8 Hours]**

UNIT- V

SCALABLE:

Scalable, x, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures. **[10 Hours]**

Text Books:

1. Advanced Computer Architecture Second Edition, Kai Hwang, Tata McGraw Hill Publishers.

Reference Books:

1. Computer Architecture, Fourth edition, J. L. Hennessy and D.A. Patterson. ELSEVIER.
2. Advanced Computer Architectures, S.G. Shiva, Special Indian edition, CRC, Taylor &Francis.
3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G. Wellein, CRC Press, Taylor & Francis Group.
4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.
5. Computer Architecture, B. Parhami, Oxford Univ. Press.

III Year – I Semester	PROFESSIONAL ELECTIVE-I	L	T	P	C
1005203133	UNIX AND SHELL PROGRAMMING	3	0	0	3

COURSE OBJECTIVES:

1. To provide knowledge of UNIX Operating System and its File System.
2. To develop the ability to formulate filtration techniques using filters.
3. To provide a comprehensive knowledge of SHELL programming, services and utilities.
4. To develop the ability to learn Distributed processing and multi-tasking.
5. To Create Productive environment for software development using rich set of tools.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Elucidate architecture and features of UNIX Operating System and differentiate it from other Operating Systems
CO2	Execute various UNIX commands for file handling and process control
CO3	Build Regular expressions for pattern matching and apply them to various filters for a specific task
CO4	Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem

UNIT- I

Introduction to Unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-INodes-The Directory Hierarchy. **[8 Hours]**

UNIT- II

File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File. **[8 Hours]**

UNIT- III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs. Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters. **[8 Hours]**

UNIT- IV

Shell Programming-Shell Variables-The Export Command- The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-The Script Command-The Eval Command-The Exec Command. **[8 Hours]**

UNIT- V

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation, synchronization and mutual exclusion-The Trap Command-The Stty Command-The Kill Command-Job Control.

Sockets- Socket system calls for connection oriented protocol and connectionless protocol, example- client/server program, socket options. **[10 Hours]**

Text Books:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

Reference Books:

1. Unix and shell programming by B.M. Harwani, OXFORD university press.

III Year – I Semester	PROFESSIONAL ELECTIVE-I	L	T	P	C
1005203134	COMPILER DESIGN	3	0	0	3

COURSE OBJECTIVES:

1. To understand the theory and practice of compiler implementation.
2. To learn finite state machines and lexical scanning.
3. To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation
4. Over a series of four projects, you will create an extremely simple compiler C as a project in this course. The projects are Parsing, Scanning, Semantic Analysis, and Code Generation. The text provides a good deal of the structure and the best solutions for each project will be available for all students in succeeding projects.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Compare different types of language processors and design a lexical analyzer.
CO2	Identify the similarities and differences among various parsing techniques and grammar transformation techniques
CO3	Analyze the role of a semantic analyzer and gain knowledge on the procedure for generating Syntax directed translation, synthesized and inherited attributes.
CO4	Evaluate the effectiveness of optimization and differentiates machine dependent and machine-independent optimizations.

UNIT- I

Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology. Programming Language Basics.

Lexical Analysis-: The role of lexical analysis, specification of tokens. Recognitions of tokens, the lexical analyzer generator lexical. **[10 Hours]**

UNIT-II

Syntax Analysis: The Role of a parser, Context free Grammars, Writing A grammar, top down parsing, bottom up parsing, Ambiguous grammar, Recursive Descent parser, LL parser, Operator Grammar, Operator precedence parser. **[8 Hours]**

UNIT-III

Bottom up parsing:- Shift reduce parsing, LR parser, More Powerful LR parser (CLR, LALR) Using Ambiguous Grammars, Error Recovery in LR parser **[8 Hours]**

UNIT-IV

Syntax Directed Transactions Definition, Evolution order of SDTs Application of SDTs. Syntax Directed Translation Schemes. Attribute Grammars, types of attributes.
Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching

[12 Hours]

UNIT-V

Runtime Environments, Stack allocation of space, access to Non Local data on the stack, Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation,Machine Independent Optimization. The principle sources of Optimization peep hole Optimization, Introduction to Data flow Analysis. **[10 Hours]**

Text Books:

1. Compilers, Principles Techniques and Tools.Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman,2nd edition,pearson,2007
2. Compiler Design K.Muneeswaran, OXFORD
3. Principles of compiler design,2nd edition,Nandhini Prasad,Elsebier.

Reference Books:

1. Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE
2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu ,SPRINGER

III Year – I Semester		L	T	P	C
1005203110	ADVANCED WEB TECHNOLOGIES LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. Design static web application development and Students will gain the skills and front designs.
2. Able to get project based experience needed for entry into web application and development careers using advanced technologies

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Apply and design web pages using HTML &CSS.
CO2	Able to design the user interactive pages using Node Js and React Js.
CO3	Analyze a given problem and apply requisite appropriate tools for designing interactive web applications.
CO4	Create programs using Node JS.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	**Exercise – 1** Design Web page to illustrate the following for Educational Institution • Home Page • Login Page • Registration page About Institution	Web Page Design
2	**Exercise – 2** Design Web page to illustrate the following for Educational Institution • Departments • Faculty Details • Student personal Info Placement Staff Details	Web Page Design
3	**Exercise – 3** Design Web page to illustrate the following for Educational Institution • Student Academic Info • Traning and Placement ddetails Student Chapters	Web Page Design
4	**Exercise – 4** Login page has username and password fields along	Web Page Design

	with submit button, forgot password and sign up hyperlinks.	
5	**Exercise – 5** Perform form validation using Java Script for Login and Registration forms using regular expressions	Java Script
6	**Exercise – 6** Setup Node.js Development Environment, Run sample console programs	Node JS
7	**Exercise – 7** Create different modules using Node JS	Node JS
8	**Exercise – 8** React Environment Setup, Using webpack and babel and Using the create-react-app command.	Environment Setup
9	**Exercise – 9** Implement States and Props	States and Props
10	**Exercise – 10** Create different types of Forms using React JS	React JS

Text Books:

1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Black Book Dream Tech
2. React. Js Book: Learning React JavaScript Library from Scratch, Book by Greg Sidelnikov
3. Node.js in Action, by Alex Young , Bradley Meck , Mike Cantelon , Tim Oxley , Marc Harter , T.J. Holowaychuk , Nathan Rajlich
4. React in Action 1st Edition by Mark Tielens Thoma

Reference Books:

1. Build Your Own Website The Right Way Using HTML & CSS, 3rd Edition by ge The WordPress Anthology
2. The Principles of Beautiful Web Design, 2nd Edition by Jason Beair

III Year – I Semester		L	T	P	C
1005202212	ALGORITHMS LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Implement dynamic programming techniques for appropriate applications
CO2	Apply the divide-and-conquer rule for recursive applications
CO3	Execute the shared memory technique for serial and parallel algorithms
CO4	Build the application with backtracking and branch-and-bound techniques for state space tree algorithms

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	**Exercise – 1** Implement recursive binary search algorithm	Divide and Conquer technique
2	**Exercise – 2** Implement recursive quick sort algorithm	Divide and Conquer technique
3	**Exercise – 3** Implement recursive merge sort algorithm	Divide and Conquer technique
4	**Exercise – 4** Implement Randomized quick sort algorithm	Divide and Conquer technique
5	**Exercise – 5** Find Optimal solution for a Knap Sack Problem	Greedy method
6	**Exercise – 6** Find the shortest path using single source shortest path algorithm	Greedy method
7	**Exercise – 7** Implement Huffman coding technique	Greedy method
8	**Exercise – 8** Implement 0/1 knapsack problem	Dynamic programming technique
9	**Exercise – 9** Find the shortest path using All pairs shortest path algorithm	Dynamic programming technique

10	**Exercise – 10** Implement traveling sales person problem	Dynamic programming technique
11	**Exercise – 11** Implement sum of subsets problem	Backtracking technique
12	**Exercise – 12** Implement N-Queen's problem	Backtracking technique

Text Books:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharam, Universities Press.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd.

Reference Books:

1. Design and Analysis of Computer Algorithms, First Edition, V. AHO, Pearson
2. Design and Analysis of Algorithms, ParagHimanshu Dave, HimansuBalachandra Dave, Pearson Education.

III Year – I Semester		L	T	P	C
1005202113	PROGRAMMING ESSENTIALS IN PYTHON LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. To learn about Python programming language syntax, semantics, and the runtime environment.
2. To be familiarized with universal computer programming concepts like data types, containers.
3. To be familiarized with general computer programming concepts like conditional execution, loops & functions.
4. To be familiarized with general coding techniques and object-oriented programming.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Analyze the given Python program to identify bugs and to rectify it.
CO2	Apply knowledge of Python constructs for developing programs/applications.
CO3	Implement object oriented concepts and exception handling mechanism.
CO4	Use Numpy and pandas libraries for handling data.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1.	**Exercise – 1** a. Practice Python Installation b. Declaration of Variables, identifiers and type conversions c. Write simple programs by defining variables and assigning values of different basic data types d. Write programs to know data type of a variable using Type statement e. Write programs to do multiple assignments at a time f. Write programs for writing multiple statements in a single line g. Use Input statement, type conversion h. Use different operators in programs	Python installation
2.	**Exercise -2** Python programs on Decision Control Statements a. Write programs using selection statements b. Implement programs on and conditional branching	Decision Control Statements

	statements	
3.	**Exercises -3** Python programs on looping control structures a. Design and develop programs using Iterative statements- while, for, nested loops b. Use Break, continue, pass statements in programs c. Understand the usage of else statement in loops with a case study	looping control structures
4.	**Exercise -4** Identify the need and importance in the creation of Python Functions and Modules a. Write programs for defining and calling functions b. Understand Scope of a variable and Use global statement c. Differentiate fruitful and void functions through a case study d. Apply recursive and Lambda functions e. Understand different kinds of arguments through a case study f. Installing and usage of standard library modules g. Use python packages	Identify the need and importance in the creation of Python Functions and Modules
5.	**Exercise -5** Solve the problems using Strings and understanding the methods and operations on Lists a. Apply string formatting operator b. Use built in string methods, functions and regular expressions c. Define a list and write programs to access and modify elements of a list d. Practice basic list operations, methods e. Write programs to use list as a stack and queue	Solve the problems using Strings and understanding the methods and operations on Lists
6.	**Exercise -6** Programs on the implementation of methods and operations of List data structure a. Define a list and write programs to access and modify elements of a list b. Practice basic list operations, methods c. Write programs to use list as a stack and queue	Programs on the implementation of methods and operations of List data structure
7.	**Exercise -7** Implement programs to solve the problems using Python other data structures: Tuples and Dictionaries a. Write programs to define a dictionary and write programs to modify values, adding new keys b. Apply looping over a dictionary c. Use built in dictionary methods, functions d. Create a tuple and assign values	Implement programs to solve the problems using Python other data structures: Tuples and Dictionaries

	e. Use basic tuple operations and comparisons	
8.	**Exercise -8** Implement the Python Classes and Objects to address the real-world scenarios a. Define classes and objects using python for the real-world scenario b. Defining constructors and using Self c. Understand public and private members d. Practice calling class methods from another class e. Write built in functions to check, get, set and delete attributes	Implement the Python Classes and Objects to address the real-world scenarios
9.	**Exercise -9** Develop the programs to implement parent-child relationship a. Demonstrate different inheritance types b. Apply polymorphism and method overriding c. Create abstract classes	Develop the programs to implement parent-child relationship
10.	**Exercise -10** Write the programs to address the exceptions via exception handling in the development of solutions and implement operator overloading a. Write a simple exception handling program with try-except b. Write a program for catching multiple exceptions c. Demonstrate raising and re raising exceptions d. Apply else and finally clauses e. Demonstrate the usage of polymorphism in overloading of operators	Write the programs to address the exceptions via exception handling in the development of solutions and implement operator overloading
11.	**Exercise -11** a. Create a series from a list, numpy array and dict b. Convert the index of a series into a column of a dataframe c. Combine many series to form a dataframe d. Assign name to the series' index e. Get the items not common to both series A and series B f. Get the minimum, 25th percentile, median, 75th, and max of a numeric series g. Get frequency counts of unique items of a series h. Bin a numeric series to 10 groups of equal size i. Find the positions of numbers that are multiples of 3 from a series Get the positions of items of series A in another series B	Pandas
12.	**Exercise -12** a. create a 1D array b. Extract items that satisfy a given condition from 1D array	numpy

	c. Replace items that satisfy a condition without affecting the original array d. Reshape an array e. Extract all numbers between a given range from a numpy array f. Swap two columns in a 2d numpy array g. Import a dataset with numbers and texts keeping the text intact in python numpy h. Compute the mean, median, standard deviation of a numpy array i. Insert values at random positions in an array j. Find the count of unique values in a numpy array	

Text Books:

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

Reference Books:

1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press.
2. Programming and Problem Solving with Python, Ashok NamdevKamthane, Amit Ashok Kamthane, TMH, 2019.
3. https://www.tutorialspoint.com/python3/python_tutorial.pdf

III Year – I Semester	SKILL ORIENTED COURSE - III	L	T	P	C
1020202100	EMPLOYABILITY READINESS PROGRAM	2	0	0	2

COURSE OBJECTIVES

1. To enhance the problem solving skills in the area of 'Quantitative Aptitude' this will enable the students to achieve in-campus placements and competitive examinations.
2. To improve the logical thinking capability of students by enhancing the skills in Reasoning.
3. To encourage the all-round development of students by focusing on verbal ability.
4. To perform better during Campus Recruitment and various interviews they face in their career.

COURSE OUTCOMES

CO	At the end of the course, the student will have the ability to:
CO1	Follow strategies in minimizing time consumption in problem solving and apply shortcut methods to solve problems and confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
CO2	Apply various methods of solving a problem by analysing the concept and situation effectively.
CO3	Communicate effectively with improved vocabulary and able to write e-mails, essays and resumes appropriately.
CO4	Succeed in professional and personal life by applying all mathematical, reasoning and verbal skills.

Part-A **No. of lecture hours: 25**

Aptitude

Number System: Speed Maths, Numbers, Factors, Prime & Co-Primes, LCM, HCF, Divisibility rules, finding unit place digit and last two digits of an expression.

Averages and Ages: Average of different groups, change in averages by adding, deleting and replacement of objects, problems on ages.

Ratio, Proportion and Variations: Definition of Ratio, Ratio of Proportion, Comparison of ratios, Compound ratio, Direct and indirect proportion.

Allegation and mixtures: Allegation rule, Mean value of the mixture, Replacement of equal amount of quantity.

Percentages: Converting fractions and decimal into percentages, successive percentage, populations, expenditure and savings

Time and Work: Men and Days, Work and Wages, Hours and Work, Alternate days concept.

Time and Distance: Difference between the average and relative speeds, reaching the destination late and early, Stoppage time per hour, time and distance between two moving bodies.

Trains, Boats and Streams: Train crossing man, same and opposite directions, Speed of boat and stream.

Profit and loss: Relation between Cost price and Selling price, Discount and Marked price, Gain or Loss percentages on selling price

Simple and Compound Interest: Problems on Interest (I), Amount (A), Principal (P) and Rate of

Interest(R), Difference between the simple interest and compound interest for 2 and 3 years.

Permutation and Combination: Fundamental rules, problems on permutations & combinations.

Outcome:

1. Apply shortcut methods to solve mathematical problems.

2. Follow strategies in minimizing time consumption in problem solving and to perform well in various competitive exams and placement drives.

3. Solve various Basic Mathematics problems by following different methods

4. Solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.

Logical Reasoning

Blood Relations: Defining the various relations among the members of a family, Solving Blood Relation Puzzles by using symbols and notations. Problems on Coded relations.

Series completion: Number series, Alphabet series, and Letter series.

Coding and Decoding: Letter coding, Number coding, Number to letter coding, Matrix coding, Substitution, Mixed letter coding, Mixed number coding, deciphering individual letter codes by analysis.

Direction sense test: Sort of directions in puzzles distance between two points, problems on shadows, Application of triangular triplets.

Clocks: Relation between minute-hour hands, angle vs. time, exceptional cases in clocks

Calendars: Definition of a Leap Year, Finding the odd days, finding the day of any random calendar date, repetition of calendar years.

Outcome:

1. Solve various Basic Mathematics problems by following different methods and analyses.

2. Follow strategies in minimizing time consumption in problem solving

3. Apply shortcut methods to solve problems and confidently solve any mathematical problems

Part-B **No. of lecture hours: 25**

Verbal: Competitive Grammar: Verb-Tenses, Adjectives & Adverb, Preposition, Conjunction, Syntax (Activity based learning).

Word Etymology, One word substitutes, Word games – Vocabulary development.

Reading Comprehension: General Strategies for Reading Comprehension: Narrative Text, Strategies for Reading Comprehension: Expository Text, Main Idea/Summarization

Sentence Correction/ Improvement/ Completion, Subject-verb agreement, Repetition, Error in modifiers.

Direct-Indirect Speech, Active Passive Voice, Cloze Test

Outcome:

1. Understand the vocabulary.
2. Understand the core competencies to succeed in professional and personal life.
3. Students have the adequate writing skills that are needed in an organization.

Text Books:

1. Quantitative Aptitude by R S Agarwal, S Chand Publications
2. *Quantitative* Analysis. Third edition (Hall, William Thomas). Norris F. Hall · Cite this: J. Chem. Educ. 1942, 19, 7, 350.
3. A Modern Approach to Verbal Reasoning by R S Agarwal, S.Chand Publications.
4. Arun Sharma and Meenakshi Upadhyay for verbal ability

Reference Books:

1. Quantitative Aptitude – Abhijit Guha, McGraw Hills.
2. Logical Reasoning, Arun Sharma, McGraw Hill.
3. Analytical & Logical Reasoning, Peeyush Bhardwaj, Arihant Publications
4. Mc Graw Hill Objective English 5 th edition.

III Year – I Semester	AUDIT COURSE - IV	L	T	P	C
1099203120	ENTREPRENEURSHIP DEVELOPMENT	2	0	0	0

COURSE OBJECTIVES:

1. To understand the meaning, role and qualities of an entrepreneur.
2. To give an overview on the concept of Entrepreneurship
3. To know basic idea or knowledge about business plan and MSME's.
4. To understand the basic knowledge about Capital structure, Sources of finance.
5. To understand the concept of Creativity and Entrepreneurial Plan.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO 1	Understand the outline of Entrepreneurship development
CO 2	To understand the factors, remedies for sickness of industry
CO 3	To understand capital and financial sources, Govt. polices.
CO 4	To know how to select, generate idea, feasibility study and control of project.

UNIT I

Introduction to Entrepreneur: Definition, requirements to be an entrepreneur, characteristic of successful entrepreneurs, Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur, Entrepreneur and Manager, Growth of entrepreneurship in India. Factors Affecting Entrepreneurial Growth. The role of entrepreneurship in economic development;

UNIT II

Introduction to entrepreneurship: entrepreneurship process; Classification of entrepreneurship, Entrepreneurial motivation and barriers; Factors impacting emergence of entrepreneurship; Types of Entrepreneurships, Sick industries, Reasons for Sickness, Remedies for Sickness. Role of BIFR in revival, Bank Syndications.

UNIT III

Introduction to Business, Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Types of Business Organization, Micro, Small and Medium scale enterprises, role of small enterprises in economic development; proprietorship, partnership, Ltd. companies and co-operatives: their formation.

UNIT IV

Capital structure, Sources of finance: debt or equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs, Institutional support for new ventures: Supporting organizations; Incentives and facilities; Financial Institutions and Small-scale Industries, Govt. Policies for SSIs.

UNIT V

Creativity and Entrepreneurial Plan: Business Idea Generation – sources of new ideas, methods of generating ideas, creative problem solving, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study: market feasibility, technical/operational feasibility, financial feasibility; drawing business plan; preparing project report; presenting business plan to investors.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Text Books:

1. VSP Rao, Kuratko: "Entrepreneurship', Cengage Learning, NewDelhi,
2. K.Ramachandran: "Entrepreneurship Development", TMH, NewDelhi, 2012
3. B.Janakiram, M Rizwana: "Entrepreneurship Development" ExcelBooks, New Delhi, 2011
4. Rajeev Roy: "Entrepreneurship", Oxford University Press, NewDelhi,2012
5. Manjunatha, Amit Kumar Goudar: "Management andEntrepreneurship" University Science Press, New Delhi, 2011
   Eric A Morse, Ronald K Mitchell: "Cases in Entrepreneurship", SAGE Publication, New Delhi, 2011.

References:

1. Couger, C-Creativity and Innovation (IPP, 1999)
2. Nina Jacob, -Creativity in Organisations (Wheeler, 1998)
3. Jonne&Ceserani-Innovation &Creativity(Crest) 2001.
4. BridgeSetal-Understanding Enterprise: Entrepreneurship and Small Business (Palgrave,2003)
5. Holt-Entrepreneurship: New Venture Creation (Prentice-Hall) 1998.
6. Singh P&Bhanderkar A-Winning the Corporate Olympiad:TheRenaissan cearadigm(Vikas)
7. Dollinger M J-Entrepreneurship (Prentice-Hall, 1999).
8. Tushman, M.L. & Lawrence, P.R. (1997)-Managing Strategic Innovation & Change Oxford .
9. Jones T. (2003)-Innovating at the Edge: How Organizations Evolve and Embed Innovation Capability.Butterwork Heinemann, U. K.
10. Amidon, D. M.(1997)-Innovation Strategy for the Knowledge Economy: The Kanawakening. Butterwork-Heinemann, New Delhi, India.

E-Books and Online Resources

1. https://www.dynamictutorialsandservices.org/2018/10/entrepreneurship-development-notes.html
2. https://www.google.com/search?client=avast-a-1&q=entrepreneurship+development+notes&oq=entrepreneurship+development+notes&aqs=avast..69i64j69i59i450l8.12j0j7&ie=UTF-8

NPTEL/SWAYAMMOOCS:

1. https://onlinecourses.nptel.ac.in/noc21_mg70/preview
2. https://onlinecourses.nptel.ac.in/noc21_hs102/preview

III Year – I Semester		L	T	P	C
1005203160	SUMMER INTERNSHIP	0	0	0	1.5

INTERNSHIPS: It shall be completed in collaboration with local industries, Govt.Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme.

The minimum duration of this course shall be at least 4-6 weeks.

A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship.

After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate from industry / skill development centre shall be included in the report. It shall be evaluated for 50 external marks at the end of the semester. The technical report and the oral presentation shall carry 20 marks and 30 marks respectively. There shall be no internal marks for Summer Internship. In case, if a student fails, he /she shall reappear as and when semester supplementary examinations are conducted.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Apply domain knowledge during the course of internship
CO2	Develop/implement the solutions with appropriate techniques, resources and contemporary tools.
CO3	Work independently and in collaboration in multidisciplinary environment and to allocate time effectively and manage to complete the work allotted within stipulated time.
CO4	Exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report and to demonstrate effective oral and written communication skills

DETAILED SYLLABUS FOR
III-B. Tech
II-SEMESTER

III Year – II Semester		L	T	P	C
1005202204	DATA WAREHOUSING AND DATA MINING	3	0	0	3

COURSE OBJECTIVES:

1. To understand data warehouse and data mining concepts, architecture, business analysis and tools
2. To understand data pre-processing and data visualization techniques
3. To study algorithms for finding hidden and interesting patterns in data
4. To understand and apply various classification and clustering techniques on real-time data

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Identify stages in building a Data Warehouse and challenges in Data mining
CO2	Access raw input data and apply data pre-processing techniques, generalization techniques and data characterization techniques to provide suitable input for a range of data mining algorithms
CO3	Analyze data mining techniques like classification and Association rules that can be applied to data objects and to find the interesting patterns.
CO4	Solve real world problems by using the various Clustering methods

UNIT- I

Introduction: What Motivated Data Mining? Why Is It Important? Knowledge Discovery Process, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Classification of Data Mining Systems, Data Mining Task Primitives, Major Issues in Data Mining

Data Pre-processing: Why Pre-process the Data? Data Cleaning, Data Integration, Data Transformation, Data Reduction and Data Discretization. **[10 Hours]**

UNIT-II

Data Warehouse and OLAP Technology: An Overview: What Is a Data Warehouse? OLAP versus OLTP, A Multidimensional Data Model- Data Warehouse Schemas, Concept Hierarchies, Typical OLAP Operations, Data Warehouse Architecture, Data Warehouse Implementation.

[8 Hours]

UNIT-III

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, Building a decision tree, Methods for expressing an attribute test conditions, Measures for selecting the best split, Algorithm for decision tree induction. Model Over fitting: Due to presence of noise, Due to lack of

representation samples, Evaluating the performance of classifier: holdout method, random sub sampling, and cross-validation, bootstrap. **[12 Hours]**

UNIT-IV

Association Analysis: Basic Concepts, Frequent Itemset Mining Methods - Apriori Algorithm, Frequent-Pattern Growth Approach, Generating Association Rules from Frequent Itemsets. Mining various kinds of Association rules. **[10 Hours]**

UNIT-V

Cluster Analysis: What Is Cluster Analysis? Different Types of Clustering's, Different Types of Clusters, K-means: The Basic K-means Algorithm, K-means additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses.
Hierarchical Clustering: Agglomerative and Divisive Hierarchical Clustering algorithms, Strengths and Weaknesses of Hierarchical Clustering.
DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **[12 Hours]**

Text Books:

1. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.
2. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.

Reference Books:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : Introductory and Advanced topics : Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

E-Books:

1. https://www.academia.edu/6489220/Data_Mining_ebook
2. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf

III Year – II Semester		L	T	P	C
1012203100	COMPUTER NETWORKS	3	0	0	3

COURSE OBJECTIVES:

1. Building a firm foundation for understanding fundamentals of Computer Networks.
2. Familiarize with the basic terminologies of Computer Networking area.
3. Understand the state of art in Network protocols, Architecture and Applications.
4. Acquire the knowledge of the basic protocols involved in Wired/Wireless communication process.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Define Network and its components and Illustrate the functionality of OSI and TCP/IP reference models.
CO2	Compare different network layer protocols and Demonstrate various types of routing technique.
CO3	Evaluate Architecture for Application layer protocols.
CO4	Choose appropriate protocol for desired communication service.

UNIT- I

Introduction: Network Topologies, Types of Networks: WAN, LAN, MAN. Reference models: The OSI Reference Model, the TCP/IP Reference Model, A Comparison of the OSI and TCP/IP Reference Models.

Physical Layer: Guided Transmission media- Twisted-pair cable, Coaxial cable and Fiber optic cable. **[8 Hours]**

UNIT- II

The Data Link Layer: Design issues: Services Provided to the Network Layer, Framing, Error Control, Flow Control, Error Detection: Parity check, Checksum, CRC, Error Correction: Hamming Code, Linear block codes, FEC.

Elementary Data Link Protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel

Sliding Window Protocols: One Bit Sliding Window Protocol, A Protocol Using Go-Back-N, Selective Repeat. **[10 Hours]**

UNIT- III

The Medium Access Control Sub Layer: The Channel Allocation Problem: Static Channel Allocation, Dynamic Channel Allocation.

Multiple Access Protocols: Aloha, pure ALOHA, Slotted ALOHA, CSMA: CSMA/CD, CSMA/CA, Collision Free Protocols, Limited Contention Protocols, Wireless LAN Protocols.

Ethernet: Classic Ethernet Physical Layer, Classic, MAC Sub-layer.

Wireless LAN'S: The 802.11 Architecture and Protocol Stack, The 802.11 Physical Layer,The802.11 MAC Sub-layer Protocol. **[10Hours]**

UNIT- IV

The Network Layer: Design Issues – Store and Forward Packet Switching, Services Provided to the Transport layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram Networks.
Routing Algorithms: The Optimality principle, shortest path Algorithm, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing.
Congestion Control Algorithms: Approaches to Congestion Control, Traffic Throttling-Load Shedding. **[10 Hours]**

UNIT- V

Transport Layer: Transport Services, Connection management, TCP and UDP protocols, ATM, AAL Protocol.
Application Layer: The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services. **[10 Hours]**

Text Books:

1. Computer Networks (5th Edition) – Andrew S. Tanenbaum.Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010.
2. Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education.

Reference Books:

1. Computer Networking: A Top-Down Approach (6th Edition) – Kurose and Ross
2. Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) – Douglas E. Comer.

III Year – II Semester		L	T	P	C
1099202100	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	3	0	0	3

COURSE OBJECTIVES:

1. Understand the concepts of managerial economics and the market dynamics namely Demand, Elasticity of demand and pricing in different market structures.
2. Acquire the knowledge about production theories and cost analysis besides dealing with the production and factors of production.
3. Analyze the different market structures and understand various pricing methods which are adopted in attracting the customers under different markets.
4. To provide the basic knowledge on financial accounting
5. To understanding Capital budgeting decisions.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Analyze the Demand, Price and Cost.
CO2	Identify the Nature of different markets
CO3	Understand Various Business Forms
CO4	Evaluate investment project proposals

UNIT-I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand, Demand schedule, Demand curve - Law of Demand and its Exceptions- Elasticity of Demand & Its types - Demand forecasting and Methods of forecasting.

UNIT-II

Production and Cost Analysis: Concept of Production function- Cobb-Douglas Production function – Leontief production function, Production Function with One variable Input, Two Variable Inputs and Concept of Returns to scale -economies of scale,Different cost concepts – Cost –Volume-Profit (CVP) analysis (simple problems)

UNIT-III

Part-I: Introduction to Market Structures and pricing methods: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly- Features – Price and Output Determination, Significance of Pricing and various methods of pricing with contemporary examples

Part-II: Introduction to Business: Features, Merits and Demerits - Sole Trader, Partnership, Joint Stock Company – Public Enterprises – Business Cycles: Meaning and Features – Phases of Business Cycle.

UNIT-IV

Introduction to Financial Accounting: Systems of Book-keeping, Golden rules of Accounting, Accounting Principles, Accounting Cycle- Journal, Ledger, Trail Balance, Preparation of Trading-Account, P&L Account and Balance Sheet (Simple Problems)

UNIT-V

Capital and Capital Budgeting Decisions: Introduction to Capital, Classification of Capital, Time value of money. Types of Capital Budgeting Decisions: Traditional Methods (Payback period, Accounting rate of return) and Modern methods (Net Present Value method, Internal Rate of Return Method and Profitability Index Method) (Simple Problems)

Text Books:

1. M.Kasi Reddy & Saraswathi, "Managerial Economics and Financial Analysis", PHI Publications, New Delhi, 10th Revised Edition, 2012.

2. Varshney& Maheswari, "Managerial Economics", Sulthan Chand Publishers, 1st Revised Edition, 2009.

3. S.N. Maheshwari & S.K.Maheshwari, "Financial Accounting", Vikas Publication House Pvt.Ltd, 4th Edition, 2012.

Reference Books:

1. D.N. Dwivedi, "Managerial Economics", Vikas Publication House Pvt.Ltd, 2nd Edition, 2012.

2. R.Narayana Swamy, "Financial Accounting- A managerial Perspective", Pearson publications, 1st Indian Reprint Edition, 2012.

3. J.V.Prabhakar Rao & P.V.Rao, "Managerial Economics & Financial Analysis", Maruthi Publishers, 1st Revised Editon, 2011

III Year – II Semester	PROFESSIONAL ELECTIVE-II	L	T	P	C
1005203230	SOFTWARE PROJECT MANAGEMENT	3	0	0	3

COURSE OBJECTIVES:

1. To study how to plan and manage projects at each stage of the software development lifecycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3. To understand successful software projects that support organization's strategic.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Examine how software development life cycle models can impact the software deliverables
CO2	Conduct activities necessary to successfully complete and close the Software projects
CO3	Estimate the effort required for a software project development and identify software risks
CO4	Develop the skills for tracking and controlling software deliverables

UNIT- I

Introduction: Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure. **[10 Hours]**

UNIT- II

Project Approach Iterative &incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

Check Points of the Process: Major milestones, Minor milestones and Periodic status assessments. **[8 Hours]**

UNIT- III

Iterative Process Planning: Work Breakdown Structure, planning guidelines, cost and schedule estimating, iteration planning process, pragmatic planning.

Effort Estimation and Planning: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis. **[10 Hours]**

UNIT- IV

Risk Management:
Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach. **[10 Hours]**

UNIT- V

Creating a framework for monitoring & control:
Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling **[10 Hours]**

Text Books:

1. Software Project Management", Walker Royce: Pearson Education, First Edition, 2005.
2. "Software Project Management", Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill, Fifth Edition,1968..
3. "Software Project Management in practice", Pankaj Jalote, Pearson Eduation, First edition, 2002.

Reference Books:

1. "Software Project Management," Joel Henry, Pearson Education, first edition, 2005.
2. Effective Software Project Management, Robert K.Wysocki, Wiley, 2006.

III Year – II Semester	PROFESSIONAL ELECTIVE-II	L	T	P	C
Course Code :	DISTRIBUTED SYSTEMS	3	0	0	3

COURSE OBJECTIVES:

1. Explain difference between failure model and security model
2. Give outline of resource sharing concept
3. Explain client server communication.
4. Extract the features of Internet protocols
5. Describe important characteristics of distributed systems and the salient architectural features of such systems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Illustrate the basic elements and concepts related to distributed system technologies
CO2	List the characteristics of distributed systems for designing architectural models
CO3	Enumerate the features and applications of important standard protocols which are used in the distributed system
CO4	Interpret inter-process communication in a distributed system

UNIT- I

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model. **[10 Hours]**

UNIT- II

Interprocess Communication: The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast Comprehensions. **[10 Hours]**

UNIT- III

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads. **[10 Hours]**

UNIT- IV

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication. **[10 Hours]**

UNIT- V

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

[10 Hours]

Text Books:

1. Ajay D Kshemkalyani, MukeshSighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

Reference Books:

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI
2. https://nptel.ac.in/courses/106/106/106106168/

III Year – II Semester	PROFESSIONAL ELECTIVE-II	L	T	P	C
1005203232	ADVANCED PYTHON PROGRAMMING	3	0	0	3

COURSE OBJECTIVES:

- Create routes (or views) with Flask.
- Serve static content and files using Flask.
- Create Relative URLs with templates and how to check out Template and Custom Filters.
- Build a Django application, hands-on.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Develop full-stack web sites based on content stored in an RDMS.
CO2	How to work with databases using SQLite.
CO3	How to handle and validate forms in Django.
CO4	How to connect templates with models to serve data dynamically.

UNIT-I

Python:
Variables and Data types (int, float, string, tuple, set, list, dictionary), String manipulations, control structures(if, if-else, elif, while, for),Decorators, files, Object Oriented Programming-classes and objects, inheritance

Web:
What is User experience and User interface, How the Web Works, Structure of a Web Application, HTTP and REST, What is an API, What are RESTful API's, HTML, CSS, JS, AJAX

UNIT-II

Introduction to Flask framework:
What is Flask, Creating an environment for flask, Hello world Application, Debug Mode, Routing-single URL route & multiple URL routes, Advanced URL routing(dynamic URLs), Limiting webpages to specific HTTP Request methods, jinja templating engine(Template inheritance& Logic statements), Passing data to our template from flask, Static Files, Accessing Request Data, Sessions, Redirects

UNIT-III

Database: Setting up the environment for MYSQL database (Xampp Server), Database connection (mysql-connector)

Working with Flask:

Inserting, retrieving, updating and deleting the data in the database, Build a TASK MANAGER application in which you need to create a task, update a task, delete a task and list all the tasks.

UNIT-IV

Introduction to Django:
What is Django, Creating an environment for Django, Creating a project, creating an app, File Structure,Model View Template (MVT), Object Relational Mapper (ORM), Introduction to Views and Models,Routing, Advanced URL routing (dynamic URLs), Static Files, Basic CLI commands, Accessing Request Data,Passing data to our template from Django, Database connection

UNIT-V

Working with Django
Model classes(model migrations and model fields), views(function based views and class based views), Admin panel, Inserting, retrieving, updating and deleting the data in the database using model objects and admin panel, Build a BLOG SERVICE PROVIDER application in which there will be many users and some admins, each user has their own data, an user need to create a blog, update a blog, delete a blog and any one can see all the blogs using the website.

TEXTBOOKS:

1. Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming
   http://bedford-computing.co.uk/learning/wp-content/uploads/2015/10/No.Starch.Python.Oct_.2015.ISBN_.1593276036.pdf
2. Django - The Easy Way: A step-by-step guide on building Django websites, 2nd Edition
   https://www.pdfdrive.com/django-the-easy-way-a-step-by-step-guide-on-building-django-websites-2nd-edition-e196919892.html
3. Flask Web Development: Developing Web Applications with Python
   https://www.pdfdrive.com/flask-web-development-developing-web-applications-with-python-e158348898.html

REFERENCES:

1. https://www.freecodecamp.org/news/how-the-web-works-a-primer-for-newcomers-to-web-development-or-anyone-really-b4584e63585c/
2. https://medium.com/free-code-camp/how-the-web-works-part-ii-client-server-model-the-structure-of-a-web-application-735b4b6d76e3#.e6tmj8112
3. https://www.freecodecamp.org/news/how-the-web-works-part-iii-http-rest-e61bc50fa0a#.vbrmrnihn
4. https://www.programiz.com/python-programming
5. https://www.digitalocean.com/community/tutorials/how-to-make-a-web-application-using-flask-in-python-3
6. https://drive.google.com/drive/folders/1FrJWTA2a4EBXFHe_u4RuZuLRP3B16w_O

III Year – II Semester	PROFESSIONAL ELECTIVE-II	L	T	P	C
1005203233	BIG DATA ANALYTICS	3	0	0	3

COURSE OBJECTIVES:

1. Optimize business decisions and create competitive advantage with Big Data analytics
2. Introducing Java concepts required for developing map reduce programs
3. Derive business benefit from unstructured data
4. Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
5. To introduce programming tools PIG & HIVE in Hadoop echo system.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Relate different aspects of Big Data in accordance with various big data applications
CO2	Categorize various dimensions of Big Data (5V's) and its sources in real time
CO3	Make use of recent tools related to Hadoop, Spark and MapReduce etc
CO4	Analyze the different aspects of cluster computing with real world applications

UNIT- I

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files. **[8 Hours]**

UNIT- II

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner. **[8 Hours]**

UNIT- III

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators. **[10 Hours]**

UNIT- IV

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin. **[8 Hours]**

UNIT- V

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data. **[8 Hours]**

Text Books:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, SrinathPerera, Thilina Gunarathne

III Year – II Semester	PROFESSIONAL ELECTIVE-II	L	T	P	C
1054202200	ARTIFICIAL INTELLIGENCE	3	0	0	3

COURSE OBJECTIVES:

Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviors on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously. The main purpose of this course is to provide the most fundamental knowledge to the students so that they can understand what the AI is. And this course will introduce some basic search algorithms for problem solving. In this course students will learn about knowledge representation and reasoning and about the Expert Systems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Choose appropriate methods in AI that may be suited to solve a given problem and Game Playing
CO2	Make use of AI search algorithms and formalizations on real world problems
CO3	Analyze the basic issues of different types of knowledge representation techniques to build intelligent system
CO4	Apply probabilistic and fuzzy models to solve problems with uncertainty.

UNIT- I

INTRODUCTION TO ARTIFICIAL INTELLIGENCE: Introduction, history, intelligent systems, foundations of AI, Applications of AI, current trends in AI.

PROBLEM SOLVING: Definition, characteristics of problem, types of Problem-solving techniques, General Problem Solver (GPS), Water Jug Problem, Missionaries and Cannibals Problem. **[10 Hours]**

UNIT- II

STATE-SPACE SEARCH: Definition, Examples, Exhaustive search techniques: BFS, DFS, IDDFS, Heuristic search techniques: Uniform Cost Search, Best First Search, A* algorithm & Constraint satisfaction Problem.

GAME PLAYING: Introduction about game playing, Mini-Max Algorithm, Alpha-Beta pruning algorithm. **[14 Hours]**

UNIT- III

LOGIC CONCEPTS: Introduction, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic.

PREDICATE LOGIC: Introduction, PNX Normal form, Skolemization, Resolution in Predicate Logic. **[12 Hours]**

UNIT- IV

KNOWLEDGE REPRESENTATION: Introduction, approaches to knowledge representation, knowledge representation using semantic network, knowledge representation using frames.

UNCERTAINTY MEASURE: PROBABILITY THEORY: Introduction, probability theory, Bayesian belief networks, Certainty factor theory, Dempster- shafer theory. **[12 Hours]**

UNIT- V

EXPERT SYSTEM: Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems, application of expert systems.

FUZZY LOGIC: Introduction, Fuzzy sets, Fuzzyset operations, Types of Menmbership functions, Multi valued logic, Linguistic variables, Hedges. **[12 Hours]**

Text Books:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

Reference Books:

1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F.Lugar,5thed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

III Year – II Semester	OPEN ELECTIVE-II	L	T	P	C
1054203232	EVOLUTIONARY COMPUTATION	3	0	0	3

COURSE OBJECTIVE:
This course will introduce the main concepts, techniques and applications in the field of evolutionary computation. It gives students some practical experience on when evolutionary computation techniques are useful, how to use them in practice and how to implement them with different programming languages.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Formulate a given problem amenable for evolutionary optimization/search
CO2	Understand the relations between the most important evolutionary algorithms presented in the course, new algorithms to be found in the literature now or in the future, and other search and optimisation techniques.
CO3	Determine the appropriate parameter settings to make different evolutionary algorithms work well.
CO4	Design new evolutionary operators, representations and fitness functions for specific practical and scientific applications.

UNIT I

Introduction to optimization, constrained and unconstrained optimization, local and global optimization, linear programming problem: linear programming formulation, graphical solution of LPP, Simplex method, Artificial Basis techniques: Big M method.

UNIT II

Traditional optimization and search techniques. Local vs global search methods, Introduction to genetic algorithm: What is genetic algorithms?, Why genetic algorithm? Simple GA, Operators in Genetic algorithm: encoding, selection, crossover, mutation, constraints in genetic algorithm, Problem solving using genetic algorithm: maximizing a function, real-coded genetic algorithms.

UNIT III

Differential evolution: process flow and operators, selection of DE control parameters, schemes of differential evolution: DE/best/1, DE/best/2, DE/rand-to best/1, Numerical illustration of DE algorithm for a simple function optimization,

UNIT IV

Particle swarm optimization: process flow and operators, selection of PSO control parameters, schemes of PSO, Numerical illustration of DE algorithm for a simple function optimization.

UNIT V

Multi-objective optimization, Evolutionary multi-objective optimization: Pareto-dominance and Pareto-optimal solutions, many objective optimizations .

Text Books:

1. Handbook on Evolutionary Computation. T. Baeck, D. B. Fogel, and Z. Michalewicz (eds.) IOP Press, 1997.
2. Genetic Algorithms in Search, Optimisation & Machine Learning. D E Goldberg, Addison-Wesley, 1989
3. Evolutionary Computation: Theory and Applications. X. Yao (ed). World Scientific Publ. Co., Singapore, 1999. (ISBN 3-540-65907-2)
4. Engineering Optimization: Theory And Practice by Singiresu S Rao, New Age International (P) Ltd., Publishers, 1979
5. Introduction to Evolutionary Computing by A. E. Eiben and J. E. Smith, Springer, 2003.
6. Evolutionary Computation 1: Basic Algorithms and Operators edited by T. Bäck, D. B. Fogel, Z. Michalewicz, 2000.

III Year – II Semester	OPEN ELECTIVE-II	L	T	P	C
1003203240	OPTIMIZATION AND RELIABILITY	3	0	0	3

COURSE OBJECTIVES:

1. The aim of this course is to provide students with a basic understanding of the approaches and techniques to assess and improve process and/or product reliability.
2. The objectives are to introduce the principles and techniques of Statistical distributions and their practical uses in product and/or process design and estimation of product warranty period
3. To understand techniques of modern reliability engineering tools.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand and comprehend the concepts of optimization and develop problem equation for a given scenario
CO2	Apply, solve an engineering problem from a numerical point of view
CO3	Write programming methods to solve a engineering problem
CO4	Develop a problem formulation for a cantilever beam problem, and solve it

UNIT-I

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions, merits and demerits of classical optimization techniques.

UNIT-II

NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, Pattern search methods, conjugate method, types of penalty methods for handling constraints, advantages of numerical methods.

UNIT-III

GENETIC ALGORITHM (GA): Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA,

GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

MULTI-OBJECTIVE GA: Pareto's analysis, Non-dominated front, multi – objective GA, Non dominated sorted GA, convergence criterion, applications of multi-objective problems.

UNIT-IV

APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNIT-V

RELIABILITY: Concepts of Engineering Statistics, risk and reliability, probabilistic approach to design, reliability theory, design for reliability, numerical problems, hazard analysis.

Text Books:

1. Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers
2. Engineering Optimization – S.S.Rao, New Age Publishers
3. Reliability Engineering by L.S.Srinath
4. Multi objective genetic algorithm by Kalyanmoy Deb, PHI Publishers.

Reference Books:

1. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison- Wesley Publishers
2. Multi objective Genetic algorithms - Kalyanmoy Deb, PHI Publishers
3. Optimal design – Jasbir Arora, Mc Graw Hill (International) Publishers
4. An Introduction to Reliability and Maintainability Engineering by CE Ebeling, Wavel and PrintersInc., 2009
5. Reliability Theory and Practice by I Bazovsky, Dover Publications, 2013.

III Year – II Semester	OPEN ELECTIVE-II	L	T	P	C
1004203236	DIGITAL IMAGE PROCESSING	3	0	0	3

Course Objectives:

- Describe and explain basic principles of digital image processing
- Design and implement algorithms that perform basic image processing.
- Design and implement algorithms for advanced image analysis (e.g. image compression, image segmentation).
- Assess the performance of image processing algorithms and systems (colour and morphological).

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Explain the fundamentals of gray scale and color image processing.
CO2	Evaluate different transforms and compression methods on image for image processing applications.
CO3	Solve the methods to extract information from the image in terms of spatial filtering, frequency filtering, restoration and segmentation.
CO4	Examine the different techniques of color and multi resolution processing.

UNIT-I

Evolution of Digital image processing, Examples of fields that use digital image processing, Fundamental steps of digital image processing, Components of an image processing system, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between pixels.

UNIT-II

IMAGE TRANSFORMS: Orthogonal Sinusoidal Basis Function – Discrete Fourier Transform, Discrete Cosine Transform Non-sinusoidal orthogonal basic function - Haar, Walsh, Hadamard, Slant. Statistics of input signal- KL transform.

UNIT-III

Image Enhancement: Intensity Transformations, Histogram Equalization.
Image Enhancement in Spatial domain: spatial filtering, linear and non linear smoothing filter, sharpening spatial filters using first order and second order derivative.
Image Enhancement in Frequency domain: Image smoothing using low pass, Image sharpening using high pass filter.
Image Restoration techniques: A model of the image degradation/restoration process, Noise models, Restoration in presence of noise: Mean filters, Adaptive filters, Inverse filter, Wiener filter.

UNIT-IV

Image Compression: Need for image compression, Huffman coding, Arithmetic coding, LZW coding, Block Transform coding, Predictive coding (lossless and lossy).

Image Segmentation: Point, Line and Edge detection, Region based segmentation, Edge detection, Edge linking, Thresholding.

UNIT-V

Color Image Processing: Color models and their conversions, Pseudo color image processing, full color image processing, Color image smoothing and sharpening, Using color in image segmentation.

Text Books:

1. "Digital image processing", Gonzalez, R. C., and R. Woods. 4th Edition. (2018).
2. "Digital image processing", Jayaraman, S., S. Esakkirajan, and T. Veerakumar, TMH publication. Year of Publication (2009).

Reference Books:

1. "Digital image processing using MATLAB", Gonzalez, Rafael C., Richard Eugene Woods, and Steven L. Eddins, Pearson Education India, 2020.
2. "Fundamentals of Digital Image Processing", Sharma, Dr Sanjay, SK Kataria and Sons, 2008.

III Year – II Semester	OPEN ELECTIVE-II	L	T	P	C
1019203240	INTRODUCTION TO EMBEDDED SYSTEMS	3	0	0	3

Course Objectives:

- The basic concepts of an embedded system are introduced and the various elements of embedded hardware and their design principles are explained.
- Different steps involved in the design and development of firmware for embedded systems is elaborated.
- Fundamental issues in hardware software co-design were presented and explained.
- Familiarize with the different IDEs for firmware development for different family of processors/controllers and embedded operating systems.
- Embedded system implementation and testing tools are introduced and discussed

Course Outcomes:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function
CO2	Design the Embedded hardware by considering the hardware components required for an embedded system
CO3	Analyze the various embedded firmware design approaches on embedded environment to suit for desired application
CO4	Understand how to integrate hardware and firmware of an embedded system and apply this knowledge to real time operating system.

UNIT-I

Embedded System -Definition, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Characteristics of an embedded system.

UNIT-II

EMBEDDED HARDWARE DESIGN:

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT-III

EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV

HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware.

UNIT-V

EMBEDDED SYSTEM DEVELOPMENT: The integrated development environment, Types of files generated on cross-compilation, Dissembler/Decompiler, Simulators,

Emulators and Debugging, Boundary Scan, Embedded Software development process and tools.

Text Books:

1. Embedded Systems-architecture, programming and design by RajKamal 3rd edition, McGraw hill
2. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013.
3. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited, 2013.

Reference Books:

1. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.
2. Embedded Systems-Lyla B.Das-Pearson Publications, 2013.

III Year – II Semester		L	T	P	C
1012203110	COMPUTER NETWORKS LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. Understand network layers, structure/format, and role of each network layer.
2. Able to design and implement various network application such as data transmission between client and server, file transfer, real-time multimedia transmission.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Implement error detection techniques.
CO2	Apply appropriate algorithm for finding of shortest route.
CO3	Configure the routing table. And Implement and compare the various routing algorithms.
CO4	Implement client/server communication and Implementing connection oriented and connectionless protocols.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	**Exercise – 1** Implementation a Basic Network using Topologies in Packet Tracer.	Understands different Network Topologies
2	**Exercise – 2** Implement the three CRC polynomials on a data set of characters– CRC 12, CRC 16 and CRC CCIP.	Can Apply error detection mechanism.
3	**Exercise – 3** Switch and Router configuration and Configuring VLAN in packet tracer.	Switch and Router configuration and Configuring VLAN in packet tracer.
4	**Exercise – 4** Implement Dijkstra's algorithm to compute the Shortest path through a graph.	Ability to identify the shortest path in the network transmission.
5	**Exercise – 5** Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.	Identifying the route for transmitting the data over the network.
6	**Exercise – 6** Take an example subnet of hosts. Obtain broadcast tree for it.	Understands the concept of subnet and broadcasting
7	**Exercise – 7** Implementation of Connection oriented concurrent service (TCP).	Implements Connection Oriented Service

8	**Exercise – 8** Implementation of Connectionless Iterative time service (UDP).	Implements Connectionless Iterative time service
9	**Exercise – 9** Configuration of DHCP Server and Implementation of DNS.	Configuration of DHCP Server
10	**Exercise – 10** Implementation of HTTP (Hyper Text Transfer Protocol).	Implements Hypertext Transfer Protocol

Text Books:

1. Computer Networks (5th Edition) – Andrew S. Tanenbaum.Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010.
2. Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education.

Reference Books:

1. Computer Networking: A Top-Down Approach (6th Edition) – Kurose and Ross
2. Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) – Douglas E. Comer.

III Year – II Semester		L	T	P	C
1005203210	NOSQL DATABASES LAB	0	0	3	1.5

COURSE OBJECTIVES:

1. Distinguish and describing how NoSQL databases differ from relational databases from a theoretical perspective.
2. Explore the origins of NoSQL databases and the characteristics.
3. Demonstrate competency in selecting a particular NoSQL database for specific use cases.
4. Demonstrate Document databases with MongoDB.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Compare and contrast the uses of relational RDBMSs and NoSQL systems for different types of data and applications.
CO2	Recognize Key value Databases and document databases.
CO3	Create a sample database using NoSql.
CO4	Apply the Query concepts in MongoDB database.

LIST OF EXPERIMENTS

S.No.	Name of the experiment	Skill
1	**Exercise – 1** Introduction to MongoDB and its Installation on Windows & Linux.	MongoDB Installation
2	**Exercise – 2** Description of mongo Shell, Create database and show database.	Database Creation
3	**Exercise – 3** Commands for MongoDB and to study operations in MongoDB – Insert, Query, Update, Delete and Projection.	MongoDB Commands
4	**Exercise – 4** Download a zip code dataset at http://media.mongodb.org/zips.json .Use mongo import to import the zip code dataset into MongoDB. After importing the data, answer the following questions by using aggregation pipelines: 1. Find all the states that have a city called "BOSTON". Find all the states and cities whose names include the string "BOST". 2. Each city has several zip codes. Find the city in each state with the greatest number of zip codes and rank those cities along with the states using the city populations. MongoDB can query on spatial information.	MongoDB
5	**Exercise – 5** Where Clause equivalent in MongoDB: Write a MongoDB query to find the restaurants that achieved a score, more than 80 but less than 100.	MongoDB – where clause
6	**Exercise – 6**	MongoDB

	Write a MongoDB query to find the restaurants which locate in latitude value less than -95.754168.	Query
7	**Exercise – 7** To study operations in MongoDB – AND in MongoDB, OR in MongoDB, Limit Records and Sort Records. To study operations in MongoDB – Indexing, Advanced Indexing, Aggregation and Map Reduce.	MongoDB Operations
8	**Exercise – 8** Column oriented databases study, queries, and practices.	Column Oriented database
9	**Exercise – 9** Create a database that stores road cars. Cars have a manufacturer, a type. Each car has a maximum performance and a maximum torque value. Do the following: Test Cassandras replication schema and consistency models.	Cassandra
10	**Exercise – 10** Master Data Management using Neo4j Manage your master data more effectively the world of master data is changing. Data architects and application developers are swapping their relational databases with graph databases to store their master data. This switch enables them to use a data store optimized to discover new insights in existing data,providea360-degree view of master data and answer questions about data relationships in real time.	Data Management
11	**Exercise – 11** Shopping Mall case study using Cassandra, where we have many customers ordering items from thermall and, we have suppliers who deliver them their ordered items.	Cassandra

Text Books:

1. An introduction to Information Retrieval, Christopher D.manning, Prabhakar Raghavan, Hinrich Schutze
2. TheDesignandImplementationofModernColumn-OrientedDatabaseSystems,Daniel Abadi Yale University
3. Next Generation database: NoSQL and big data by Guy Harrison.

Reference Books:

1. Redmond, E. &Wilson , Author: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.
2. Sadalage, P. & Fowler, M. (2012). NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. (1st Ed.). Upper Saddle River, NJ: Pearson Education, Inc. ISBN- 13: 978-0321826626 ISBN-10: 0321826620

E-Resources:

https://www.udemy.com/course/sql-nosql-big-data-hadoop/

III Year – II Semester	SKILL ORIENTED COURSE - IV	L	T	P	C
1005203280	DEVOPS	0	0	4	2

PREREQUISITES:

This is an entry-level course, but students should possess:

• General Software Engineering knowledge

COURSE OBJECTIVES:

1. Explain the drivers responsible for the emergence of Devops.
2. Define and discuss the key concepts and principles of Devops.
3. List and explain the business benefits of Devops and continuous delivery.
4. Describe the service delivery process.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the importance of Devops tools used in SDLC, Jenkins to Build, Deploy and Test Software Applications.
CO2	Examine the different Version Control Strategies.
CO3	Analyze & Illustrate the Containerization of OS images and deployment of application over Docker.
CO4	Synthesize the provisioning Using Chef/Puppet/ Ansible or Saltstack and summarize the importance of Software Configuration Management in Devops.

Brief Introduction about the Course:

DevOps emphasizes building trust and better lessoning between developers and system administrators. This helps the organization in aligning technological projects to business requirements. Changes rolled out are usually small and reversible, which the entire team begins to comprehend.

LIST OF EXPERIMENTS / PROGRAMS / ACTIVITIES

S. No.	Name of the experiment / List of Programs / List of Activities (hands-on)	Skill
1	To understand the concept of DevOps with related technologies which are used to code, Build, Test, Configure & Monitor the software applications.	Prerequisite
2	To install and Configure Jenkins to test, and deploy Java or Web Applications using NetBeans or eclipse	Build & test Applications with Continuous Integration

3	To perform version control on websites/ Software using different version control tools like RCS/CVS/GIT/Mercurial (Any Two)	Version Control
4	To Install and Configure Docker for creating Containers of different Operating System Images.	Virtualization & Containerization
5	To Build, Deploy and Manage web or java application on Docker.	Virtualization & Containerization
6	To install and Configure Software configuration management using Chef/Puppet/Ansible or Saltstack	Software Configuration Management
7	To perform Software Configuration Management and Provisioning using Chef/Puppet/ Ansible or Saltstack.	Provisioning

Text Books:

1. The DevOps Handbook,Authors: Gene Kim, Jez Humble, Patrick Debois, John Allspaw and John Willis .
2. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations

Web References:

1. https://www.udacity.com/course/intro-to-devops--ud611

III Year – II Semester	AUDIT COURSE - V	L	T	P	C
1099203220	PROFESSIONAL ETHICS AND UNIVERSAL HUMAN VALUES	2	0	0	0

COURSE OBJECTIVES:

1. To help the student to see the need for developing a holistic perspective of life.
2. To help students distinguish between values and skills and understand the need, basic guidelines, content and process of value education and Harmony.
3. To help the students understand their role as engineers, behavior and how to use ethical theories.
4. To help the students remember the codes, their responsibilities towards society, safety and risk.
5. Making the students aware and sensitive to value system in real life situations. To help the students to discriminate between ephemeral and eternal values.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Recognize importance of Universal human values, self-exploration and environment
CO2	Describe the core values that shape the ethical behavior of an engineer through value education, harmony and ethical human conduct.
CO3	Recall basics of professional ethics and Ethical theories.
CO4	Listing sustained happiness through identifying their responsibilities.

UNIT-I

Universal Human Values-I – Introduction

Self-exploration- Aspirations and Concerns- Self-Management- Health- Relationships- Society- Natural Environment- Sharing and feedback

UNIT-II

Universal Human Values-II - Understanding Harmony and Ethical Conduct

Introduction to Value Education- Harmony in the Human Being, Family and Society, Nature/Existence- Implications of the Holistic Understanding – a Look at Professional Ethics.

UNIT-III

Engineering Ethics:

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy – Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics- Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma

UNIT-IV

Engineering as Social Experimentation & Engineers' Responsibility for Safety and Risk
Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering-Engineers'- Responsibility for Safety and Risk: Safety and Risk, Concept of Safety – Types of Risks - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT-V

Engineers' Responsibilities and Rights:
Collegiality-Loyalty-Professionalism and Loyalty- Professional Rights –Professional Responsibilities-Conflict of Interest-Ethical egoism-Confidentiality-Acceptance of Bribes/Gifts- when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies- Occupational Crimes - Whistle Blowing -Cross-culture Issues.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. "Engineering Ethics and Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar- PHI Learning Pvt. Ltd-2009
3. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications
4. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications
5. "Professional Ethics and Human Values" by Prof.D.R.Kiran

Reference Books:

1. Science & Humanism – towards a unified worldview, P. L. Dhar & R. R.Gaur (1990), Commonwealth Publishers, New Delhi.
2. AvartansheelArthshastra, A. Nagraj, Divya Path Sansthan, Amarkantak, India
3. Economy of Permanence – (a quest for social order based on non-violence), J. C. Kumarappa (2010), Sarva-Seva-Sangh-Prakashan, Varansi, India
4. Energy and Equity, Ivan Illich (1974), The Trinity Press, Worcester &Harper Collins, USA
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BSP Publication
6. "EthicsinEngineering"byMikeW.MartinandRolandSchinzinger–TataMcGraw-Hill–2003.
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
8. Sociology Themes and Perspectives, Harper Collins; EIGHT edition (2014), Martin Holborn and Peter Langley, 1980.
9. Samagrakranti: Jaya Prakash Narayan's philosophy of social change, Siddharth PublicationsRenu Sinha, 1996.
10. Small Is Beautiful: A Study of Economics as if People Mattered, E. F.Schumacher, 1973, Blond & Briggs, UK.

E-Books and Online Resources:

1. https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN.pdf
2. https://india.oup.com/productPage/5591038/7421214/9780199475070

NPTEL/SWAYAMMOOCS:

1. https://nptel.ac.in/courses/109/104/109104068/
2. https://onlinecourses.swayam2.ac.in/ntr19_ge06/preview

PROGRAM STRUCTURE
FOR
IV - B. Tech
I & II SEMESTER

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
PROGRAM STRUCTURE

IV Year **I Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	**Professional Elective-III**					
	1005204130	Soft Computing	3	0	0	3
	1005204131	Advanced Computer Networks				
	1012203200	Cryptography and Network Security				
	1005203137	Human Computer Interaction				
	1005203140	Software Testing Methodologies				
2	**Professional Elective-IV**					
	1005204132	Software Quality Assurance	3	0	0	3
	1005204133	Digital Forensics				
	1005204134	Social Networking and Semantic Web				
	1054203100	Machine Learning				
	1005204170	MOOCS				
3	**Professional Elective-V**					
	1005204135	Pattern Recognition	3	0	0	3
	1005204136	Artificial Neural Networks				
	1005204137	Software Architecture and Design Patterns				
	1005204138	Cloud Computing				
	1005204171	MOOCS				
4	**Open Elective-III**		3	0	0	3
	1003204132	Additive Manufacturing				
	1019203200	IoT and its Applications				
	1054204131	Business Analytics				
	1001202240	Environmental Pollution and Control				
5	**Open Elective-IV**					
	1003202242	Industrial Robotics	3	0	0	3
	1004204140	Speech Processing				
	1054204136	Information Retrieval Systems				
	1054204130	Predictive Analytics				
6	1099203200	Management Science	3	0	0	3
7	1005204180	Amazon Web Services	0	0	4	2
8	1099204120	IPR and Patents	2	0	0	0
9	1005204160	Industrial / Research Internship	0	0	0	2
Total Credits						22
10		**Honors/Minor Courses**	**4**	**0**	**0**	**4**

IV Year **II Semester**

S. No.	Course Code	Course Title	L	T	P	C
1	1005204260	Main Project	0	0	0	12
SEMESTER LONG INTERNSHIP						
Total Credits						**12**

Total Credits (IV Year – I&II Sem) = 34

DETAILED SYLLABUS FOR

IV-B. Tech

I-SEMESTER

IV Year – I Semester	PROFESSIONAL ELECTIVE-III	L	T	P	C
1005204130	SOFT COMPUTING	3	0	0	3

COURSE OBJECTIVES:

1. To understand the concepts of feed forward &feedback neural networks.
2. To understand the concept of fuzziness involved in various systems.
3. To expose the ideas about genetic algorithm.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Identify and describe soft computing techniques and their roles in building intelligent machines
CO2	Comprehend machine learning and soft computing techniques in solving real world applications.
CO3	Apply fuzzy logic and reasoning to handle uncertainty
CO4	Apply genetic algorithms to combinatorial optimization problems and neural networks to pattern classification and regression problems

UNIT- I

INTRODUCTION ARTIFICIAL NEURAL NETWORKS:

Neural Network: Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network. **Earlier neural networks:** ADALINE, MADALINE. **Neural Network Architectures:** Single layer feed forward network, Multi-layer feed forward network, Recurrent network. **[10 Hours]**

UNIT-II

SUPERVISED AND UNSUPERVISED LEARNING NETWORK

Supervised Learning Network: Perceptron network, Back propagation network, Radial basis function network. **Unsupervised Learning Network:** Fixed weight competitive nets, Kohonen self-organizing feature maps, Counter propagation network, Adaptive reasoning theory**.** **[10 Hours]**

UNIT-III

Auto associative memory network, Hetro associative memory network, Bidirectional associative memory, Hopfield networks. **[8 Hours]**

UNIT-IV

FUZZY LOGIC FUZZY LOGIC:

Crisp set and Fuzzy set, Basic concepts of fuzzy sets, Fuzzy set operations, Fuzzy Arithmetic-fuzzy numbers, Fuzzy ordering, Fuzzy vectors. Fuzzy measures-belief and

plausibility measure. Probability measure - Measure of fuzziness, Fuzzy integrals. Membership functions: Features of membership function, Fuzzification. Fuzzy Rule Based Systems: Fuzzy proposition, Formation and decomposition of rules, Fuzzy reasoning, Fuzzy inference systems, Fuzzy expert system. Defuzzification: Max-membership, Centroid method, Weighted average, Mean max. **[10 Hours]**

UNIT-V

GENETIC ALGORITHMS:
Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods. **[10 Hours]**

Text Books:

1. Simon Haykin," A comprehensive foundation. Neural Networks", Pearson, Second Edition, 2001.
2. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.

Reference Books:

1. Timothy J. Ross, "Fuzzy logic with engineering applications", John Wiley & Sons, Third Edition, 2009.
2. Melanie Mitchell, "An Introduction to Genetic Algorithms", Prentice-Hall, 1998.

NPTEL/MOOC:

1. https://onlinecourses.nptel.ac.in/noc21_cs11

IV Year – I Semester	PROFESSIONAL ELECTIVE-III	L	T	P	C
1005204131	ADVANCED COMPUTER NETWORKS	3	0	0	3

COURSE OBJECTIVES:

1. Recognize the technological trends of Computer Networking and discuss the key technological components of the Network.
2. Familiarize the student with advanced terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Enumerate the layers of the OSI model and TCP/IP model. Explain the function(s) of each layer. Ability to understand about different architectures network.
CO2	Identify the different types of network devices and their functions within a network.
CO3	Understand and building the skills of sub netting, routing mechanisms and transport layer protocols.
CO4	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

UNIT- I

Review of Computer Networks, Devices and the Internet:
Internet, Network edge, Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, Internet Protocols and Addressing. Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure. The Link Layer and Local Area Networks-Link Layer, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization. **[10 Hours]**

UNIT-II

Data-link protocols:
Ethernet, Token Ring and Wireless (802.11). Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs), Multiple access schemes. **[8 Hours]**

UNIT-III

Routing and Internetworking:
Introduction to Router, Configuring a Router, Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intra-domain Routing Protocols, Inter-domain Routing Protocols, Congestion Control at Network Layer. Logical Addressing: IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra-domain Multicast Protocols, Inter-domain Multicast Protocols, Node-Level Multicast algorithm. **[10 Hours]**

UNIT-IV

Transport and Application Layer Protocols:
Client-Server and Peer-To-Peer Application Communication, Protocols on the transport layer, reliable communication. Routing packets through a LAN and WAN. Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control. Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Domain Name System (DNS), Building a Simple Web Server, DHCP Server and DNS Server. **[10 Hours]**

UNIT-V

Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hiper LAN , Bluetooth Mobile Network and Transport layer, WAP GSM and CDMA: Network architecture and management **[10 Hours]**

Text Books:

1.Computer Networking: A Top-Down Approach, James F. Kuros and Keith W. Ross,Pearson, 6th Edition,2012
2.Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Prentice, 5th Edition,20102. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.

Reference Books:

1. A Practical Guide to Advanced Networking , Jeffrey S. Beasley and PiyasatNilkaew,Pearson, 3rd Edition,2012

IV Year – I Semester	PROFESSIONAL ELECTIVE-III	L	T	P	C
1012203200	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	0	3

COURSE OBJECTIVES:

1. To learn the principles and practice of cryptography and network security.
2. To gain knowledge in Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers)
3. To gain Knowledge in Public-key cryptography (RSA, discrete logarithms), Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes.
4. To gain knowledge in Email and web security, viruses, firewalls, digital right management, and other topics.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understanding the principles and practices of cryptography and network security
CO2	Understanding the concepts of symmetric block cipher or conventional key encryption or private key encryption or one key encryption.
CO3	Apply basic knowledge of public key cryptography or asymmetric key cryptography or two key cryptography
CO4	Understanding the cryptographic protocols, hash functions, authentication, key management, key exchange, signature, schemes, Email and web security, viruses, firewalls

UNIT- I

Basic Principles

Security attacks, services & mechanisms, fundamental security principles, A Model for Network Security, Symmetric Cipher Model, Substitution Techniques Transportation Techniques, Rotor Machines, steganography. **[8 Hours]**

UNIT-II

Symmetric Encryption

Secret Key Cryptography: Traditional Block Cipher Structure**,** Data Encryption Standard (DES), Block Cipher Design Principles, Triple DES, Blowfish, AES, Steam ciphers, RC4, Modes of Operation. **[10 Hours]**

UNIT-III

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, the Chinese Remainder Theorem, Discrete Logarithms.

Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm,

Diffie-Hellman Key Exchange, Introduction to Elliptic Curve Cryptography. **[10 Hours]**

UNIT-IV

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm (SHA), Message Authentication Codes - Message Authentication Requirements and Functions, HMAC, Digital signatures, RSA Digital Signature Scheme, NIST Digital Signature Schemes(DSA approach). **[10 Hours]**

UNIT-V

Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS, Security at the Network Layer: IPSec, System Security **[10 Hours]**

Text Books:

1. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.
2. Cryptography and Network Security, William Stallings, (6e) Pearson.
3. Everyday Cryptography, Keith M.Martin, Oxford.

Reference Books:

1. Network Security and Cryptography, Bernard Meneges, Cengage Learning.
2. Cryptography and Network Security: AtulKahate, Mc Graw Hill, 2nd Edition.
3. Information Security, Principles and Practice : Mark Stamp, Wiley India.
4. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Principles of Information security by Michael E Whitman and Herbert J.Mattord.
7. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.

IV Year – I Semester	PROFESSIONAL ELECTIVE-III	L	T	P	C
1005203137	HUMAN COMPUTER INTERACTION	3	0	0	3

COURSE OBJECTIVES:

1. The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.
2. Analyze and identify user models, user support, socio-organizational issues and stakeholder requirements of HCI systems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Explain the capabilities of both humans and computers from the viewpoint of human information processing.
CO2	Demonstrate typical Human Computer Interaction (HCI) models, styles and various historic HCI paradigms.
CO3	Apply an interactive design process and universal design principles to designing HCI systems.
CO4	Illustrate and utilise HCI design principles, standards and guidelines.

UNIT- I

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations,universal usability, goals for our profession.

Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design,development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories. **[10 Hours]**

UNIT-II

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus,Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays. **[8 Hours]**

UNIT-III

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure,Naming and Abbreviations, Natural Language in Computing

Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces,Displays- Small and large.

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity,Variability in Response Time, Frustrating Experiences

Balancing Function and Fashion: Introduction, Error Messages, Non anthropomorphic

Design, Display Design, WebPage Design, Window Design, Color . **[10 Hours]**

UNIT-IV

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs fromDisplays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process. **[10 Hours]**

UNIT-V

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia DocumentSearches, Advanced Filtering and Searching Interfaces
Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization. **[10 Hours]**

Text Books:

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books:

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.

IV Year – I Semester	PROFESSIONAL ELECTIVE-III	L	T	P	C
1005203140	SOFTWARE TESTING METHODOLOGIES	3	0	0	3

COURSE OBJECTIVES:

1. Fundamentals for various testing methodologies.
2. Describe the principles and procedures for designing test cases.
3. Provide supports to debugging methods.
4. Acts as the reference for software testing techniques and strategies

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understanding the purpose of Software Testing
CO2	Understand the Transaction Flow Testing and Dataflow testing
CO3	Test the software using domain testing and Logic Based Testing
CO4	Apply the software testing tools for real world applications

UNIT- I

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.
Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing. **[8 Hours]**

UNIT-II

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.
Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domain sand Interfaces Testing, Domain and Interface Testing, Domains and Testability. **[10 Hours]**

UNIT-III

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection .
Syntax Testing: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips. **[10 Hours]**

UNIT-IV

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. **[10 Hours]**

UNIT-V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard. **[10 Hours]**

Text Books:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

Reference Books:

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press.
7. Win Runner in simple steps by Hakeem Shittu, 2007 Genixpress.
8. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

E-Books:

1. Practical Test Design:Selection of traditional and automated test design techniques 1st Edition, Kindle Edition.
2. Instant Approach to Software Testing: Principles, Applications, Techniques, and Practices: Principles, Applications, Techniques, and Practices (English Edition) 1st Edition, Kindle Edition.

IV Year – I Semester	PROFESSIONAL ELECTIVE-IV	L	T	P	C
1005204132	SOFTWARE QUALITY ASSURANCE	3	0	0	3

COURSE OBJECTIVES:

1. Describe approaches to quality assurance
2. Understand quality models
3. Evaluate the system based on the chosen quality model

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Enumerate the Components of the Software Quality Assurance System.
CO2	Integrate Quality Activities in the Project Life Cycle
CO3	Interpret procedures, work instructions and list out the Software Quality Metrics and Costs.
CO4	Analyze the SQA Standards and estimate the role of Management in Quality Assurance.

UNIT- I

Introduction: The Software Quality Challenge, Software Quality, Software Quality Factors: The Components of the Software Quality Assurance System - Overview of Pre-Project Software Quality Components. **[8 Hours]**

UNIT-II

SQA Components in the Project Life Cycle: Integrating Quality Activities in the Project Life Cycle, Reviews Software Testing – Strategies Software Testing –Implementation, Assuring the Quality of Software Maintenance. **[8 Hours]**

UNIT-III

Software Quality Infrastructure Components: Procedures and Work Instructions, Supporting Quality Devices Staff Training, Instructing and Certification, Preventive and Corrective Actions.

Software Quality Management Components: Project Progress Control: Software Quality Metrics, Software Quality Costs. **[8 Hours]**

UNIT-IV

Standards, Certification and Assessment: SQA Standards ISO 9001 Certification Software, Process Assessment. **[8 Hours]**

UNIT-V

Organizing for Quality Assurance: Management and its Role in Quality Assurance, The Software Quality Assurance. **[8 Hours]**

Text Books:

1. Software Quality Assurance, Theory of implementation, Daniel Galin, Pearson.
2. Software Testing and Analysis. Process, Principles, and Techniques, MauroPezze and Michal Young, John Wiley 2008.

Reference Books:

1. Software Testing Techniques, BorizBeizer, 2nd Edition, DreamTech, 2009.
2. Foundations of Software Testing, Aditya P. Mathur, Pearson, 2008.
3. Software Testing and Analysis. Process, Principles, and Techniques, Mauro Pezze and Michal Young, John Wiley 2008.
4. Metrics and Models in Software Quality Engineering, Stephen H. Kan, 2nd Edition, Pearson, 2003
5. Software Testing and Quality Assurance: Theory and Practice, Kshirasagar Naik and Priyadarshi Tripathy (Eds), John Wiley, 2008

E-Resources:

1. softwaretestingfundamentals.com/software-quality-assurance/
2. http://nptel.ac.in/courses/106101061/

IV Year – I Semester	PROFESSIONAL ELECTIVE-IV	L	T	P	C
1005204133	DIGITAL FORENSICS	3	0	0	3

COURSE OBJECTIVES:

1. Analyze and conduct a computer forensics examination and report the findings that will lead to the incarceration of the perpetrators.
2. Learn different aspects of digital evidence: ways to uncover illegal or illicit activities left on disk and recovering files from intentionally damaged media with computer forensics tools and techniques.
3. Acquire Knowledge on Network Forensics, Advanced Computer Forensics that protects information assets from potential intrusion, damage, or theft.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Analyze computer forensics services, computer forensics tools and techniques.
CO2	Analyze types of forensic systems for investigations.
CO3	Make use of computer forensic services and data recovery techniques and identify potential sources of electronic evidence for maintaining the integrity of digital evidence.
CO4	Perform basic forensic data acquisition and analysis using computer-based applications and utilities.

UNIT- I

Computer Forensics Fundamentals:
What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find it. **[8 Hours]**

UNIT-II

Types of Computer Forensics System: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Computer Forensics, Second Edition Biometric Security Systems, Homeland Security Systems.

[8 Hours]

UNIT-III

Computer Forensics Services:
Occurrence of Cyber Crime, Cyber Detectives, Cyber Crime with Risk Management Techniques, Computer Forensics Investigative Services, Forensics Process Improvement. Data Recovery: Data Recovery Defined, Data backup and recovery, Role of Backup in Data Recovery, Data Recovery Solution, Hiding and Recovering Hidden Data. **[8 Hours]**

UNIT-IV

Evidence Collection and Data Seizure:
Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody, Reconstructing the Attack. Duplication and Preservation of Digital Evidence - Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation. **[8 Hours]**

UNIT-V

Computer Forensics Analysis: Discovery of Electronic Evidence, Identification of Data, Reconstructing of Past Events. **[8 Hours]**

Text Books:

1. "Computer Forensics, Computer Crime Investigation," John R. Vacca, Firewall Media, New Delhi, 2010.
2. "Computer Forensics and Investigations," Nelson, Phillips Enfinger, Steuart, CENGAGE Learning, 2014.

Reference Books:

1. "Real Digital Forensics," Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education, 2006.
2. "Forensic Compiling, A Tractitioneris Guide," Tony Sammes and Brian Jenkinson, Springer International edition, 2005.
3. "Computer Evidence Collection & Presentation," Christopher L.T. Brown, Firewall Media, MA, 2nd edition, 2006.

E-Resources:

1. https://www.cs.nmt.edu/~df/lectures.html
2. https://www.lynda.com/Developer-tutorials/Computer-Forensics-Essential-Training/170337-2.html

IV Year – I Semester	PROFESSIONAL ELECTIVE-IV	L	T	P	C
1005204134	SOCIAL NETWORKING AND SEMANTIC WEB	3	0	0	3

COURSE OBJECTIVES:

1. To explain the analysis of the social Web and the design of a new class of applications that combine human intelligence with machine processing.
2. To describe how the Semantic Web provides the key in aggregating information across heterogeneous sources.
3. To understand the benefits of Semantic Web by incorporating user-generated metadata and other clues left behind by users.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Enumerate the measures of social network analysis.
CO2	Illustrate Electronic sources for network analysis and different Ontology languages.
CO3	Model and aggregate social network data.
CO4	Develop social-semantic applications and evaluate Web- based social network.

UNIT- I

Introduction to the Semantic Web and Social Networks:
The Semantic Web-Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web. Social Network Analysis- What is network analysis, Development of Social Network Analysis, Key concepts and measures in network analysis. **[8 Hours]**

UNIT-II

Web data, Semantics and Knowledge Representation on the Semantic Web:
Electronic sources for network analysis- Electronic discussion networks, Blogs and online communities, Web-based networks. Knowledge Representation on the Semantic Web - Ontologies and their role in the Semantic Web, Ontology languages for the Semantic Web (RDF, OWL). **[8 Hours]**

UNIT-III

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. **[8 Hours]**

UNIT-IV

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. **[8 Hours]**

UNIT-V

Evaluation of web-based social network extraction:
Differences between survey methods and electronic data extraction, Context of the empirical study, Data collection, Preparing the data, Optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis. **[8 Hours]**

Text Books:

1. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

1. Semantic Web Technologies
2. Semantic Web and Semantic Web Services, Liyang Lu Chapman and Hall,CRC Publishers
3. Information sharing on the semantic Web, Heiner Stuckenschmidt, Frank Van Harmelen
4. Programming the Semantic Web

E-Resources:
1. https://link.springer.com/content/pdf/10.1007%2F978-0-387-71001-3.pdf
2. www.springer.com/in/book/9780387710006
3. https://en.wikipedia.org/wiki/Social_Semantic_Web

IV Year – I Semester	PROFESSIONAL ELECTIVE-IV	L	T	P	C
1054203100	MACHINE LEARNING	3	0	0	3

COURSE OBJECTIVES:

1. Familiarity with a set of well-known supervised, unsupervised and semi-supervised learning
2. The ability to implement basic machine learning algorithms
3. Understanding of how machine learning algorithms are evaluated
4. Applying new concepts and solving problems using different machine learning techniques.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Recognize the characteristics of machine learning that make it useful to real-world Problems.
CO2	Characterize machine learning algorithms as supervised, semi-supervised, and Unsupervised.
CO3	Be able to use support vector machine, regularized regression algorithms.
CO4	Understand the concept behind neural networks for learning non-linear functions.

UNIT- I

INTRODUCTION TO MACHINE LEARNING:

Introduction to machine learning, Definition, traditional programming vs machine learning algorithms, learning a system, supervised learning, unsupervised learning and reinforcement learning, application areas**.** **[10 Hours]**

UNIT-II

CLASSIFICATION AND REGRESSION MODELS

Linear Separability and decision regions, linear discriminates, linear regression, logistic regression, decision trees-ID3 and C4.5, KNN. **[10 Hours]**

UNIT-III

DIMENSIONALITY REDUCTION AND SUPPORT VECTOR MACHINES

Dimensionality reduction and Feature selection, Dimensionality reduction algorithms: LDA and PCA, Margin of a classifier, Support Vector Machine, learning nonlinear hypothesis using kernel functions. **[10 Hours]**

UNIT-IV

CLUSTERING AND ENSEMBLE METHODS

Introduction to clustering: K-means clustering, Gaussian mixture model, Ensemble Methods: bagging and boosting, Random forest and AdaBoost algorithms and Bayesian learning algorithm. **[10 Hours]**

UNIT-V

ARTIFICIAL NEURAL NETWORKS:

Introduction,The perceptron, the perceptron learning algorithm, Multilayer neural networks, activation functions, Back Propagation algorithm and introduction to Deep learning models: CNN. **[10 Hours]**

Text Books:

1. Tom Mitchell, *"Machine Learning"*, Mc GrawHill publications, 1997
2. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
3. Introduction to Machine Learning with Python by Andreas C. Müller, Sarah Guido O'Reilly Media.
4. Deep Learning by Josh Patterson, Adam Gibson, O'Reilly Media.

Reference Books:

1. UnderstandingMachine Learning: From Theory toAlgorithms, ShaiShalev-Shwartz, Shai Ben-David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

IV Year – I Semester	PROFESSIONAL ELECTIVE-IV	L	T	P	C
1005204170	MOOCS	3	0	0	3

MOOCs: It is an online course (Minimum of 12 weeks) to promote advanced knowledge suitable for placement and research.

To award credits, the student should get certificate after they have registered for written exam and successfully passed

(Or)

College will conduct the written examination/Viva-voce and award the credits and grades.

In case a student fails in any online course, he/she may be permitted to register for the same course or an alternate course decided by the department committee. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of MOOCs course remains same as general theory course.

Course Outcomes:

After completing this Course, the student should be able to:

COs	Course Outcomes
CO1	Connect openly on a global scale, with global learners and instructors.
CO2	Develop high quality learning using multimedia platform.
CO3	Self assessment of their performance and learning process.
CO4	Develop a life long learning culture and updating the knowledge according with emerging trends.

IV Year – I Semester	PROFESSIONAL ELECTIVE-V	L	T	P	C
1005204135	PATTERN RECOGNITION	3	0	0	3

COURSE OBJECTIVES:

To equip students with basic mathematical and statistical techniques commonly used in Pattern recognition. To introduce students to a variety of pattern recognition algorithms. Enable students to apply machine learning concepts in real life problems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Explain the parametric and linear models of classification.
CO2	Compare and Parameterize different learning algorithms.
CO3	Develop machine independent and unsupervised learning techniques.
CO4	Applying pattern recognition technique to real world problems such as Documentation analysis and Recognition

UNIT- I

Introduction to Pattern Recognition:

Problems, applications, design cycle, learning and adaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory-Bays rule, discriminate functions, loss functions and Bayesian error analysis. **[8 Hours]**

UNIT-II

Linear models:

Linear Models for Regression, linear regression, logistic regression Linear Models for Classification **[10 Hours]**

UNIT-III

Neural Network: Perception, multi-layer perception, back propagation algorithm, error surfaces, practical techniques for improving back propagation, additional networks and training methods, Ad boost. **[8 Hours]**

UNIT-IV

Linear discriminate functions:

Decision surfaces, two-category, multi-category minimum- squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine. **[10 Hours]**

UNIT-V

Algorithm independent machine learning:

lack of inherent superiority of any classifier, bias and variance, re-sampling for classifier design, combining classifiers.

Unsupervised learning and clustering:

k-means clustering, fuzzy k-means clustering, hierarchical clustering. **[10 Hours]**

Text Books:

1. Richard O. Duda, Peter E. Hart, David G. Stork, "Pattern Classification", 2nd Edition John Wiley & Sons,2001.
2. Machine learning by Saikat Dutt, S.Chandramouli and A.K.Das, Pearsonpublishing, 2018.

Reference Books:

1. C. Bishop, "Pattern Recognition and Machine Learning", Springer,2006
2. Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, "The Elements of Statistical Learning", 2nd Edition, Springer, 2009.

E-Books:

1. https://www.coursera.org/learn/machine-learning#syllabus

NPTEL/MOOC:

1. https://youtube.com/playlist?list=PLbMVogVj5nJQJMLb2CYw9rry0d5s0TQRp
2. https://youtube.com/playlist?list=PLbMhDVUMngcx-ATexXZH_-u1wwslGliyS

IV Year – I Semester	PROFESSIONAL ELECTIVE-V	L	T	P	C
1005204136	ARTIFICIAL NEURAL NETWORKS	3	0	0	3

COURSE OBJECTIVES:

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithm and issues of various feed forward and feedback neural networks.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Demonstrate ANN structure and activation Functions.
CO2	Define foundations and learning mechanisms and state-space concepts.
CO3	Explain multi-layer feed forward networks and Back propagation algorithms
CO4	Analyze Radial Basis Function Networks and SVMs.

UNIT- I

Introduction:

A Neural Network, Human Brain,Biological neurons and artificial neurons. Model of an ANN, Activation functions used in ANNs. Typical classes of network architectures.

[10 Hours]

UNIT-II

Learning Process:

Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrix algebra. State-space concepts, Error Correction Learning, Memory Based Learning, Hebbian Learning,Competitive, Boltzmann Learning. **[8 Hours]**

UNIT-III

Single layer perceptron:

Introduction, Structure and learning of perceptron, Pattern classifier,introduction and Bayes' classifiers, Perceptron as a pattern classifier, Perceptron convergence theorem. Limitations of a perceptron. **[10 Hours]**

UNIT-IV

Multi-Layer perceptron& RBF networks:

Feed forward ANN, Structures of Multi-layer feed forward networks. Backpropagation algorithm, Back propagation - training and convergence, Regularization Theory. Regularization and RBF networks. RBF network design and training. **[10 Hours]**

UNIT-V

Applications of Neural Networks:
Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making. **[10 Hours]**

Text Books:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

Reference Books:

1. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Intelligence, Li Min Fu MC GRAW HILL EDUCATION 2003.
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

E-Books:

1. https://www.inf.ed.ac.uk/teaching/courses/nlu/assets/reading/Gurney_et_al.pdf
2. http://dai.fmph.uniba.sk/courses/NN/haykin.neural-networks.3ed.2009.pdf
3. https://kupdf.net/download/ann-by-byegnanarayanapdf_5ab9885ae2b6f523273f5edb_pdf

NPTEL/MOOC:

1. https://nptel.ac.in/courses/106/106/106106184/
2. https://nptel.ac.in/courses/117/105/117105084/
3. http://www.nptelvideos.in/2012/12/neural-networks-and-applications.html

IV Year – I Semester	PROFESSIONAL ELECTIVE-V	L	T	P	C
1005204137	SOFTWARE ARCHITECTURE AND DESIGN PATTERNS	3	0	0	3

COURSE OBJECTIVES:

1. To understand interrelationships, principles and guidelines governing architecture and evolution overtime.
2. To understand various architectural styles of software systems.
3. To understand design patterns and their underlying object-oriented concepts.
4. To understand implementation of design patterns and providing solutions to real world software design problems.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Classify the architecture, create it and moving from one to many, different structural patterns.
CO2	Illustrate the architecture and build the system the components
CO3	Design creational and structural patterns
CO4	Outline about behavioural pattern and case study in utilizing the architectural structures

UNIT- I

Envisioning Architecture:

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating and Architecture:

Quality Attributes, achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

[8 Hours]

UNIT-II

Analyzing Architectures:

Architecture Evaluation, Architecture design decision making, ATAM, CBAM

Moving from One System to Many:

Software Product Lines, Building systems from off the shelf components, Software architecture in future. **[10 Hours]**

UNIT-III

Patterns:

Pattern Description, organizing catalogs, role in solving design problems, Selection and usage.

Creational Patterns:

Abstract factory, Builder, Factory method, Prototype, Singleton. **[8 Hours]**

UNIT-IV

Structural Patterns:

Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY

Behavioral Patterns:

Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor. **[10 Hours]**

UNIT-V

Case Studies

A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in Interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

A Case Study (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. **[10 Hours]**

Text Books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

IV Year – I Semester	PROFESSIONAL ELECTIVE-V	L	T	P	C
1005204138	CLOUD COMPUTING	3	0	0	3

COURSE OBJECTIVES:

After taking the course, students will be able:

1. To learn the basics of Cloud computing
2. To know the key concepts of Virtualization
3. To gain knowledge on cloud computing service models
4. To develop cloud implementation, programming and mobile cloud computing
5. To learn key components of Amazon web services.
6. To maintain the Cloud backup and solutions

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the basics of cloud computing and key concepts of virtualization
CO2	Gain knowledge on cloud computing service models, architectural design of store clouds
CO3	Develop cloud implementation, programming and mobile cloud computing, Understand the application of cloud resource management and scheduling algorithms for computing clouds.
CO4	Analyze and develop the backup strategies for cloud data based on features.

UNIT- I

SYSTEMS MODELING CLUSTERING, AND VIRTUALIZATION OF CLUSTERS AND DATA CENTERS

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security and Energy Efficiency.

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, ResourceManagement, Virtualization for Data Center Automation. **[10 Hours]**

UNIT-II

CLOUD PLATFORM ARCHITECTURE

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware **[8 Hours]**

UNIT-III

CLOUD PROGRAMMING AND SOFTWARE ENVIRONMENTS

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft AZURE, Emerging Cloud Software Environments. **[10 Hours]**

UNIT-IV

CLOUD RESOURCE MANAGEMENT AND SCHEDULING

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, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines. **[10 Hours]**

UNIT-V

STORAGE SYSTEMS

Evolution of storage technology, storage models, file systems and database, distributed filesystems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3).

CLOUD SECURITY AND TRUST MANAGEMENT Cloud Security defense strategies, Distributed intrusion/ Anomaly detection. Data and software protection techniques, Reputation guided protection of Data Centre. **[10 Hours]**

Text Books:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press.

Reference Books:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH.
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH.

E-Books:

1. https://www.ulektzbooks.com/books/SIA-Publishers-and-Distributors-(P)-Ltd./Cloud-Computing-(JNTU-K)-MTE3NTE=
2. https://www.smartzworld.com/notes/cloud-computing-pdf-notes-cc/

IV Year – I Semester	PROFESSIONAL ELECTIVE-V	L	T	P	C
1005204171	MOOCS	3	0	0	3

MOOCs: It is an online course (Minimum of 12 weeks) to promote advanced knowledge suitable for placement and research.

To award credits, the student should get certificate after they have registered for written exam and successfully passed

(Or)

College will conduct the written examination/Viva-voce and award the credits and grades.

In case a student fails in any online course, he/she may be permitted to register for the same course or an alternate course decided by the department committee. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of MOOCs course remains same as general theory course.

Course Outcomes:

After completing this Course, the student should be able to:

COs	Course Outcomes
CO1	Connect openly on a global scale, with global learners and instructors.
CO2	Develop high quality learning using multimedia platform.
CO3	Self assessment of their performance and learning process.
CO4	Develop a life long learning culture and updating the knowledge according with emerging trends.

IV Year – I Semester	OPEN ELECTIVE-III	L	T	P	C
1003204132	ADDITIVE MANUFACTURING	3	0	0	3

Course Objectives: The course aims at the importance of Additive Manufacturing, classifications, models, specifications of various Additive Manufacturing Techniques. To learn the different tools, soft-wares required and the applications of Additive Manufacturing.

COURSE OUTCOME:

CO's	At the end of the course, the student will have the ability to:
CO1	Recognize the development of Additive manufacturing technology and opportunities for transforming a concept into product development.
CO2	Apply the suitable rapid prototyping process for a given product
CO3	Analyze STL file problems, find solution and repair
CO4	Explore the applications of AM processes in various fields

UNIT – I

INTRODUCTION: Prototyping fundamentals, historical development, fundamentals of rapid prototyping, advantages and limitations of rapid prototyping, commonly used terms, classification of RP process.

LIQUID-BASED RAPID PROTOTYPING SYSTEMS: Stereo lithography Apparatus (SLA): models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies. Solid Ground Curing (SGC): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-II

SOLID-BASED RAPID PROTOTYPING SYSTEMS: Laminated object manufacturing (LOM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Fused deposition modelling (FDM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT – III

POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective laser sintering (SLS): models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Three-dimensional printing (3DP): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

DIRECTED ENERGY DEPOSITION PROCESSES: Laser Engineered Net Shaping (LENS): process, working principle, applications, advantages and disadvantages, case studies. Direct Metal Deposition (DMD): process, working principle, applications, advantages and disadvantages, case studies.

UNIT – IV

RAPID PROTOTYPING DATA FORMATS: STL Format, STL File Problems, consequence of building valid and invalid tessellated models, STL file Repairs: Generic Solution, other Translators, Newly Proposed Formats.

RAPID PROTOTYPING SOFTWARE'S: Features of various RP software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.

UNIT –V

RP APPLICATIONS: Application in engineering, analysis and planning, aerospace industry, automotive industry, jewellery industry, coin industry, GIS application, arts and architecture. RP medical and bioengineering applications: planning and simulation of complex surgery, customized implants & prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bimolecular.

Text Books:

1. Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, Ian Gibson, David W Rosen, Brent Stucker, Springer, 2015, 2nd Edition.
2. Rapid prototyping: Principles and Applications /Chua C.K., Leong K.F. and LIM C.S/World Scientific publications

Reference Books:

1. Rapid Manufacturing / D.T. Pham and S.S. Dimov/Springer
2. Wohlers Report 2000 /Terry T Wohlers/Wohlers Associates
3. Rapid Prototyping & Manufacturing / Paul F.Jacobs/ASME Press
4. Rapid Prototyping: Principles and Applications in Manufacturing, Rafiq Noorani, John Wiley
& Sons, 2006.

IV Year – I Semester	OPEN ELECTIVE-III	L	T	P	C
1019203200	IOT AND ITS APPLICATIONS	3	0	0	3

COURSE OBJECTIVES:

The main objective of course make student to understand the IoT basic concepts, standards, communication protocols, technological relation and real time applications and their design, implementation and deployment issues.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	To Understand the Architecture, protocols and applications of IoT.
CO2	To Analyse the communication protocols and standards used in IoT
CO3	To analyse and design the simple IoT applications to monitor or control IoT devices using simulation or hardware
CO4	To implement the real time IoT applications.

UNIT- I

Introduction to IoT:

Need of Internet of Things, Internet of Things ERA, Characteristics of Internet of Things, architectural view of Internet of Things, Technologies behind Internet of Things – Server-End Technology – Major Components of IoT system – Development Tools – API and device interfacing components. **[10 Hours]**

UNIT- II

IoT Design: Physical Design of IOT, Things in IoT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels, Sources of IoT, Examples of IoT – Smart Watch – Smart Home – Smart Phone. **[10 Hours]**

UNIT- III

IoT Communication:

M2M communication – M2M to IoT – M2M architecture – software development tools, Communication Technologies – Wireless communication technologies – Wired Communication, IoT Protocols, IoT functional blocks – IoT communication models.

[8 Hours]

UNIT- IV

IoT Physical Devices & Endpoints: Basic building blocks of IoT devices, Introduction to Raspberry Pi , About the Board , Operation System on Raspberry Pi , Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Interfacing LED, Sensor with raspberry pi.

[8 Hours]

UNIT- V

Home Automation – Smart lighting – Home intrusion detection, Cities – smart parking, Environment – Weather monitoring system – Air Pollution Monitoring – Forest Fire Detection, Agriculture – smart irrigation system. **[8 Hours]**

Text Books:

1. Internet of Things: A hands-On Approach, Arshdeep Bahga, Vijay Madisetti, 2014 edition, University Press.
2. The Internet of Things: Enabling technologies, Platforms and Use cases, Pethuru Raj and Anupama C. Raman, 2017 edition, CRC Press, Taylor and Francis Group.

Reference Books:

1. Internet of Things: Architecture and design Principles, Raj Kamal, Tata Mc-Graw hill Edition.

IV Year – I Semester	OPEN ELECTIVE-III	L	T	P	C
1054204131	BUSINESS ANALYTICS	3	0	0	3

COURSE OBJECTIVES:

- The course is designed to gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- The course familiarizes the students with the processes needed to develop, report, and analyze business data.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Determine appropriate business analytics models and then apply descriptive analytics tools.
CO2	Use the Software's like R, Excel, SPSS for the model development and interpreting the outputs
CO3	Develop and apply predictive analytics models/tools to gain insight from data for business decision making
CO4	Design and solve Linear optimization models

Unit I

Introduction to Business Analytics: Evolution of Business analytics, scope, Data for Business Analytics, Models in Business Analytics, problem solving with business analytics- Types of data, Integrating Analytics with business, Business Analytics for Competitive Advantage, Descriptive, Predictive, and Prescriptive Analytics, Dashboards Business Analytics Process Cycle.

Unit II

Analytics on Spreadsheets: Basic Excel, Excel Formulas, Excel Functions, Data Queries. Descriptive Analytics: Descriptive Statistical measures - Populations and samples, Statistical notations, Measures of Location, Measures of Dispersion, and Measures of Association.
Statistical Inference: Hypothesis testing, one-Sample Test, Two-Sample Test, Two tailed Hypothesis for mean, ANOVA. Predictive Analytics:
Simple Linear regression, Multiple Linear regression, Residual Analysis, Building regression models, Regression with categorical Independent variables – CASE STUDIES.

Unit III

Machine Learning, Supervised Learning and Unsupervised Learning, Clustering & Segmentation, Affinity/ Association Analysis, Data Reduction, Visual Analytics and Data Visualization Prescriptive Analytics: Building Linear Optimization models, Implementing Linear Optimization models on spreadsheets, Solving Linear Optimization models- CASE STUDIES.

Unit IV

Marketing Analytics, Models and metrics- Market Insight – Market data sources, sizing, PESTLE trend analysis, and porter five forces analysis - Market basket Analysis, Text Analytics, Spreadsheet Modelling - Sales Analytics: E Commerce sales mode, sales metrics, profitability metrics and support metrics.

Unit V

Introduction to Big Data, Master Data Management. Data Mining on what kind of data, What kinds of patterns can be mined, Which technologies are used, Which kinds of applications are targeted, Major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity.

References:

1. Analytics at Work by Thomas H. Davenport, Jeanne G.Harris and Robert Morison, Harvard Business Press, 2010.
2. Getting Started with Business Analytics: Insightful Decision – Making by David Hardoon, Galit Shmueli, Chapman & Hall/CRC, 2013.
3. Business Intelligence: A Managerial Approach by Efraim Turban, Ramesh Sharda, Dursun Delen and Daid King, Pearson Publication, 2012.
4. Business Intelligence Making Decision through Data Analytics, Jerzy Surma, Business Expert Press, 2011.
5. Successful Business Intelligence: Secrets to Making BI a Killer App by Cindi Howson, Tata McGraw Hill Edition 2012.
6. R for Everyone: Advanced Analytics and Graphics, Jared Lander, Addison Wesley.

IV Year – I Semester	OPEN ELECTIVE-III	L	T	P	C
1001202240	ENVIRONMENTAL POLLUTION AND CONTROL	3	0	0	3

COURSE OBJECTIVES:

The students will be explained

1. Impart knowledge on fundamental aspects of air pollution & control, noise pollution.
2. Differentiate the solid wastes and hazardous wastes based on characterization.
3. Introduces some basics of sanitation methods essential for protection of community health.
4. Provide basic knowledge on sustainable development.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Have knowledge on air pollutant control devices and the NAAQ standards.
CO2	Differentiate the treatment techniques used for solid and industrial wastewater treatment methods.
CO3	Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
CO4	Appreciate the importance of sustainable development while planning a project or executing an activity.

UNIT- I

AIR POLLUTION [6 Hours]

Air pollution Control Methods– Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000.

UNIT- II

INDUSTRIAL WASTEWATER MANAGEMENT [8Hours]

Industrial wastewater Management:– Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards

UNIT- III

SOLID WASTE MANAGEMENT: [8 Hours]

Solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of Land filling.

UNIT- IV

ENVIRONMENTAL SANITATION AND HAZARDOUS WASTE [10 Hours]

Environmental Sanitation: Sanitation Methods for institutions and hospitals

Hazardous Waste: Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT- V

SUSTAINABLE DEVELOPMENTS [8 Hours]

Sustainable developments Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability– Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elesevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

Reference Books:

1. “Air Pollution Control: A Design Approach” by C David Cooper and F C Alley
2. “Encyclopaedia of Air Pollution Control Equipments: Selection, Design, Operation and Maintenance” by Frederick W Lipfert and Litao Wang Hsiaolan Liu
3. Environmental Pollution and Control , J Jefferey Peirce

IV Year – I Semester	OPEN ELECTIVE-IV	L	T	P	C
1003202242	INDUSTRIAL ROBOTICS	3	0	0	3

COURSE OBJECTIVES:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.

2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.

3. Mathematical approach to explain how the robotic arm motion can be described.

4. The students will understand the functioning of sensors and actuators.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the various robot configuration and components
CO2	Choose appropriate actuators and sensors for a robot based on specific application
CO3	Analyze the kinematic and dynamic analysis for simple serial kinematic chains
CO4	Explain trajectory planning for a manipulator by avoiding obstacles.

UNIT-I

INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT-II

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-III

MOTIONANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT-IV

Differential transformation and manipulators, Jacobians – problems Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

UNIT-V

ROBOT ACTUATORS AND FEED BACK COMPONENTS:

Actuators: Pneumatic, Hydraulic actuators, electric& stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

Text Books:

1. Industrial Robotics / Groover M P /Pearson Edu. 2.Robotics and Control / Mittal R K &Nagrath I J / TMH.

Reference Books:

1. Robotics / Fu K S/ McGraw Hill.

2. Robotic Engineering / Richard D. Klafter, Prentice Hall

3. Robot Analysis and Control / H. Asada and J.J.E. Slotine / BSP Books Pvt.Ltd.

4. Introduction to Robotics / John J Craig / Pearson Edu

IV Year – I Semester	OPEN ELECTIVE-IV	L	T	P	C
1004204140	SPEECH PROCESSING	3	0	0	3

COURSE OBJECTIVES:

1. Familiarize with the fundamentals of speech processing
2. Familiarize with models for speech analysis and perception
3. Understand frequency and time-frequency analysis of speech signal.
4. Develop the ability to calculate features and fundamental frequency of speech signal.
5. Familiarize with basic speech coding techniques, like pitch extraction, spectral analysis

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Explain the Field of Artificial Intelligence from general AI to self-driving cars.
CO2	Analysis and synthesis of speech using different technologies, explain how they work, and discuss their strengths and limitations.
CO3	Illustrate the working principles of Tube type Microwave sources and its applications and advantages.
CO4	summarize the applications of different Speech methods (TTS, ASR and spoken language acquisition)

UNIT I

Introduction: Speech production and perception, information sources in speech, linguistic aspect of speech, acoustic and articulatory phonetics, nature of speech, models for speech analysis and perception.

UNIT II

Short-term processing: Need, approach, time, frequency and time-frequency analysis; Short-term Fourier transform (STFT): overview of Fourier representation, non-stationary signals, development of STFT, transform and filter-bank views of STFT.

UNIT III

Speech Analysis: Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT IV

Speech Modeling: Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, and Implementation issues.

Unit V

Speech coding: Need and parameters, classification, waveform coders, speech-specific coders, GSM, CDMA and other mobile coders; Applications: Some applications like pitch extraction, spectral analysis and coding standard.

Text Books:

1. "Theory and Applications of Digital Speech Processing", Lawrence Rabiner and Ronald Schafer, Prentice-Hall, 2011.

Reference Books:

1. Discrete-Time Speech Signal Processing, T.F. Quatieri, Prentice-Hall, 2002
2. "The Scientist and Engineer's Guide to Digital Signal Processing", Steven W. Smith, California Technical Publishing.
3. Springer Handbook of Speech Processing, Benetsy, M.M. Sondhi, Y. Huang (eds.), Springer-Verlag, 2008.
4. Discrete-Time Processing of Speech Signals, J.R. Deller, J.H.L. Hansen, and J.G. Proakis, Wiley India Pvt. Ltd., 2000.

IV Year – I Semester	OPEN ELECTIVE-IV	L	T	P	C
1054204136	INFORMATION RETRIEVAL SYSTEMS	3	0	0	3

COURSE OBJECTIVES:

1. To provide the foundation knowledge in information retrieval.
2. To equip students with sound skills to solve computational search problems.
3. To appreciate how to evaluate search engines.
4. To appreciate the different applications of information retrieval techniques in the Internet or Web environment.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Identify the terminology used in Information retrieval systems and basic data structures used.
CO2	Use inverted files to build IR systems.
CO3	Classify signature file usability in retrieving of information.
CO4	Operate on IR system using PAT Trees and PAT arrays.

UNIT I

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

UNIT II

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

UNIT III

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT IV

New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

UNIT V

Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files.

Text Books:

3. Information Retrieval Data Structures and Algorithms, Frakes, W.B., Ricardo Baeza, Yates,
   Prentice Hall, 1992.
4. Modern Information Retrieval, Yates, Pearson Education.
5. Information Storage & Retrieval, Robert Korfhage, John Wiley & Sons.

Reference Books:

1. Information Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T
   Maybury, Kluwer Academic Press, 1997.
2. Information Retrieval Algorithms and Heuristics, Grossman, David A., Frieder, Ophir 2ed, Springer.

Web References:

1. http://cse.iitkgp.ac.in/~pabitra/course/ir06/ir06.html
2. https://classes.soe.ucsc.edu/ism293/Spring09/material/Lecture%202.pdf
3. http://videolectures.net/Top/Computer_Science/Information_Retrieval/

IV Year – I Semester	OPEN ELECTIVE-IV	L	T	P	C
1054204130	PREDICTIVE ANALYTICS	3	0	0	3

COURSE OBJECTIVES:

1. This course will enable students to apply specific statistical and regression analysis methods applicable to predictive analytics
2. To identify new trends and patterns, uncover relationships,
3. Create forecasts and to develop and use various quantitative and classification predictive models based on various regression and models.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Design effective experiments and analyze the results.
CO2	Use resampling methods to make clear and bulletproof statistical arguments without invoking esoteric notation.
CO3	Explain and apply a core set of classification methods of increasing complexity (rules, trees, random forests), and associated optimization methods (gradient descent and variants).
CO4	Explain and apply a set of unsupervised learning concepts and methods.

UNIT I

Linear Regression: Coefficient of determination-- Significance test, Residual analysis – Standard Error - Ratio of variance- Galton Graph – Ratio of Regression – Interpretation of Galton's Graph - Confidence and Prediction intervals.

UNIT II

Multiple Linear Regression: Coefficient of determination--Interpretation of regression coefficients-- Categorical variables— heteroscedasticity - Multi-co linearity outliers-- Auto regression and Transformation of variables—Regression--Model Building.

UNIT III

Logistic And Multinomial Regression: Logistic function-- Estimation of probability using Logistic regression, Variance-- Wald Test-- Hosmer Lemshow Test-- Classification Table—Gini Co-efficient.

Unit IV

Forecasting: Moving average-- Exponential Smoothing-- Casual Models. Time Series Analysis-- Moving Average Models-- ARIMA models-- Multivariate Models.

UNIT V

Index numbers: construction of Index numbers – selection of items- selection of base – selection of average and system of weighting – construction of various types of index numbers. Theory of probability ad sampling: statistical probability – the Laws of probability – permutations and combinations.

Reference Books:

1. Anderson, Sweeney and Williams ―Statistics for business and economics‖, Cengage Learning, 2011.
2. Richard I. Levin. David S. Rubin, ―Statistics for Management‖, Pearson Education, 2012.
3. Richard A. Johnson, Irwin Miller and John Freund, ―Probability and Statistics for Engineers‖, Pearson Education, 2014.
4. Ronald E. Walpole, Raymond H. Meyers, Sharon L. Meyers, ―Probability and Statistics for Engineers and Scientists‖, Pearson Education.
5. Asthana B.N., ―Elements of Statistics‖ Chaitanya publishing house, Allahabad.

IV Year – I Semester		L	T	P	C
1099203200	MANAGEMENT SCIENCE	3	0	0	3

COURSE OBJECTIVES:

1. To familiarize with the process of management and to provide basic insight into select contemporary management practices.
2. To provide conceptual knowledge on functional management and strategic management.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Illustrate basic insights of management principles
CO2	Summarize Production process, and Inventory techniques
CO3	Apply Strategies and policies to functional areas
CO4	Understand Contemporary management Practices

Unit-I

Introduction to Management: Concept –nature and importance of Management –Generic Functions of Management – Scientific Management – Administrative Management - Theories of Motivation (Maslow's, hertz berg and X-Y Theory) – Designing organization structure ,Decision making process- Principles of organization.

Unit-II

Operations Management: Plant location, Principles and Types of plant layout , Work study- Statistical Quality Control- Control Charts (X Bar chart &R-charts, P-chart and C-chart) - production methods (job, batch mass production) – Material Management: Need for Inventory control- Tools and techniques of Inventory Control - EOQ, ABC analysis, HML, SDE, VED, and FSN analyses.

Unit-III

Strategic Management: Strategic Management Process - Vision, Mission, Goals, and Strategy - Environmental Scanning –Strategy Formulation – Strategy Implementation – Strategy Control. Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM, Identifying Critical Path- (Simple Problems)

Unit-IV

Functional Management: Concept of HRM: Definition, Functions. Concept of HRM, HRD and PMIR- Functions of HR Manager, Job Evaluation and Merit Rating, Concept of MM-Definition, Marketing Functions, Marketing Mix, Product Life Cycle.

Unit-V

Contemporary Management Practices: Basic concepts of MIS, Just-in-Time(JIT) system, Total Quality Management(TQM), Six sigma and Modes of Logistics, Enterprise Resource Planning (ERP), Business process Re-engineering, Green Marketing, Human Resource Accounting, MRP, CMM, Supply Chain Management, Business Process outsourcing (BPO), Bench marking, Balanced Scorecard.

Text Books:

1. Dr. P. Vijaya Kumar &Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.
3. Dr. P. Vijaya Kumar &Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
4. Dr. A. R. Aryasri, Management Science' TMH 2011

Reference Books:

1. Koontz &Weihrich: 'Essentials of management' TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011

NPTEL/SWAYAMMOOCS:

1. https://onlinecourses.swayam2.ac.in/imb19_mg08/preview
2. https://www.coursera.org/learn/strategic-management

IV Year – I Semester	SKILL ORIENTED COURSE-V	L	T	P	C
1005204180	AMAZON WEB SERVICES	0	0	4	2

PREREQUISITES:

This is an entry-level course, but students should possess:

- General IT technical knowledge
- General IT business knowledge

COURSE OBJECTIVES:

1. AWS Academy Cloud Foundations is intended for students who seek an overall understanding of cloud computing concepts, independent of specific technical roles.
2. It provides a detailed overview of cloud concepts, AWS core services,
3. Differentiate between Amazon Simple Storage Service (Amazon S3), Amazon Elastic Block Store (Amazon EBS), Amazon Elastic File System (Amazon EFS), and Amazon Simple Storage Service Glacier (Amazon S3 Glacier)

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Understand the Cloud services platform and architecture.
CO2	Describe various web service provided by Amazon.
CO3	Applying the Security and Pricing service to the application.
CO4	Analyze a given problem and apply requisite appropriate services to the application.

Brief Introduction about the Course:

AWS Academy Cloud Foundations is intended for students who seek an overall understanding of cloud computing concepts, independent of specific technical roles. It provides a detailed overview of cloud concepts, AWS core services, security, architecture, pricing, and support.

LIST OF EXPERIMENTS / PROGRAMS / ACTIVITIES

S. No.	Name of the experiment / List of Programs / List of Activities (hands-on)	Skill
1	Setting up AWS IAM account and test access to AWS services when logged in as different IAM users.	IAM account creation
2	Creating Amazon Virtual Private Cloud(VPC), adding components to it to produce a customized network.	Explore VPC
3	Building your own VPC, create security groups for EC2 instance and Launch a Web server	Cloud Security

4	Basic overview of launching, resizing, managing and Monitoring EC2 instance.	Explore EC2
5	Create a simple AWS Lambda function that is triggered by a CloudWatch event.	AWS Lambda
6	Create an Amazon EBS volume, attach it to an instance, and apply a file system to the volume.	Explore EBS
7	Working with AWS Elastic Beanstalk environment. Deploy code to it and test the results.	Working with EBS
8	Design to reinforce the concept of leveraging an AWS-managed database instance for solving relational database needs.	Build a database server
9	Working with Elastic Load Balancing(ELB) and Auto scaling service to load balance	Load balancing
10	Working with Elastic Load Balancing (ELB) for automatically scale your infrastructure.	Load balancing for own infrastructure

Text Books:

1. Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud | First Edition | By Pearson Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud | First Edition | By Pearson
2. Learning Aws - Second Edition: Design, build, and deploy responsive applications using AWS Cloud components, 2nd Edition

Web References:

1. https://aws.amazon.com/whitepapers/

IV Year – I Semester	AUDIT COURSE-VI	L	T	P	C
1099204120	IPR AND PATENTS	0	0	4	2

COURSE OBJECTIVES:

Upon successful completion of this subject students should be able:

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
3. To disseminate knowledge on copyrights and its related rights and registration aspects
4. To disseminate knowledge on trademarks and registration aspects
5. To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects
6. To aware about current trends in IPR and Govt. steps in fostering IPR

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Interpret the various aspects of IPR
CO2	Conclude importance of Copyrights, Trademarks & Trade Secrets
CO3	Obtain Patent Rights for New Innovations
CO4	Elaborate on Privacy Issues

UNIT I

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Introduction to Intellectual Property Law – Evolutionary past – Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration –Geographical indications- Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues- India`s New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP

UNIT II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers **–** Copyright Formalities and Registration– Limitations – Infringement of Copyright – International Copyright Law - Semiconductor Chip Protection Act-Fair use and Fair Dealing concepts

UNIT III

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Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent

Searching – Patent Cooperation Treaty – New developments in Patent Law - Invention Developers and Promoters-Non patentable inventions

UNIT IV

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Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Concept of distinctiveness -Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

UNIT V

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Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law-Plant Variety Protection and Farmer's Right- Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime

Text Books

1. "Law Relating to Intellectual Property Rights" by V K Ahuja
2. "Intellectual Property Rights" by Neeraj Pandey and Khushdeep Dharni

Reference Books

1. "Intellectual Property Rights: Text and Cases" by R Radhakrishnan and S Balasubramanian
2. "Intellectual Property Rights-Infringement And Remedies" by Ananth Padmanabhan
3. "Intellectual Property Rights (IPRs): TRIPS Agreement and Indian Laws" by E T Lokganathan
4. B.L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications Universal law Publishing Pvt. Ltd., India 2000
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi ,2010
6. Lionel Bently & Brad Sherman, Intellectual Property Law, Oxford. P. Narayanan, Intellectual Property Law, Eastern Law House

E-Books and Online Resources

1. Intellectual Property Rights A general Introduction https://www.pdfdrive.com/intellectual-property-rights-a-general-introduction-e41126141.html

NPTEL/SWAYAMMOOCS:

1. https://www.my-mooc.com/en/mooc/intellectual-property-law-policy-part-1-pennx-iplaw1x/

IV Year – I Semester		L	T	P	C
1005204160	SUMMER INTERNSHIP	0	0	0	2

INTERNSHIPS: It shall be completed in collaboration with local industries, Govt.Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme.

The minimum duration of this course shall be at least 4-6 weeks.

A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship.

After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate from industry / skill development centre shall be included in the report. It shall be evaluated for 50 external marks at the end of the semester. The technical report and the oral presentation shall carry 20 marks and 30 marks respectively. There shall be no internal marks for Summer Internship. In case, if a student fails, he /she shall reappear as and when semester supplementary examinations are conducted.

COURSE OUTCOMES:

CO's	At the end of the course, the student will have the ability to:
CO1	Apply domain knowledge during the course of internship
CO2	Develop/implement the solutions with appropriate techniques, resources and contemporary tools.
CO3	Work independently and in collaboration in multidisciplinary environment and to allocate time effectively and manage to complete the work allotted within stipulated time.
CO4	Exhibit integrity and ethical behaviour while carrying out the internship and for the preparation of internship report and to demonstrate effective oral and written communication skills

DETAILED SYLLABUS FOR

IV-B. Tech

II-SEMESTER

IV Year – II Semester	MAIN PROJECT	L	T	P	C
1005204260		0	0	0	12

Main Project *(*Project - Project work, seminar and internship in industry):
In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated by external examiner.

Course Outcomes:

COs	At the end of the course, the student will have the ability to:
CO1	Apply the software engineering principles in planning, formulating an innovative design/ approach and computing the requirements appropriate to chosen topic within the context of legal, societal and environment constraint.
CO2	Ability to perform individually as well as in a team, accepting responsibility, taking initiative, and providing leadership, necessary to ensure project success
CO3	Ability to use formal and informal communications with team members and guide, make presentations and prepare technical document.
CO4	Develop/implement the solutions with appropriate techniques, resources and contemporary tools.