# REGULATIONS,

# COURSE STRUCTURE

**For**

## I B.Tech.

## Common to all Branches

**With effective from the Academic Year**

**2021-2022**

sasi INSTITUTE OF TECHNOLOGY & ENGINEERING
autonomous

Accredited by NAAC with "A" Grade
Recognised by UGC under section 2(f) &12(B)
Approved by AICTE - New Delhi
Permanently Affiliated to JNTUK, SBTET
Ranked as "A" Grade by Govt. of A.P.

# B.Tech Regulations

## 1.1 Short title and Commencement

The regulations listed under this head are common for all degree level under graduate programs (B.Tech.) offered by the college with effect from the academic year 2021-22 and they are called as "SITE21" regulations.

The regulations here under are subject to amendments as may be made by the Academic Council of the college from time to time, keeping the recommendations of the Board of Studies in view. Any or all such amendments will be effective from such date and to such batches of candidates including those already undergoing the program, as may be decided by the Academic Council.

## 1.2. Definitions

a. "Commission" means University Grants Commission(UGC)
b. "Council" means All India Council for Technical Education(AICTE)
c. "University" Means Jawaharlal Nehru Technological University Kakinada(JNTUK)
d. "College" means Sasi Institute of Technology & Engineering, Tadepalligudem.
e. "Program" Means any combination of courses and /or requirements leading to award of a degree
f. "Course" Means a subject either theory or practical identified by its course title and code number and which is normally studied in asemester.
g. For example, (ELECTRONC DEVICES) is a course offered at third semester of B.Tech (ECT) and its code is (21ETETT3030)
h. "Degree" means an academic degree conferred by the university upon those who complete the undergraduate curriculum
i. "Regular Student" means student enrolled into the four year programme in the first year
j. "Lateral entry Students" Means student enrolled into the four year programme in the second year

## 1.3. Academic Programs

### 1.3.1. Nomenclature of Programs

The nomenclature and its abbreviation given below shall continue to be used for the degree programs under the University, as required by the Council and Commission. The name of specialization shall be indicated in brackets after the abbreviation. For e.g. UG engineering degree in Mechanical Engineering program is abbreviated as B.Tech. (ME). Bachelor of Technology (B.Tech.) degree program offered in:

1. Artificial Intelligence & Machine Learning(AI & ML)
2. Civil Engineering(CE)
3. Computer Science and Engineering(CSE)
4. Computer Science and Technology(CST)
5. Electronics and Communication Engineering(ECE)
6. Electronics and Communication Technology(ECT)
7. Electrical and Electronics Engineering(EEE)
8. Information Technology(IT)
9. Mechanical Engineering(ME)

- Curriculum framework is important in setting the right direction for a Degree program as it takes into account the type and quantum of knowledge necessary to be acquired by a student to qualify for a award in his/her chosen branch or specialization.
- Besides, this also helps in assigning the credits for each course, sequencing the courses semester-wise and finally arriving at the total number of courses to be studied and the total number of credits to be earned by a student to fulfill the requirements for conferment of degree.
- Each theory course shall consist of five units.

### 1.3.2. Curriculum Structure

The curriculum structure is designed in such a way that it facilitates the courses required to attain the expected knowledge, skills and attitude by the time of their graduation as per the needs of the

stakeholders. The curriculum structure consists of various course categories (as described in 1.6.3 to 1.6.9) to cover the depth and breadth required for the program and for the attainment of program outcomes of the corresponding program. Each Programme of study will be designed to have 40-45 theory courses and 16-18 laboratory courses. The distribution and types of courses offered from the above is indicated in the following table 3.

### 1.3.3. Induction Program

The Induction Program for two weeks is designed to make the newly joined students feel comfortable, sensitize them towards exploring their academic interests and activities, reducing competition and making them work for excellence, promote bonding within them, build relations between teachers and students and building of character. Induction program covers

Physical activity
Creative arts
Universal human values
Literary and Proficiency modules
Lectures by Eminent peoples

### 1.4Admission Criteria

The eligibility criteria for admission into UG engineering programs are as per the norms approved by government of Andhra Pradesh from time to time. The sanctioned seats in each program in the college are classified into CATEGORY-A and CATEGORY-B at first year level and Lateral Entry at second year level.

- **CATEGORY – A Seats:** These seats will be filled as per the norms approved by the Government of Andhra Pradesh.
- **CATEGORY – B Seats:** These seats will be filled by the College as per the norms approved by the Government of Andhra Pradesh.
- **CATEGORY – Lateral Entry Seats** : Lateralentry candidates shall be admitted into the Third semester directly as per the norms approved by government of Andhra Pradesh. The percentages of Category-A, Category-B and Lateral Entry Seats are decided time to time by the Government of Andhra Pradesh.

## 2. Award of B. Tech. Degree

a) A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:
   i. A student shall be declared eligible for the award of B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.
   ii. The candidate shall register for 160 credits and secure all the 160 credits.

b) The medium of instruction for the entire under graduate programmer in Engineering &Technology will be in **English** only.

## 3. Programme Pattern:

a) Total duration of the of B. Tech (Regular) Programme is four academic years
b) Each Academic year of study is divided into Two Semesters.
c) Minimum number of instruction days in each semester is 90.
d) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
e) The total credits for the Programme is 160.
f) Three week induction program is mandatory for all first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.
g) Student is introduced to "Choice Based Credit System (CBCS)".
h) A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses)
i) A student has to register for all courses in a semester.
j) All the registered credits will be considered for the calculation of final CGPA.

k) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'.Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.

l) A 10 months industry/field mandatory internship, both industry and social, during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduates to connect with the needs of the industry and society at large.

m) All the students shall be mandatorily registered for NCC, NSS activities and Community Service Project as per the Government and University norms.

n) Each college shall assign a faculty advisor/mentor after admission to each student or group of students from same department to provide guidance in courses registration / career growth/placements/opportunities for higher studies/ GATE / other competitive exams etc.

## 4. Registration for Courses:

a) In each semester a student shall mandatorily register courses which he/she wishes to pursue within a week from the starting of the class work with the advice of Head of the Department and mentor of the student of the concerned department of the college.

b) If any student wishes to withdraw the registration of the course, he/she shall submit a letter to the Principal of the college through the Head of the Department and mentor within fifteen days.

c) The concerned college shall thoroughly verify and upload the data/courses registered by each student in the university examination center within 20 days. The Principal of the concerned college shall ensure that there no wrong registration courses by the student. The university registration portal will be closed after 20 days.

**5. (a) Award of B. Tech. Degree:** A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

i. A student shall be declared eligible for award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission stands cancelled.

ii. The student shall register for 160 credits and must secure all the 160 credits.

iii. All students shall mandatorily register for the courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure at least 40% of the marks allotted in the internal evaluation for passing the course and shall maintain 75% of attendance in the subject.

iv. All students shall mandatorily register for NCC/NSS activities and will be required to participate in an activity specified by NSS officer during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.

v. Credits are defined as per AICTE norms.

**(b) Award of B. Tech. (Honor)/B. Tech. (Minor):**B. Tech. with Honors or a B. Tech. with a Minor will be awarded if the student earns 20 additional credits are acquired as per the regulations/guidelines. The regulations/guidelines are separately provided. Registering for an Honors/Minor is optional.

## 6. Attendance Requirements

a) A student is eligible to write the University examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entire programme.

c) Shortage of Attendance below 65% in aggregate shall not be condoned.

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

e) Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
f) A stipulated fee of Rs. 500/- in the concerned semester shall be payable towards condonation of shortage of attendance. Students availing condonation on medical ground shall produce a medical certificate issued by the competitive authority.
g) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum required credits.

h) If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
i) For induction programme attendance shall be maintained as per AICTE norms.
j) For non-credit mandatory courses the students shall maintain the attendance similar to credit courses

## 7. Evaluation-Distribution and Weightage of marks

i. Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the University Examination section from time to time.
ii. To maintain the quality, external examiners and question paper setters shall be selected from reputed institutes like IISc, IITs, IIITs, IISERs, NITs and Universities.
iii. For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge, the student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.
iv. A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/ project etc by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the sum total of the internal marks and end semester examination marks together.

v. **Distribution and Weightage of marks:** The assessment of the student's performance in each course will be as per the details given:

| S.No | Components | Internal | External | Total |
|---|---|---|---|---|
| 1 | Theory | 30 | 70 | 100 |
| 2 | Engineering Graphics/Design/Drawing | 30 | 70 | 100 |
| 3 | Practical | 15 | 35 | 50 |
| 4 | Mini Project/Internship/Industrial Training/ Skill Development programs/Research Project | - | 50 | 50 |
| 5 | Project Work | 60 | 140 | 200 |

**(vi) Continuous Internal Theory Evaluation:**

a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (20 multiple choice questions) for 10 marks for a duration of 20 minutes (ii) one descriptive examination (3 full questions for 5 marks each) for 15 marks for a duration of 90 minutes and (iii) one assignment for 05 marks. All the internal exams shall be conducted as per university norms from first 50% of the syllabi.
b) In the similar lines, the second online, descriptive examinations assignment shall be conducted on the rest of the 50% syllabus.
c) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The first mid marks (Mid-1) consisting of marks of online objective examination, descriptive examination and assignment shall be submitted to the University examination section within one week after completion of first mid examination.
d) The mid marks submitted to the University examination section shall be displayed in the concerned college notice boards for the benefit of the students.
e) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of university

examination section within one week from the submission.
f) Second mid marks (Mid-2) consisting of marks of online objective examination, descriptive examination and assignment shall also be submitted to University examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of university examination section within one week from the submission.
g) Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for other mid exam.

Example: **Mid-1 marks** = Marks secured in
(Online examination-1 + descriptive examination-1 +one assignment-1)
**Mid-2 marks** = Marks secured in
(Online examination-2+descriptive examination-2+one assignment-2)

**Final internal Marks** = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid-1/Mid-2) marks x 0.2)

h) With the above criteria, university examination section will send mid marks of all subjects in consolidated form to all the concerned colleges and same shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of university examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under any circumstances.

**(vii) Semester End Theory Examinations Evaluation:**

a) The semester end examinations will be conducted university examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
b) For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed.
c) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day–to–day work) and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester for 15 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.
d) 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. Students shall pursue this course during summer vacation just before its offering as per course structure. The minimum duration of this course is at least 6 weeks. The student shall register for the course as per course structure after commencement of academic year. 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. Attendance requirements are as per the norms of the University. 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 center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.
e) 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 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: 15 marks and viva-voce: 35 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.

f) Mandatory Course (M.C): Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these subjects. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified.

g) **Procedure for Conduct and Evaluation of MOOC:** There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be pass.

**h)** ***Major 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 with an 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: 15 marks, Seminar: 15 marks). 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 140 marks.

## 8 Results Declaration:

i. Before results declaration, an academic council meeting shall be conducted and results shall be placed before the academic council for approval.
ii. With the approval of academic council, the results shall be submitted to the University to get the Approval from Honorable Vice-Chancellor.
iii. The University may normalize the result, if required, before declaration of the result (Guidelines for normalization will be provided separately)
iv. A copy of approved results in a CD shall be submitted to the University examination Center.

**9. Academic Audit:** Academic audit in each semester will be conducted as per norms.

**10. Recounting or Re-evaluation of Marks in the End Semester Examination:** A student can request for recounting of revaluation of his/her answer book on payment of a prescribed fee as per norms.

**11. Supplementary Examinations:** A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the University.

**12. Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by the University.

**13. Promotion Rules:** The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.5 for promotion to higher classes

a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement as per University norm.

b) A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.

c) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

**14. Course Pattern**

a) The entire course of study is for four academic years; all years are on semester pattern.

b) A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.

c) When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

**15. Earning of Credit**:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to E as given below. Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned. For project same % percentages will be followed for grading.

| Marks Range Max:100 | Marks range Max:50 | Level | Letter Grade | Grade point |
|---|---|---|---|---|
| ≥ 90 | ≥ 45 | Outstanding | A+ | 10 |
| ≥80 to <89 | ≥40 to <44 | Excellent | A | 9 |
| ≥70 to <79 | ≥35 to <39 | Very Good | B | 8 |
| ≥60 to <69 | ≥30 to <34 | Good | C | 7 |
| ≥50 to <59 | ≥25 to <29 | Fair | D | 6 |
| ≥40 to <49 | ≥20 to <24 | Satisfactory | E | 5 |
| <40 | <20 | Fail | F | 0 |
| - | | Absent | AB | 0 |

**16. 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 shall be placed in one of the following four classes:

| Class Awarded | CGPA to be secured | Remarks |
|---|---|---|
| First Class with Distinction | ≥7.75 (Without any supplementary appearance) | From the CGPA secured from 160 Credits |
| First Class | ≥ 6.75 | |
| Second Class | ≥ 5.75 to < 6.75 | |
| Pass Class | ≥ 5.00 to < 5.75 | |

**17. Minimum Instruction Days:**

The minimum instruction days for each semester shall be 90 working days. There shall be no branch transfers after the completion of the admission process. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

**18. Withholding of Results:**

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

**19. Transitory Regulations**

a) Discontinued or detained candidates are eligible for re-admission as and when next offered.

b) The re-admitted candidate will be governed by the rules & regulations under which the candidate has been admitted.

c) In case of transferred students from other Universities, credits shall be transferred to JNTUK as per the academic regulations and course structure of JNTUK.

d) The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions haveto obtain the credits of any equivalent subjects as prescribed by JNTUK. In addition, the transferred candidates have to pass the failed subjects at the earlier Institute with already obtained internal/sessional marks to be conducted by JNTUK.

**20. Gap – Year:**

Gap Year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

## 21. General:

a) Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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

c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

d) The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

## ACADEMIC REGULATIONS (SITE21M) FOR B.Tech (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2020-21 onwards

### 1. Award of B. Tech. Degree

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

a) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years. After six academic years from the year of their admission, he/she shall forfeit their seat in B. Tech course and their admission stands cancelled.

b) The candidate shall register for 121 credits and secure all the 122 credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech (lateral entry)

3. **Promotion Rules:** A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

   A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

4. **Award of Class**

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

| Class Awarded | CGPA to be secured | Remarks |
|---|---|---|
| First Class with Distinction | ≥ 7.75 (Without any supplementary appearance) | From the CGPA secured from 121 Credits from II Year to IV Year |
| First Class | ≥ 6.75 | |
| Second Class | ≥ 5.75 to < 6.75 | |
| Pass Class | ≥ 5.00 to < 5.75 | |

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

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

## COMMUNITY SERVICE PROJECT

### *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***

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

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.

***Implementation of Community Service Project***

1. Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation
2. Each class/section should be assigned with a mentor.
3. Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc.
4. A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded. The log book has to be countersigned by the concerned mentor/faculty in charge.
5. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
6. The final evaluation to be reflected in the grade memo of the student.
7. The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
8. Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
9. Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

***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 –

- Agriculture
- Health
- Marketing and Cooperation
- Animal Husbandry
- Horticulture
- Fisheries
- Sericulture

- Revenue and Survey
- Natural Disaster Management
- Irrigation
- Law & Order
- Excise and Prohibition
- Mines and Geology
- Energy
- Internet
- Free Electricity
- Drinking Water

***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

**BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS**

1. Satisfaction with the quality of student learning
2. New avenues for research and publication via new relationships between faculty and community
3. Providing networking opportunities with engaged faculty in other disciplines or institutions
4. A stronger commitment to one's research

**BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES**

1. Improved institutional commitment
2. Improved student retention
3. Enhanced community relations

**BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY**

1. Satisfaction with student participation
2. Valuable human resources needed to achieve community goals
3. New energy, enthusiasm and perspectives applied to community work
4. Enhanced community-university relations.

**SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT**

The following the recommended list of projects for engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are 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.

***For Engineering Students***

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programs
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programs and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilization of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

***Complementing the community service project, the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs are;***

**Programs for School Children:**

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

***Programs for Women Empowerment***

1. Government Guidelines and Policy Guidelines
2. Women's' Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

***General Camps***

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharat
7. AIDS awareness camp
8. Anti-Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programs
12. Commemoration and Celebration of important days

***Programs for Youth Empowerment***

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

***Common Programs***

1. Awareness on RTI
2. Health intervention programs
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –

i. Agriculture
ii. Health
iii. Marketing and Cooperation
iv. Animal Husbandry
v. Horticulture
vi. Fisheries
vii. Sericulture
viii. Revenue and Survey
ix. Natural Disaster Management
x. Irrigation
xi. Law & Order
xii. Excise and Prohibition
xiii. Mines and Geology
xiv. Energy

***Role of Students:***

1. Students may not have the expertise to conduct all the programmes on their own. The students thencan play a facilitator role.
2. For conducting special camps like Health related, they will be coordinating with the Governmental agencies.

3. As and when required the College faculty themselves act as Resource Persons.

4. Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.

5. And also, with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.
6. An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

## *Timeline for the Community Service Project Activity*

**Duration: 8 weeks**

***1. Preliminary Survey (One Week)***

a) A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.

b) A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.

c) The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

***2. Community Awareness Campaigns (Two Weeks)***

Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

***3. Community Immersion Programme (Four Weeks)***

Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

***4. Community Exit Report (One Week)***

During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University.

Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.

## Course Numbering Scheme

The Course number code consists of 11alphabets. A typical course number code is illustrated in the followingFigure-1.

Mechanical Engineering (ME)

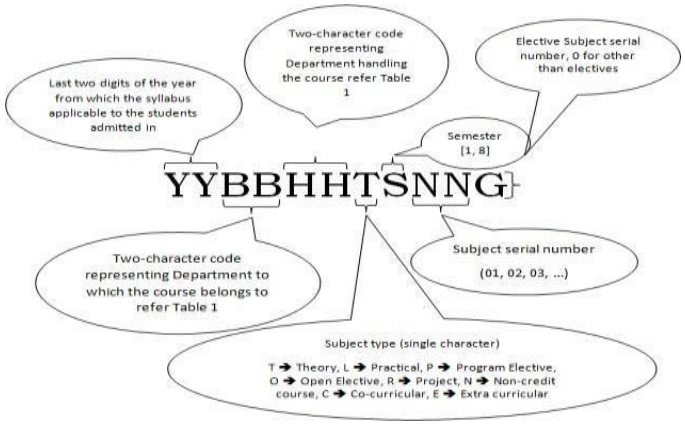



**Figure 1:** Course Numbering Scheme

The department codes are in given in following table 1.

**Table 1: Department Codes**

| Department | Two-character code |
|---|---|
| Artificial Intelligence and Machine Learning | AM |
| Civil Engineering | CE |
| Electrical & Electronics Engineering | EE |
| Mechanical Engineering | ME |
| Electronics & Communications Engineering | EC |
| Electronics & Communications Technology | ET |
| Computer Science Engineering | CS |
| Computer Science Technology | CT |
| Information Technology | IT |

| | |
|---|---|
| Management Science | MS |
| Mathematics | MA |
| Physics | PH |
| Chemistry | CH |
| English | EG |
| Biology | BI |
| Common to All Branches | CM |

**Example: ED** in 3rd semester for ECT with S.No 3

**Course Code:** 21ETETT3030

**Table 2: Comparison of Number of credits given by AICTE and Approved credits**

| S. No. | Category | | No. of Credits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ECE/ECT | | EEE | | CSE/IT/CST | | ME | | CE | |
| | | AICTE | APSCHE | Approved | AICTE | Approved | AICTE | Approved | AICTE | Approved | AICTE | Approv |
| 1 | Humanities and Social Sciences | 12 | 7 | 7.5 | 12 | 11 | 12 | 11 | 12 | 11 | 12 | 08 |
| 2 | Basic Science courses | 25 | 18 | 21 | 26 | 25 | 24 | 26 | 25 | 26 | 26 | 26 |
| 3 | Engineering Science courses | 24 | 22.5 | 19.5 | 20 | 20 | 29 | 29.5 | 24 | 23 | 29 | 24.5 |
| 4 | Professional Core courses | 48 | 55.5 | 55.5 | 53 | 62 | 49 | 48.5 | 48 | 55 | 47 | 56.5 |
| 5 | Professional Elective Courses | 18 | 15 | 15 | 18 | 15 | 18 | 18 | 18 | 18 | 23 | 21 |
| 6 | Open elective courses | 18 | 15 | 15 | 18 | 12 | 12 | 12 | 18 | 12 | 11 | 9 |
| 7 | Project work , Seminar and Internship | 15 | 26.5 | 26.5 | 11 | 15 | 15 | 15 | 15 | 15 | 12 | 15 |
| 8 | Mandatory Courses | - | | - | - | - | - | - | - | - | - | - |
| Total Credits | | 160 | 160 | 160 | 158 | 160 | 159 | 160 | 160 | 160 | 160 | 160 |

## Malpractice

## DISCIPLINARY ACTION FOR MALPRACTICES/IMPROPER CONDUCT IN EXAMS

| S. No. | Nature of Malpractices/Improper conduct | Punishment |
|---|---|---|
| | If the candidate: | |
| 1. (a) | Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only. |
| 1. (b) | Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter. | Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. |
| 2. | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.The Hall Ticket of the candidate is to be cancelled and sent to the University. |
| 3. | Impersonates any other candidate in connection with the examination. | The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case |

| | | |
|---|---|---|
| | | is registered against him. |
| 4. | Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks. | Cancellation of the performance in that subject. |
| 6. | Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination. | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The |

| | | |
|---|---|---|
| | | continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. |
| 9. | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.<br>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations. |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment. | |

## MALPRACTICES

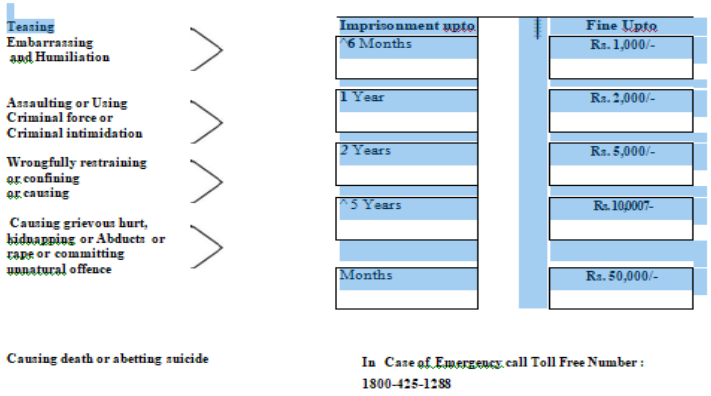
- The Principal shall refer the cases of malpractices in Continuous Evaluation and Semester-End Examinations, to Malpractice Enquiry Committee, constituted by him/her for the purpose. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action, against the erring students based on the recommendations of thecommittee.
- Any action on the part of student at an examination trying to get undue advantage in the

performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing/keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

# Ragging

## Prohibition of ragging in educational institutions Act 26 of 1997 Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student.




In Case of Emergency call Toll Free Number :
1800-425-1288

**LET US MAKE SITE RAGGING FREE INSTITUTE**

**Program Outcomes for an Engineering Graduates:**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

| I B.Tech I Semester Course Structure SITE21 Regulations | | | | | | |
|---|---|---|---|---|---|---|
| **Common for CSE,ECE &IT** | | | | | | |
| S.N | Subject Code | Course | L | T | P | C |
| 1 | 21CMEGT1010 | Technical English | 3 | 0 | 0 | 3 |
| 2 | 21CMMAT1020 | Engineering Mathematics-I | 3 | 0 | 0 | 3 |
| 3 | 21CMEET1030 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 4 | 21CMCST1040 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 5 | 21CSMEL1050<br>21ECMEL1050<br>21ITMEL1050 | Computer Aided Engineering Graphics | 2 | 0 | 2 | 3 |
| 6 | 21CMEGL1060 | English Communication Skills Lab | 0 | 0 | 3 | 1.5 |
| 7 | 21CMEEL1070 | Basic Electrical Engineering Lab | 0 | 0 | 3 | 1.5 |
| 8 | 21CMCSL1080 | Programming for Problem Solving Lab | 0 | 0 | 3 | 1.5 |
| 9 | 21CMESN1090 | Environmental Science | 2 | 0 | 0 | 0 |
| **TOTAL** | | | **16** | **0** | **11** | **19.5** |

| I B.Tech II Semester Course Structure SITE21 Regulations | | | | | | |
|---|---|---|---|---|---|---|
| **Common for CSE,ECE,IT** | | | | | | |
| S.N | Subject code | Course | L | T | P | C |
| 1 | 21CMMAT2010 | Engineering Mathematics - II | 3 | 0 | 0 | 3 |
| 2 | 21CSPHT2020<br>21ECPHT2020<br>21ITPHT2020 | Engineering Physics | 3 | 0 | 0 | 3 |
| 3 | 21CMCHT2030 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 4 | 21CMCST2040 | Python Programming | 3 | 0 | 0 | 3 |
| 5 | 21ECECT2050 | Network Analysis | 3 | 0 | 0 | 3 |
| 5 | 21CSCST2050<br>21ITITT2050 | Data Structures | 3 | 0 | 0 | 3 |
| 6 | 21CSPHL2060<br>21ECPHL2060<br>21ITPHL2060 | Engineering Physics Lab | 0 | 0 | 3 | 1.5 |
| 7 | 21CMEEL2070 | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 8 | 21ECMEL2080 | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 8 | 21CSCSL2080<br>21ITITL2080 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | 21CMMSN2090 | Constitution of India, Professional Ethics & Human Rights | 2 | 0 | 0 | 0 |
| **TOTAL** | | | **16** | **0** | **11** | **19.5** |

| I B.Tech I Semester Course Structure SITE21 Regulations | | | | | | |
|---|---|---|---|---|---|---|
| **Common for AI&ML,CE,CST,ECT, EEE, ME** | | | | | | |
| SN | Subject Code | Course | L | T | P | C |
| 1 | 21CMMAT1010 | Engineering Mathematics – I | 3 | 0 | 0 | 3 |
| 2 | 21AMPHT1020<br>21CEPHT1020<br>21CTPHT1020<br>21ETPHT1020<br>21EEPHT1020<br>21MEPHT1020 | Engineering Physics | 3 | 0 | 0 | 3 |
| 3 | 21CMCHT1030 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 4 | 21CMCST1040 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 5 | 21AMMEL1050<br>21CTMEL1050<br>21ETMEL1050 | Computer Aided Engineering Graphics | 2 | 0 | 2 | 3 |
| 5 | 21CEMEL1050<br>21EEMEL1050<br>21MEMEL1050 | Engineering Graphics | 2 | 0 | 2 | 3 |
| 6 | 21AMPHL1060<br>21CEPHL1060<br>21CTPHL1060<br>21ETPHL1060<br>21EEPHL1060<br>21MEPHL1060 | Engineering Physics Lab | 0 | 0 | 3 | 1.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | 21CMCHL1070 | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 8 | 21CMCSL1080 | Programming for Problem Solving Lab | 0 | 0 | 3 | 1.5 |
| 9 | 21CMMSN1090 | Constitution of India, Professional Ethics & Human Rights | 2 | 0 | 0 | 0 |
| **TOTAL** | | | **16** | **0** | **11** | **19.5** |

| **I B.Tech II Semester Course Structure SITE21 Regulations** | | | | | | |
|---|---|---|---|---|---|---|
| **Common for AI &ML,CE, CST,ECT,EEE &ME** | | | | | | |
| S.N | Subject Code | Course | L | T | P | C |
| 1 | 21CMEGT2010 | Technical English | 3 | 0 | 0 | 3 |
| 2 | 21CMMAT2020 | Engineering Mathematics – II | 3 | 0 | 0 | 3 |
| 3 | 21CMEET2030 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 4 | 21CMCST2040 | Python Programming | 3 | 0 | 0 | 3 |
| 5 | 21ETETT2050 | Network Analysis | 3 | 0 | 0 | 3 |
| 5 | 21AMAMT2050<br>21CTCTT2050 | Data Structures | 3 | 0 | 0 | 3 |
| 5 | 21CEMET2050<br>21EEMET2050<br>21MEMET2050 | Engineering Mechanics | 3 | 0 | 0 | 3 |
| 6 | 21CMEGL2060 | English Communication Skills Lab | 0 | 0 | 3 | 1.5 |
| 7 | 21CMEEL2070 | Basic Electrical Engineering Lab | 0 | 0 | 3 | 1.5 |
| 7 | 21AMAML2070<br>21CTCTL2070 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 8 | 21CEMEL2080<br>21EEMEL2080<br>21ETMEL2080<br>21MEMEL2080 | Engineering Workshop Lab | 0 | 0 | 3 | 1.5 |
| 9 | 21CMCHN2090 | Environmental Science | 2 | 0 | 0 | 0 |
| **TOTAL** | | | **16** | **0** | **11** | **19.5** |

| **TECHNICAL ENGLISH**<br>SEMESTER I/II | | | |
|---|---|---|---|
| Subject Code | 21CMEGT1010/2010 | IA Marks | 30 |
| Number of Lecture Hr/We | 03 | Exam Marks | 70 |
| Total Number of Lecture Hr | 50 | Exams Hours | 03 |
| **Credits -03** | | | |

**Course Objectives:**

To enable the students to learn and apply fundamental principles in Technical English & Communication by focusing on:

1. Technical English Vocabulary
2. Writing Skills
3. Common Errors in Writing
4. Nature and Style of Sensible Technical Writing
5. Writing Technical Reports and Letters

**Unit I**

| | |
|---|---|
| **Principles of Scientific Vocabulary**<br>• Principles of Scientific vocabulary: short and simple words-compact substitutes for wordy phrases- redundant words and expressions- Avoid hackneyed and stilted phrases, verbosity and incorrect use of words<br>• The role of roots in word building, prefixes and suffixes, confusing words and expressions. | 10 hours |
| **Unit II** | |
| **Writing Skills**<br>• Distinguishing between academic and personal styles of writing<br>• Use of clauses in technical phrases and sentences<br>• Techniques of Sentence and paragraph writing<br>• Measuring the clarity of a text through Fog Index or Clarity Index | 10 hours |
| **Unit III** | |
| **Common Errors in Writing**<br>• Subject-verb agreement and concord of nouns, pronouns and possessive adjectives<br>• Common errors in the use of articles, prepositions, adjectives and adverbs<br>• Punctuation<br>• Technical Guidelines for Communication<br>• Avoiding the pitfalls | 10 hours |
| **Unit IV** | |
| **Nature and Style of Sensible Technical Writing**<br>• Academic Writing Process<br>• Describing, processes and products<br>• Defining, Classifying<br>• Effective use of charts, graphs, and tables | 10 hours |
| **Unit V** | |
| **Report writing and Letter writing**<br>• Writing Technical Reports, Précis writing ,Letter Writing & Essay writing | 10 Hours |
| **COURSE OUTCOMES**<br>On Completion of the course student will acquire<br>1. Ability to understand Scientific vocabulary and use them confidently<br>2. Familiarity with the basic principles of writing clear sentences and paragraphs<br>3. Ability to write error free simple technical passages<br>4. Knowledge of writing different writing styles<br>5. Confidence to write letters and technical reports clearly and coherently | |
| **Question paper pattern:**<br>1. Question paper consists of 10 questions.<br>2. Each full question carrying 14 marks.<br>3. Each full question will have sub question covering all topics under a unit.<br>4. The student will have to answer 5 full questions selecting one full question from each unit. | |

**Text Books**

1. **Effective Technical Communication by Barun K Mitra**, Oxford University Publication

**Non-detailed Text**

1. **Karmayogi: A Biography of E Sreedharan by M S Ashokan**

**Reference Books**

1. *Communication Skills* by Sanjay Kumar & Pushpa Latha, OUP
2. Study Writing by Liz Hamp-Lyons and Ben Heasly, Cambridge University Press.
3. Remedial English Grammar by F T Wood, Macmillian 2007
4. *Practical English Usage* by Michael Swan Oxford University Press
5. *English Collocations in Use* by Michael McCarthy & Felicity O'Dell
6. *Effective Technical Communication* by Arsahf Rizvi,
7. *Essential English Grammar by Raymond Murphy, CUP, 2017*

| Unit | Title | Text books/Reference Books |
|---|---|---|
| **I** | Principles of Scientific Vocabulary | Text Book 1/Reference Book 5 |
| **II** | Writing Skills | Text Book 1Reference Book 2 Reference Book 6 |
| **III** | Common Errors in Writing | Text Book 1,Reference Book 3 Reference Book 4,Reference Book 7 |
| **IV** | Nature and Style of Sensible Technical Writing | Text Book 1,Reference Book 1 Reference Book 2 |
| **V** | Report writing and Letter writing | Text Book 1,Reference Book 1 Reference Book 2 |

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| **CO** | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | - | - | **2** | - | - |
| 2 | - | - | - | - | - | - | - | - | - | **2** | - | - |
| 3 | - | - | - | - | - | - | - | - | - | **2** | - | - |
| 4 | - | - | - | - | - | - | - | - | - | **2** | - | - |
| 5 | - | - | - | - | - | - | - | - | - | **2** | - | - |
| 6 | - | - | - | - | - | - | - | - | - | **2** | - | - |

**ENGINEERING MATHEMATICS-I**
( Calculus & Differential Equations)
Common to all the branches
SEMESTER I

| | | | |
|---|---|---|---|
| Subject Code | 21CMMAT1010/1020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |

**Credits – 03**

**Course Objectives:**

1. To solve the differential equations related to various engineering fields
2. To enlighten the learners in the concept of differential equations.
3. To familiarize with functions of several variables which is useful in optimization
4. To solve the partial partial differential equations of first order
5. To apply double integration techniques in evaluating areas bounded by region.

| **Unit -1** | **Hours** |
|---|---|
| **Differential Equations of first order and first degree :** Linear differential equations - Bernoulli's equations – Exact | **10** |

| | |
|---|---|
| equations and Equations reducible to exact form.<br>Applications: Newton's law of cooling - Law of natural growth and decay - Orthogonal trajectories. | |
| **Unit -2** | |
| **Linear differential equations of higher order:**<br>Homogeneous and Non-homogeneous differential equations of higher order with constant coefficients – with non-homogeneous term of the type $e^{ax}$, sin ax, cos ax, polynomials in $x^n$, $e^{ax}$ V(x) and $x^n$ V(x) – Method of Variation of parameters.<br>Applications: LCR circuit. | **10** |
| **Unit – 3** | |
| **Partial differentiation:**<br>Introduction – Homogeneous function – Euler's theorem– Total derivative– Chain rule– Jacobian – Functional dependence –Taylor's and MacLaurin's series expansion of functions of two variables.<br>Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method. | **10** |
| **Unit – 4** | |
| **PDE of first order**:<br>Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations. | **08** |
| **Unit – 5** | |
| **Multiple integrals:** Double and Triple integrals – Change of order of integration in double integrals – Change of variables to polar, cylindrical and spherical coordinates.<br>Applications: Finding Areas and Volumes. | **12** |
| **Course outcomes:**<br>On completion of this course, students are able to<br>1. Solve the differential equations related to various engineering fields (L3)<br>2. Solve the differential equations of higher order related to various engineering fields (L3)<br>3. familiarize with functions of several variables which is useful in optimization (L3)<br>4. Solve the partial partial differential equations of first order (L3)<br>5. Apply double integration techniques in evaluating areas bounded by region (L3). | |
| **Question paper pattern:**<br>1. Question paper consists of 10 questions.<br>2. Each full question carrying 14 marks.<br>3. Each full question will have sub question covering all topics under a unit.<br>4. The student will have to answer 5 full questions selecting one full question from each unit. | |
| **Text Books:**<br>1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.<br>2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education. | |

**Reference Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. Joel Hass, Christopher Heil and Maurice D. Weir, Thomas calculus, 14thEdition, Pearson.
3. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press, 2013.
4. Srimantha Pal, S C Bhunia, Engineering Mathematics, Oxford University Press.

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 4 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 5 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| Course | 3 | 3 | - | - | - | - | - | - | - | - | - | - |

| **BASIC ELECTRICAL ENGINEERING**<br>SEMESTER I/ II<br>**( Common to All)** | | | |
|---|---|---|---|
| Subject Code | 21CMEET1030/2030 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3L + 1T | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| Credits-03 | | | |

**Course Objectives:**

This course will enable student to

1. Understand basic electrical circuit operation.
2. Understand the concept of Alternating Voltage and Current.
3. Understand the operation of DC machines.
4. Understand the working of measuring instruments.
5. Understand the operation of different types of ac machines.
6. Understand the concept of Electrical Safety.

| **Unit -1z** | **Hours** |
|---|---|
| **Basic Electrical Circuits:**Basic definitions( Electric Charge, Current, Electro Magnet Force, Potential Difference; Electric Power and Energy) – types of network elements – Ohm's Law – Kirchhoff's Laws –series & parallel circuits - network theorems (Super position, Thevinen's, Norton's, Maximum power transfer theorems) | **10** |
| **Unit -2** | |
| **AC Fundamentals & Basic Electromagnetic Laws:** Study of AC Voltage and Current, RMS and Average Values, Three phase Star-Delta connections, Alternating Voltage applied to Pure | **10** |

| | |
|---|---|
| Resistance, Inductance, Capacitance and their combinations, Concept of Power and Power Factor in AC Circuit.<br>Concept of Magnetic Field, Magneto Motive Force (MMF), Permeability; Self and Mutual Induction, Basic Electromagnetic laws, | |
| **Unit – 3** | |
| **DC Machines:** DC Machine -Principle of operation & construction – emf equation- torque equation - speed control methods – losses and efficiency – brake test. Applications of DC motors. | **10** |
| **Unit – 4** | |
| **AC Machines:** Single Phase Transformers - Construction and Operation- Principles - Classification - Applications-OC & SC test of single phase transformer-regulation & Efficiency. Three Phase Induction Motors: working principle- construction, speed- torque characteristics-losses and efficiency. | **10** |
| **Unit – 5** | |
| **Electrical Safety:** Electrical Shock and Precautions against it, Treatment of Electric Shock; Concept of Fuses and Their Classification, Selection and Application; Concept of Earthing. | **10** |
| **Course Outcomes:** The student should be able to<br>1. Understand basic electrical circuit operation.<br>2. Understand the concept of Alternating Voltage and Current.<br>3. Understand the operation of DC machines.<br>4. Understand the working of measuring instruments.<br>5. Understand the operation of different types of ac machines.<br>6. Understand the concept of Electrical Safety. | |
| **Question paper pattern:**<br>1. Question paper consists of 10 questions.<br>2. Each full question carrying 14 marks.<br>3. Each full question will have sub question covering all topics under a unit.<br>4. The student will have to answer 5 full questions selecting one full question from each unit. | |
| **Text Books:**<br>i. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group.<br>ii. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand and Company Limited. | |
| **Reference Books:**<br>i. Theory and Performance of Electrical Machines by J.B. Gupta, S.K.Kataria & Sons.<br>ii. A Textbook of Electrical Technology – Volume II: AC & DC Machines by B.L.Theraja & A.K. Theraja, S.Chand and Company Limited.<br>iii. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.<br>iv. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications<br>v. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition. | |

| | |
|---|---|
| vi. Electrical Technology by Surinder Pal Bali, Pearson Publications. | |

**COURSE-OUTCOMES-TO-PROGRAM-OUTCOMES-MAPPING:**

| COs / POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 1 | | | | | | | | | |
| **CO2** | 2 | 2 | 1 | | | | | | | | | |
| **CO3** | 2 | 2 | 1 | | | | | | | | | |
| **CO4** | 2 | 2 | 1 | | | | | | | | | |
| **CO5** | 2 | 2 | 1 | | | | | | | | | |
| **CO6** | 2 | 2 | 1 | | | | | | | | | |
| **Overall Course** | **2** | **2** | **1** | | | | | | | | | |

| **PROGRAMMING FOR PROBLEM SOLVING**<br>SEMESTER I<br>(Common to All) | | | |
|---|---|---|---|
| Subject Code | 21CMCST1040 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| **Credits – 03** | | | |

**COURSE OBJECTIVES:**

**The Objectives of Programming for problem solving are:**

- To learn about C programming language syntax, semantics, and the runtime environment
- To be familiarized with general computer programming concepts like data types,conditionalstatements, loops and functions.
- To be familiarized with general coding techniques and procedure-oriented programming.

| **Unit -1** | **Hours** |
|---|---|
| **History & Hardware:** (TB 1: 1-22) Computer Hardware, Components, Types of Software, Memory Units.**Introduction to Problem solving**: (TB1:33-50) Algorithm, Characteristics of Algorithms, Pseudo Code, Flowchart, Types of Languages, Relation between Data, Information, Input and Output. **Basics of C**: (TB1:58-67)History and Features of C, Importance of C, Procedural Language, Compiler versus Interpreter, Structure of C Program, Program Development Steps, Programming Errors. | **10** |
| **Unit -2** | |
| **Overview of C:** (TB:68-125) Character Set, C-Tokens, Data Types, Variables, Constants, Operators, Operator Precedence and Associativity, Evaluation of C-Expressions, Input/output Functions. **Conditional Branching: (TB1:143-152)** if statement, if...else statement, Nested if...else statement, If…else…if ladder, switch statement. **Unconditional Branching:** | **10** |

| | |
|---|---|
| **(TB1:174-175)** go to**. Control flow Statements:** break, continue**. Looping Constructs:** (TB1:156-170) do-while statement, while statement, for statement | |
| **Unit -3** | |
| **Arrays:** (TB1:188-222) Introduction,1-DArrays,Character arrays and string representation, 2-D Arrays(Matrix), Multi-Dimensional Arrays. **Strings**: Working with Strings, String Handling Functions (both library and user defined). **Functions:** (TB1:230-260) Basics, Necessity and Advantages, Types of Functions, Parameter Passing Mechanisms, Recursion, Storage Classes, Command Line Arguments, Conversion from Recursion toIteration and Vice-Versa. | **10** |
| **Unit -4** | |
| **Pointers:** (TB1:288-347) Understanding Pointers, Pointer Expressions, Pointer and Arrays, Pointers and Strings, Pointers to Functions. **Dynamic Memor**y **Allocation:** Introduction to Dynamic Memory Alloca-tion- malloc(), calloc(), realloc(), free().<br>**Structures and Unions:** (TB1:370-394) Defining a Structure, typedef, Advantage of Structure, Nested Structures, Arrays of Structures, Structures and Arrays, Structures and Functions, Structures and Pointers, Defining Unions, Self-Referential Structures, Bitfields, Enumerations. | **10** |
| **Unit -5** | |
| **Preprocessing Directives:** (TB2:325-333) Macro Substitution, File Inclusion, Conditional Compilation and Other Directives. **File Management In C:** (TB1:408-422) Introduction to File Management, Modes and Operations on Files, Types of Files, Error Handling during I/O Operations. | **10** |

**COURSE OUTCOMES:**

On completion of the course student will be able to

- Demonstrate computer components, algorithms, translate them into programs.
- Choose thesuitable control structures for the problem to besolved.
- Make use of arrays, pointers, structures,and unions effectively.
- Organize reusable code in a program into functions.
- Demonstration of file operations.

**Question paper pattern:**

1 Question paper consists of 10 questions.
2 Each full question carrying 14 marks.
3 Each full question will have sub question covering all topics under a unit.
4 The student will have to answer 5 full questions selecting one full question from each unit.

**TEXT BOOKS:**


1) Programming in C ,Pradip Dey , Manas Ghosh, OXFORD
2) Programming in ,C Reema Thareja,Second Edition, OXFORD
3) Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg,CENGAGE.

**REFERENCE BOOKS**:

1) Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill.

2) Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson.

**Course Outcomes to Program Outcomes Mapping**

**COs VS POs MAPPING** (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

| PO / CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 1 0 | PO 1 1 | PO 1 2 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 2 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 3 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 4 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 5 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| Over all | 2 | | | | 3 | | | | | 2 | | | | 3 |

| COMPUTER AIDED ENGINEERING GRAPHICS<br>(Common to AI&M, CSE, CST,ECE,ECT & IT) | | | |
|---|---|---|---|
| Subject Code | 221AMMEL1050/1ECMEL1050/<br>21ETMEL1050/21CSMEL1050/<br>21CTMEL1050/21ITMEL1050 | IA Marks | 30 |
| Number of Lecture Hr/W | 1(L)+0(T)+4(P) | Exam Marks | 70 |
| Total Number of Leccturer Hr | 50 | Exam Hours | 3 |

**Credits – 03**

**COURSE OBJECTIVES:** On successful completion of this course, Students should be able to

1. draw engineering objects with appropriate lettering and dimensioning using various commands of AutoCAD
2. draw geometric constructions, polygons, various types of curves and scales
3. construct multi views of points, lines and planes
4. construct multi views of solids by orthographic projection method
5. convert the orthographic views into isometric views and vice versa by 2D- Commands in AutoCAD

| **Unit -1: INTRODUCTION** | **Hours** |
|---|---|

Introduction to Engineering Graphics, sheet sizes & layouts (ISO), line types with application, scales, drawing sheet sizes, title block, sheet markings, dimensioning

**AutoCAD:** Overview of Computer Graphics, starting with auto CAD, templates, menu- bar, drawing area, option buttons (drawing settings), command line area, draw commands (point, line, polyline, circle, circular arc, ellipse, elliptical arc, spline fit, spline CV, rectangle & polygon), modify commands (move, rotate, trim/extend, erase, copy, mirror, chamfer/ fillet, explode, stretch, scale, array & offset), layers (layering, setting up and use of layers, layers to create drawings

| | |
|---|---|
| and create, edit and use customized layers) & annotation commands (applying dimensions/ annotations to drawings), drawing settings (grid, snap-mode, ortho, polar tracking, object snap, iso-draft), dimension settings (edit/ modify dimension style: text size & style, arrow size & style, line types & thickness and setting other parameters of dimension text, dimension lines & extension lines) Printing documents to paper and to PDF using plot command. | 12 |
| **Unit -2: CONICS AND SCALES** | |
| Geometrical constructions, polygons, conic sections – ellipse, parabola, hyperbola (Eccentricity method only); scales – plain, diagonal and vernier scales**.** | 10 |
| **Unit – 3: ORTHOGRAPHIC PROJECTION OF POINTS, LINE AND PLANES** | |
| Principles of Orthographic Projections, Projections of Points, projection of lines (inclined to HP & VP); Projections of planes (inclined to one reference plane). | 10 |
| **Unit – 4: ORTHOGRAPHIC PROJECTION OF SOLIDS** | |
| Projections of Regular Solids- Prisms, Pyramids, Cylinder & Cone (simple position and inclined to one reference plane only) | 8 |
| **Unit-5: ISOMETRIC PROJECTIONS AND ORTHOGRAPHIC VIEWS** | |
| **Isometric Projections and orthographic views:** Principles of isometric projection – isometric scale, isometric views, conventions; isometric views of lines, planes, simple solids, Conversion of Isometric Views to Orthographic Views and vice-versa | 10 |

**COURSE OUTCOMES:** On successful completion of this course, students will be able to

1. understand the BIS conventions of engineering drawing with basic concepts & draw engineering objects with appropriate lettering and dimensioning using various commands of AutoCAD
2. construct polygons, various types of Curves and scales used engineering application like maps, buildings, bridges
3. draw multi views of points, lines and planes by orthographic projection method
4. draw multi views of solids by orthographic projection method
5. convert the orthographic views into isometric views and vice versa by 2D- Commands in AutoCAD

**Text Books**


1. N.D. Bhatt & V.M. Panchal, Engineering Drawing, 48th edition, 2005, Charotar Publishing House, Gujarat
2. R.B.Choudary, Engineering Drawing with AutoCAD 2008, Anuradha Publishers


**Reference Books**


1. S. Trymbaka Murthy, Computer Aided Engineering Drawing, I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition 2006.
2. K.R. Gopalkrishna, Engineering Graphics, 32nd edition, 2005 Subash Publishers, Bangalore


**COURSE OUTCOMES TO PROGRAM UTCOMES MAPPING:**

| PO / CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | | | | | | | | | 3 | | | | |
| 2 | 2 | | | | | | | | | 3 | | | | |
| 3 | 2 | | | | | | | | | 3 | | | | |
| 4 | 2 | | | | | | | | | 3 | | | | |
| 5 | 2 | | | | 3 | | | | | 3 | | | | 3 |
| Overall | 2 | | | | 3 | | | | | 3 | | | | 3 |

| **ENGINEERING GRAPHICS**<br>(Common to CE,EE &ME) | | | |
|---|---|---|---|
| Subject Code | 21CEMET1050/21EEMET1050<br>21MEMET1050 | IA Marks | 30 |
| Number of Lecture Hr/Wk | 1(L)+04(P) | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |

**Credits – 03**

**COURSE OBJECTIVES:** On successful completion of the course, **s**tudents should be able to

1. construct polygons, scales, engineering curves (parabola, ellipse, hyperbola, cycloids, involutes)
2. draw orthographic projections of points, lines and planes.
3. draw the orthographic projections of simple solids
4. draw sectional views of solids
5. convert given isometric view into orthographic view and vice versa using AutoCAD software.

| **Unit -1** | **Teaching Hours** |
|---|---|
| Introduction to Engineering Drawing covering Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering, Conic sections – Ellipse, Parabola, Hyperbola (Eccentricity method only); plain Cycloid, and Involutes; Scales – Plain and Vernier scales only. | 10 |
| **Unit -2** | |
| Projections of Points, Projections of straight lines and the line inclined to bothplanes; Projections of planes (inclined to one reference plane only). | 08 |
| **Unit – 3** | |
| Projections of regular polyhedrons – tetrahedron, hexahedron, octahedron (axis inclined to one reference plane only).Projections of irregular polyhedrons – Prisms, Pyramids, Cones and Cylinders(axis inclined to one reference plane only). | 08 |
| **Unit – 4** | |
| Sectional Views of Right Angular Solids covering Prism, Cylinder, Pyramid andCone | 12 |
| **Unit – 5** | |
| **Introduction to AutoCAD** - The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension Tools), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and Windows. Isometric Projections, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids;Conversion of Isometric Views to Orthographic Views and Vice-versa. | 12 |

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

1. construct polygons, scales and engineering curves
2. draw the orthographic views of points, lines and planes
3. construct the projections of regular and irregular polyhedrons
4. draw the sectional views of solids
5. draw isometric/orthographic views using AutoCAD

**Text/Reference Books**


1. N.D. Bhatt, Engineering Drawing, Charotar Publications
2. R.B.Choudary, Engineering Drawing, Anuradha Publishers
3. Agarwal & Agarwal, Engineering Drawing, Tata McGraw Hill Publishers
4. K.L.Narayana & P.Kannaiah, Engineering Drawing, Scitech Publishers
5. K.C. John, Engineering Graphics for Degree, PHI Publishers
6. PI Varghese, Engineering Graphics, Mc GrawHill Publishers
7. K Venugopal, V. Prabhu Raja, Engineering Drawing + AutoCAD, New Age


**COs VS POs MAPPING** (DETAILED; HIGH:3; MEDIUM:2; LOW:1):

| PO CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 1 0 | PO 1 1 | PO 1 2 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 2 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 3 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 4 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| 5 | 2 | | | | 3 | | | | | 2 | | | | 3 |
| Over all | 2 | | | | 3 | | | | | 2 | | | | 3 |

**ENGINEERING PHYSICS**
(Semiconductor Physics & Semiconductor Optoelectronics)
(Common for AI&MLCSE,CST,EEE&IT)

| | | | |
|---|---|---|---|
| Subject Code | 21AMAMT1020/21CTPHT1020/21EEPHT2020/21CSPHT2020/ 21ITPHT2020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 03 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |

**Credits – 03**

**COURSE OBJECTIVES:**
The objectives of this course, help the students

- **To impart** the knowledge of Quantum mechanics for understanding the conducting mechanism in solids.
- **To understand** the physics of semiconductors and their working mechanism for their utility.

| | |
|---|---|
| **Unit -1** | |
| **Quantum Mechanics:** Dual nature of matter, Significance and properties of wave function, Schrodinger time independent wave equations, Particle in a one dimensional infinite potential well.<br>**Free Electron Theory and Band theory:** Classical free electron theory (Qualitative with discussion of merits and demerits), Quantum free electron theory, Equation for electrical conductivity based on quantum free electron theory, Fermi-Dirac distribution, Density of states (3D), Fermi energy; Band theory of Solids - Bloch's theorem; Kronig - Penney model (Qualitative), Effective mass of electron. | **Hours – 12** |
| **Unit -2** | |
| **Semiconductors:** Introduction; Intrinsic semiconductors- Density of charge carriers, Electrical conductivity, Fermi level; Extrinsic semiconductors- density of charge carriers, dependence of Fermi energy on carrier concentration and temperature; Drift and diffusion currents- Einstein's equation; Hall effect- Hall coefficient- Applications of Hall effect. | **Hours – 11** |
| **Unit – 3** | |
| **Light interaction with matter:** Stimulated absorption, spontaneous emission, and stimulated emission, Einstein coefficients, Population inversion, Characteristics of lasers, Pumping mechanisms- Ruby laser, He-Ne laser, Direct and indirect band gap semiconductors, Optical transitions in bulk semiconductors Construction and working of laser diode and their applications. | **Hours – 10** |
| **Unit – 4** | |
| **Semiconductor light emitting diodes (LEDs) :** Injection Electro luminescence; Construction and working of LED, characteristics of LED's -Internal efficiency, Extraction efficiency, External Efficiency, Power conversion efficiency, Responsivity & I V characteristics, Double junction Hetero structure and its importance, LED configurations-SLED's and ELED'S, applications of LEDs. | **Hours – 9** |
| **Unit – 5** | |
| **Photo diodes**: Introduction- construction and working principle of PN photodiode, P-i-N photodiode, and Avalanche photodiode (APD), and their IV characteristics, Photovoltaic effect, construction and working of Solar cell, fill factor and efficiency of solar cell. | **Hours – 8** |

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **3** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 2 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 3 | **3** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 4 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 5 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 6 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Course** | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

| ENGINEERING PHYSICS<br>(Introduction to Mechanics) | | | |
|---|---|---|---|
| Subject Code | 21CEPHT2020<br>21MEPHT2020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 03 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| **Credits – 03** | | | |
| COURSE OBJECTIVES:<br>The objectives of this course, help the students<br>• **To explore** the knowledge of fundamental vibrations.<br>• **To impart** the concept of Newton's law of motion in central force field.<br>• **To enable** the students to understand the Rigid body dynamics.<br>• **To study** the structure- property relationship exhibited by solid materials with in the elastic limits. | | | |
| **Unit -1** | | | |
| **One Dimensional motion:** Newton's Equation of motion in one dimension-examples of particle falling under a gravity, Simple harmonic motion (Mechanical oscillator) and its characteristics, Damped harmonic motion (Mechanical oscillator) and damping conditions (over-damped, critically damped and under damped conditions), Forced oscillations (Mechanical oscillator) - un damped and damped conditions, Resonance. | | | **11** |

| | |
|---|---|
| **Unit -2** | |
| **Two dimensional motions:** Two Dimensional motion in the Cartesian coordinate system – Example of Projectile motion without air drag; Two Dimensional motion in Radial polar coordinate system- Example of planetary motion, Kepler's laws and their deduction, Newton equations for variable mass system (rocket), Calculations of Centre of mass and its characteristics . | **11** |
| **Unit -3** | |
| **Conservative & Non Conservative motion:** Invariance of Newton's equations-Under shift of coordinate system - Galileo transformation - Accelerating frames of reference, Reference frame rotating with a constant angular velocity, Centrifugal Force-Apparent gravitational acceleration, Coriolis force -Effect of Coriolis force on a freely falling body. Conservative and Non Conservative forces. | **09** |
| **Unit – 4** | |
| **Rigid body dynamics:** Angular momentum of a single particle and system of particle, conservation of angular momentum; Equation of motion of a rigid body; Kinetic energy of a rigid rotating body; Moment of Inertia, Calculations of moment of inertia-Rectangular lamina and Uniform cylinder (rod, circular disc); Parallel axis theorem and perpendicular axis theorem and their applications; Euler's equation describing rigid body motion. | **10** |
| **Unit – 5** | |
| **Elasticity:** Stress, Strain, Hook's law, stress strain curve, generalized Hook's law with and without thermal strains for isotropic materials, Factors affecting the elastic behavior, energy stored per unit volume in stretched wire, different types of moduli and their relations, bending of beams, Bending moment of a beam, Depression of cantilever. | **09** |
| **COURSE OUTCOMES:**<br>On completion of the course student will able to<br>1. **Distinguish** the various harmonic motions and resonance.<br>2. **Apply** Newton's law of motion to understand the motions of mechanical systems.<br>3. **Verify** the invariance of Newton's equation of motion.<br>4. **Understand** the concept of conservative and non-conservative motions.<br>5. **Formulate** the rigid body dynamics.<br>6. **Study** the structure- elastic property correlation under load within the elastic limits. | |
| **QUESTION PAPER PATTERN:**<br>1. It will have 5 questions with internal choice.<br>2. Each question carries 14 marks.<br>Each full question comprises sub questions covering all topics under a unit. | |
| **TEXT BOOKS:**<br>1. Introduction to Mechanics — MK Verma.<br>2. A Text Book of Engineering Physics- M.N.Avadhanulu, 11e , S.CHAND, | |
| **REFERENCE BOOKS**:<br>1. S.L Gupta& D.L. Gupta, Unified physics<br>2. An Introduction to Mechanics — D Kleppner & R Kolenkow<br>3. Principles of Mechanics — JL Synge & BA Griffiths.<br>4. Engineering Physics- Ch. Srinivas, Ch. Sesubabu Cengage | |

learning.

**WEB SOURCES:**

1. W1: http://www.physics.org/news.asp
2. W2: http://www.phys.lsu.edu/newwebsite/lecturedemo/
3. W3: http://www.nptl.ac.in
4. W3: American Association of Physics Teachers [ http://www.aapt.org/ ]
5. W3: Society of Physics Students [ http://www.aip.org/education/sps/sps.htm ]

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **3** | - | **2** | - | - | - | - | - | - | - | - | - |
| 2 | **3** | - | **2** | **1** | - | - | - | - | - | - | - | - |
| 3 | **3** | - | **2** | - | - | - | - | - | - | - | - | - |
| 4 | **3** | - | **2** | **1** | - | - | - | - | - | - | - | - |
| 5 | **3** | - | **2** | **1** | - | - | - | - | - | - | - | - |
| 6 | **3** | - | **2** | **1** | - | - | - | - | - | - | - | - |
| **Course** | **3** | - | **2** | **1** | - | - | - | - | - | - | - | - |

| ENGINEERING PHYSICS<br>(Introduction to Electromagnetic Theory) | | | |
|---|---|---|---|
| Subject Code | **21ETPHT1020/21ECPHT2020** | IA Marks | 30 |
| Number of Lecture HR/Week | 03 | Exam Marks | 70 |
| Total Number of Lecture Hr | 50 | Exam Hours | 03 |
| | | **Credits – 03** | |

**COURSE OBJECTIVES:**

The objectives of this course, help the students:

- **To impart** the knowledge of Electrostatics and Magneto statics in vacuum and in dielectric medium.
- **To impart** the knowledge of Maxwell's equations to understanding the propagation of EM waves.

| **Unit -1** | **Hours** |
|---|---|
| **Electrostatics in vacuum:** Coulomb's law, Electrostatic field (E) and Electrostatic potential or Scalar potential (V) due to a point charge, Equipotential surfaces, Relation between E&V, Gauss law in electrostatics, Applications of Gauss law-Calculation of Electric field strength and potential due to the uniform charge distribution over a (i) wire (ii) sheet (c) solid sphere and (e) solid cylinder, Divergence and Curl of electrostatic field, Energy of a discrete and continuous charge distribution. | **10** |

| | |
|---|---|
| **Unit -2** | |
| **Electrostatics in dielectric medium:** Electrostatic field and potential due to a Electric dipole, Types of dielectrics, Electric displacement (D), Dielectric polarization (P), Dielectric polarizability, Susceptibility and Dielectric constant, Relation between D, E and P, Bound charge due to electric polarization, Boundary conditions at interface of dielectric media, Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation. | **10** |
| **Unit – 3** | |
| **Magneto statics:** Biot- Savart's law, Magnetic field due to long straight current carrying conductor, Magnetic field on the axis of a current loop, Helmholtz coils, Magnetic field induction due to a solenoid, Divergence of magnetic field (Gauss law in magneto statics), Curl of Magnetic field (Ampere's circuital law); Magnetic Scalar and Vector potential, Motion of charged particle in electrical field and in a magnetic field, Hall effect. | **11** |
| **Unit – 4** | |
| **Electromagnetic induction:** Electromotive force, Faradays laws of electromagnetic induction, Differential form of Faraday's law, motional EMF; Relation between electric potential and magnetic vector potential using faraday's law, Lenz's law, Self-inductance of Solenoid, Energy density stored in an inductor, Continuity equation for current densities; Displace current; Modified Amperes circuital law. | **10** |

| Unit – 5 | |
|---|---|
| **Maxwell's equations and EM waves:** Maxwell's equation in vacuum and non-conducting medium; Wave equation of EM waves; Plane electromagnetic waves in vacuum, their transverse nature; Relation between electric and magnetic fields of an electromagnetic wave; Energy density in EM fields, Pointing Theorem, polarization of EM waves, Momentum carried by electromagnetic waves and radiation pressure. | **9** |

**COURSE OUTCOMES:**

On completion of the course student will able to

1. **Formulate** the electric field and electric potential using fundamental laws in electrostatics.
2. **Understand** the microscopic behavior of dielectrics in electrical field**.**
3. **Calculate** the static magnetic fields due to current carrying conductors.
4. **Estimate** the physical parameters of a system using the basic laws of electricity and magnetism.
5. **Recognize** the relation between electrical fields and time varying magnetic fields.
6. **Apply** Maxwell's equations for the propagation of EM waves.

**Question paper pattern:**

1. Question paper consists of 10 questions.
2. Each full question carrying 14 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

**TEXT BOOKS:**

1. Saroj K. Dash, Smaruti R. Khuntia, Fundamentals of Electromagnetic theory.
2. David Griffiths, Introduction to Electrodynamics.

**REFERENCE BOOKS**:

1. W. Saslow, Electricity, magnetism and light.
2. S.L Gupta& D.L. Gupta, Unified physics.
3. Ch. Srinivas, Ch. Seshubabu, Engineering Physics, Cengage learning.

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **3** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 2 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 3 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 4 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 5 | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 6 | **3** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Course** | **3** | **-** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

| ENGINEERING CHEMISTRY | | | |
|---|---|---|---|
| Subject Code | 21CMCHT1030/ 21CMCHT2030 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| **Credits – 03** | | | |

**COURSE OBJECTIVES:**

The objectives of this course, help the students to

1. Explain the mechanism of corrosion
2. Interpret various boiler troubles and importance of water quality standards.
3. Learn preparation of semiconducting materials, nano materials and liquid crystals – their applications
4. Acquire knowledge on nonconventional energy resources and different types of batteries
5. Know various spectroscopic techniques.
6. Acquire knowledge on volumetric analysis.

| **Unit -1** | **Hours** |
|---|---|
| **Electrochemistry and Corrosion**<br>**Electro chemistry:** Introduction, electrode potential, standard electrodes – Hydrogen and Calomel electrodes, Nernst equation and applications.<br>**Corrosion:** Introduction, Mechanism of Wet chemical corrosion, control methods – proper designing, cathodic protection- Sacrificial anodic and impressed current cathodic protection. | **9** |
| **Unit -2** | |
| **Water Chemistry and Surface Properties**<br>**Water chemistry:** Surface and subsurface water quality parameters – turbidity, pH, total dissolved salts, chloride content, Hardness of water, Temporary and Permanent hardness, Units, determination of hardness by complexometric method. Boiler troubles, Caustic Embrittlement, Priming and foaming, Boiler corrosion. Break point chlorination.<br>**Surface properties:** Determination of surface tension and viscosity of liquids. | **9** |
| **Unit -3** | |
| **Material Chemistry**<br>**Non-elemental semiconducting materials:** Stoichiometric, controlled valency and chalcogen photo/semiconductors and preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion and ion implantation).<br>**Liquid crystals:** Introduction, types and applications.<br>**Nanoparticles**: Introduction, preparation methods – Sol-gel method, Chemical reduction method – Preparation of carbon nanotubes (Arc discharge, chemical vapour deposition and laser ablation methods) properties and applications. | **10** |

| Unit -4 | |
|---|---|
| **ENERGY SOURCES:**<br>**Non-conventional energy sources,**<br>Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.<br>**Batteries and fuel cells:** Primary and secondary batteries - Dry cell, Lead Acid Cell, Lithium ion battery and Zinc air cells and fuel cells - $H_2$-$O_2$, $CH_3OH$-$O_2$, Phosphoric acid and molten carbonate. | **10** |
| **Unit -5** | |
| **SPECTROSCOPY AND CHROMATOGRAPHY TECHNIQUES**<br><br>Regions of electromagnetic spectrum - Principles of vibrational and rotational spectroscopy. Vibrational and rotational spectroscopy of diatomic molecules: Rigid diatomic molecules - selection rule - simple Harmonic Oscillator - diatomic vibrating rotator. Nuclear magnetic resonance –<br>Principle and Instrumentation.<br>Principles of chromatography – Thin Layer & Paper Chromatography. | **10** |

**COURSE OUTCOMES:**

On completion of the course student will be able to

1. Interpret the mechanism of corrosion
2. Summarize the problems faced in industries due to boiler troubles.
3. Recall the properties and applications of advanced materials.
4. Summarize the advantages of non-conventional energy resources and batteries.
5. Able to gain knowledge on spectroscopic techniques and the ranges of the electromagnetic spectrum used for exciting different molecular energy levels.
6. Determine the strength of acid, base and some elements by volumetric and instrumental analysis.

**Question paper pattern:**

1. Question paper consists of 10 questions.
2. Each full question carrying 14 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

**TEXT BOOKS:**


1. P.C. Jain and M. Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, "**Engineering Chemistry**", Cambridge University Press, New Delhi, (2019).
3. S.S. Dara, "**A Textbook of Engineering Chemistry**", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).
5. Fundamentals of Molecular Spectroscopy, by C. N. Banwell.

**REFERENCE BOOKS**:


1. K. Sesha Maheshwarammam and Mridula Chugh, "**Engineering Chemistry**", Pearson India Edn.
2. O.G. Palana, "**Engineering Chemistry**", Tata McGraw Hill Education Private Limited, (2009).
3. CNR Rao and JM Honig (Eds) "**Preparation and characterization of materials**" Academic press, New York (latest edition)

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| 2 | - | 3 | - | - | - | - | - | - | - | - | - | - |
| 3 | - | 3 | - | - | - | - | - | - | - | - | - | - |
| 4 | - | 3 | - | - | - | - | - | - | - | - | - | - |
| 5 | - | - | 3 | - | - | - | - | - | - | - | - | - |
| 6 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| **Course** | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - |

| **ENGINEERING MATHEMATICS-II**<br>( Linear algebra, Laplace transforms & Numerical Methods)<br>Common to all the branches | | | |
|---|---|---|---|
| Subject Code | 21CMMAT2010/2010 | IA Marks | 30 |
| Number of Lecture Hours/Week | 03 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| **Credits – 03** | | | |

**Course objectives:**

To enable students to apply the knowledge of Mathematics in various engineering
fields by making them to learn the following'

1. To develop the use of matrix algebra techniques that is needed by engineers for practical applications and solve system of linear equations
2. To find the inverse and power of a matrix by Cayley-Hamilton theorem and reduce the Quadratic form
3. To solve initial value problems by using Laplace transforms
4. To find the solution of algebraic/ transcendental equations and also interpolate the functions.
5. To apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical

| | |
|---|---|
| computations. | |
| **Unit -1** | **Hr** |
| **Solving systems of linear equations:** Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non homogeneous linear equations – Gauss Elimination method- Jacobi and Gauss-Seidel methods for solving system of equations numerically. | **10** |

| | |
|---|---|
| **Unit -2** | |
| **Eigen values and Eigen vectors, Cayley–Hamilton theorem and Quadratic forms:** Eigen values and Eigen vectors and properties- Cayley-Hamilton theorem (without proof) – Reduction to Diagonal form – Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation, Diagonalisation and Lagrange's reduction | **10** |
| **Unit – 3** | |
| **Laplace Transforms:** Laplace transforms – Definition and Laplace transforms of some certain functions– Shifting theorems – Transforms of derivatives and integrals – Unit step function –Dirac's delta function Periodic function – Inverse Laplace transforms– Convolution theorem (without proof).<br>Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms. | **10** |
| **Unit – 4** | |
| **Numerical Methods:** Introduction - Method of false position - Newton-Raphson method (One Variable) Introduction– Errors in polynomial interpolation – Finite differences– Forward differences– Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula. | **10** |
| **Unit – 5** | |
| **Numerical integration, Solution of ordinary differential equations with initial conditions:** Trapezoidal rule - Simpson's 1/3rd and 3/8th rule - Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method – Runge -Kutta method (second and fourth order). | **10** |
| **Course outcomes:**<br>On completion of this course, students are able to,<br>1. Develop the use of matrix algebra techniques that is needed by engineers for practical applications and solve system of linear equations (L6)<br>2. Find the inverse and power of a matrix by Cayley-Hamilton theorem and reduce the Quadratic form (L3)<br>3. Solve initial value problems by using Laplace transforms (L3)<br>4. Find the solution of algebraic/ transcendental equations and also interpolate the functions(L3)<br>5. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3). | |
| **Question paper pattern:**<br>5. Question paper consists of 10 questions.<br>6. Each full question carrying 14 marks.<br>7. Each full question will have sub question covering all topics under a unit.<br>8. The student will have to answer 5 full questions selecting one full question from each unit. | |
| **Text Books:**<br>1. B. S. Grewal," Higher Engineering Mathematics", Khanna publishers, 44th Edition, 2016.<br>2. Kreyszig, "Advanced Engineering Mathematics " - Wiley, 9th Edition, 2013.<br>3. B.V.Ramana "Higher Engineering M athematics" Tata Mc Graw-Hill, 2006 | |
| **Reference Books:** | |

1. Dr.K.V.Nageswara Reddy and Dr.B.Rama Bhupal Reddy, "Engineering Mathematics, Volume II" Scitech Publications, 2017.
2. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science, Tata McGraw Hill Education, 4th Edition, 2018
3. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications, 3rd Edition, 2020.
4. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press, 1st Edition 2014.

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 4 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| 5 | 3 | 3 | - | - | - | - | - | - | - | - | - | - |
| **Course** | 3 | 3 | - | - | - | - | - | - | - | - | - | - |

| **PYTHON PROGRAMMING**<br>Common to All<br>SEMESTER II | | | |
|---|---|---|---|
| Subject Code | 21CMCST2040 | Internal Marks | 30 |
| Number of Lecture Hours/Week | 1 | External Marks | 70 |
| Total Number of Lecture Hours | | Exam Hours | 03 |

| Pre-requisite | | Credits – 03 |
|---|---|---|

**The Objectives of Python Programming are:**

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with general computer programming concepts like data types, conditionalstatements, loops and functions.
- To be familiarized with general coding techniques and object-oriented programming andGraphical User Interfaces.

| **Unit -1** | **Hours** |
|---|---|
| **Introduction:(TB1:22-30,TB2:1.1-1.4,TB2:1.21-1.33)**Introduction Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Variables, Reading Input fromthe Keyboard, Operators.<br>**Data Types, and Expression: (TB1:41-59)** Strings Assignment, and Comment, Numeric Data Types andCharacter Sets, Type conversions, Expressions, Using functions and Modules.<br>**Decision Structures and Boolean Logic:(TB1:77-85)** if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. | 08 |

| | |
|---|---|
| **Unit -2** | |
| **Control Statement:(TB1:65-72, TB1:86-91)** Definite iteration for Loop Formatting Text for output, Selection if and if else Statement ConditionalIteration, The While Loop, Nested Loops. **Strings and Text Files:(TB1:103-125)** Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods, Text Files. | 10 |
| **Unit -3** | |
| **List and Dictionaries:(TB1:135-145, TB1:153-158)** Lists,Tuples,Sets, Dictionaries. **Design with Function:(TB1:146-149, TB1:169-190)**Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Case Study Gathering Information from a File System. **Modules**: **(TB2:8.1-8.5)** Modules, Standard Modules, Packages. | 12 |
| **Unit – 4** | |
| **File Operations:(TB1:122-123)**Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(). **Object Oriented Programming:(TB2:5.1-5.20, TB2:6.1-6.17)**Concept of class, object and instances, Constructor, class attributes and destructors, Inheritance. **Design with Classes:(TB1:294-301, TB1:309-330)** Objects and Classes, Data modeling Examples, CaseStudy an ATM. | 12 |
| **Unit – 5** | |
| **Errors and Exceptions:(TB2:7.1-7.8)** Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions**.** **Graphical User Interfaces:(TB1:245-288)** The Behavior of Terminal Based Programs and GUI -Based Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources. | 8 |

**Course outcomes:**

On completion of the course student will be able to

- Able to learn the fundamental concepts in the Python language
- Implementation of python iterative statements and strings
- Demonstrate python lists, dictionaries and functions
- Understand the concepts of modules and packages in python
- Complete coding challenges relating to object-oriented programming's essential concepts and techniques.
- Apply variety of error handling and GUI programming techniques

**Question paper pattern:**

1. Question paper consists of 10 questions.
2. Each full question carrying 14 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

**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) Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

**E-Resources:**

https://www.tutorialspoint.com/python3/python_tutorial.pdf

**Course Outcomes to Program Outcomes mapping:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 3 | 2 | 2 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | 3 |
| 4 | 3 | 2 | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 2 |
| 5 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | 2 |
| 6 | 3 | 2 | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 3 |
| **Course** | **3** | **3** | **2** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** |

| NETWORK ANALYSIS | | | |
|---|---|---|---|
| Subject Code | 21ECECT2050/ 21ETETT2050 | Internal Marks | 30 |
| Number of Lecture Hours/Week | 03 | External Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| Pre-requisite | | Credits – 03 | |

**COURSE OBJECTIVES:**

- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To know the basic Laplace transforms techniques in periods' waveforms.
- To understand the two port network parameters.
- To understand the properties of LC networks and filters.

| **Unit -1** | **Hours** |
|---|---|
| **Fundamentals and Network Topology:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor-problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples. | 08 |
| **Unit -2** | |
| **Electric Circuits:** Review of Kirchhoff's laws, Mesh analysis and Nodal analysis problem solving including dependent sources also.<br>**Network Theorems:** Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens- problem solving using dependent sources also. | 10 |
| **Unit -3** | |
| **Steady State Analysis of A.C Circuits:** Impedance concept, phase angle, series R-L, R-C, R-L- C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving.<br>**Transients:** First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. | 12 |
| **Unit – 4** | |
| **Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case-resistance present in both branches, anti resonance at all frequencies.<br>**Coupled Circuits:** Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, | 12 |

| | |
|---|---|
| Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving. | |
| **Unit – 5** | |
| **Two-port Networks:** Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. | 8 |
| **Course outcomes:**<br>On completion of the course student will be able to<br>1. Gain the knowledge on basic network elements.<br>2. Will analyze the RLC circuits' behavior in detailed.<br>3. Analyze the performance of periodic waveforms.<br>4. Gain the knowledge in characteristics of two port network parameters (Z,Y,ABCD,h&g).<br>5. Analyze the filter design concepts in real world applications. | |
| **Question paper pattern:**<br>1. Question paper consists of 10 questions.<br>2. Each full question carrying 14 marks.<br>3. Each full question will have sub question covering all topics under a unit.<br>4. The student will have to answer 5 full questions selecting one full question from each unit. | |
| **Text Books:**<br>1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rdEdition,2000.<br>2. Network Analysis by K.Satya Prasad and S Sivanagaraju,CengageLearning<br>3. Electric Circuit Analysis by Hayt andKimmarle,TMH | |
| **Reference Books**:<br>1. Network lines and Fields by John. D. Ryder 2ndedition, Asiapublishinghouse.<br>2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers. 3.Network Analysis and Filter Design by Chadha,UmeshPublications. | |

**Course Outcomes to Program Outcomes mapping:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 | PS O3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 3 | 2 | 2 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | 3 |
| 4 | 3 | 2 | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 2 |
| 5 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | 2 |
| 6 | 3 | 2 | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 3 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course** | **3** | **3** | **2** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** |

| S.No. | Unit Name | Text Book/ Reference | Chapter No. |
|---|---|---|---|
| 1. | Fundamentals and Network Topology | T2 &R1 | 1 |
| 2. | Electric Circuits and Network Theorems | T2&R1 | 2 &3 |
| 3. | Steady State Analysis of A.C Ckts &Transient | T2,T1,R2 | 4,5 &6 |
| 4. | Resonance and Coupled Circuits | T2,R2 | 6,7& 8 |
| 5. | Two-port Networks | T1 | 4 & 5 |

**DATA STRUCTURES**

Common to AI&ML,CSE.CST&IT)

| | | | |
|---|---|---|---|
| Subject Code | 21CSAMT2050/21CSCST2050 21CSCT2050/21ITITT2050 | Internal Marks | 30 |
| Number of Lecture Hours/Week | 03 | External Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| Pre-requisite | | Credits – 03 | |

**COURSE OBJECTIVES:**

- Introduce the fundamental concepts of data structures and abstract data types.
- Emphasize the importance of data structures in developing and implementing efficient algorithms.
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

| **Unit -1** | **Hours** |
|---|---|
| **Data Structures -(RB3: 1.1-1.20)** Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.**Searching(TB1: 424-434)**- Linear search, Binary search, Fibonacci search.**Sorting (TB1: 434-460)**- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms. | 08 |
| **Unit -2** | |
| **Linked List: (TB1: 162-211)** Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal ,Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular<br>Linked list-Insertion, Deletion. | 10 |
| **Unit -3** | |
| **Queues: (TB1: 253-275)** Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues, Circular Queues, Deques, Priority Queues, Multiple Queues. **Stacks:(TB1 : 219-243)**Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, | 12 |

| | |
|---|---|
| Applications-Reversing list, Factorial Calculation, Infix to Postfix Conversion, Evaluating Postfix Expressions. | |
| **Unit – 4** | |
| **Trees:(TB1: 279-306)** Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balanced **[Binary Trees (RB3: 7.50-7.57)**- AVL Trees, Insertion, Deletion and Rotations.] | 12 |
| **Unit – 5** | |
| **Graphs: (TB1: 383-419)** Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims &Kreskas Algorithm, Dijkstra's shortest path, Transitive closure, Wars hall's Algorithm. | 8 |

**Course outcomes:**

After completing this course a student will be able to:

- Discuss the Basics of data structures and computational efficiency of algorithms for sorting & searching.
- Illustration of linked lists and its operations.
- Design programs using a variety of data structures such as stacks and queues.
- Demonstrate different tree traversing method.
- Describing the graphs concepts.

**Question paper pattern:**

- Question paper consists of 10 questions.
- Each full question carrying 14 marks.
- Each full question will have sub question covering all topics under a unit.
- The student will have to answer 5 full questions selecting one full question from each unit.

**Text Books:**

- Data Structures Using C. 2nd Edition. Reema Thareja, Oxford.
- Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss

**Reference Books**:

- Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
- Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A.Forouzon, Cengage.
- Data Structures with C, Seymour Lipschutz TMH

**e-Resources:**

- http://algs4.cs.princeton.edu/home/
- https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

**Course Outcomes to Program Outcomes mapping:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 2 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 3 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 4 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 5 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| **Course** | **3** | **3** | **3** | | | | | | | | | **2** | | **2** |

| **ENGINEERING MECHANICS** | | | |
|---|---|---|---|
| Subject Code | 21CEMET2050/21EEMET2050 21MEMETT2050 | IA Marks | |
| Number of Lecture Hours/Week | 3(L) | Exam Marks | |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |

**Credits - 03**

**Course objectives**

On successful completion of the course, the students should be able to

1. understand the effect of forces and moments on the solid rigid bodies
2. analyze static problems using free body diagrams by considering friction.
3. locate centroid and calculate moment of inertia for different cross sections.
4. calculate velocity and acceleration of particles having rectilinear motion and rotation
5. analyze dynamic problems using work energy method and impulse-momentum method.

| **Unit -1** | **Hours** |
|---|---|

| | |
|---|---|
| **Introduction to engineering mechanics**: Basic terminologies in mechanics, laws of mechanics, characteristics of force, system of force. **Resultant system of forces**: Resolution of forces, method of composition of forces, resultant of coplanar concurrent force system, moment of a force and couple.<br>**Friction:** Frictional force, laws of Coulomb friction, angle of friction, limiting friction and angle of repose, problems on blocks resting on horizontal and inclined planes. | 10 Hours |

| | |
|---|---|
| **Unit -2** | |
| **Equilibrium of system of forces**: Equilibrium of a rigid body subjected to coplanar concurrent forces and coplanar non-concurrent forces, free body diagrams, Lami's theorem, equilibrium of connected bodies. | 9 Hours |
| **Unit – 3** | |
| **Centroid and centre of gravity:** Centre of gravity, centroid, use of axis symmetry determination of centroid of simple figures from first principles, centroid of composite sections.<br>**Moment of inertia**: Moment of inertia, polar moment of inertia, theorems of moment of inertia, moment of inertia of rectangle, triangle, circle, semi circle, quarter circle from first principles, moment of inertia of L, T and I sections only. Mass moment of inertia, radius of gyration, mass moment of inertia of uniform rod, rectangular plate and circular plate only. | 12 Hours |
| **Unit-4**<br>**Kinematics:** General principles in dynamics, types of motion, rectilinear motion, motion curves, motion with uniform velocity, motion with uniform acceleration, motion with varying acceleration, angular motion, relationship between linear and angular motions.<br>**Kinetics:** Bodies in rectilinear translation, kinetics of bodies rotating about fixed axes, Newton's second law of motion, D-Alembert's principle. | 10 Hours |
| **Unit - 5**<br>Work-Energy Method: Equation of Translation, work energy application to particle motion, connected system - Fixed axis rotation and plane motion, Impulse momentum method. | 9 Hours |
| **Course outcomes**<br>On completion of this course, students will be able to<br>1. Determine resultant force and moment for different force systems.<br>2. analyse the rigid bodies associated with frictional forces using conditions of equilibrium<br>3. Locate the centroid / center of gravity and determine the moment of inertia of plane sections/solids.<br>4. Understand the behavior of moving bodies in rectilinear motion and solve kinematic equations of motion curves.<br>5. Solve the problem using work energy method and impulse momentum method. | |
| **Text Books**<br>1. S.S. Bhavikatti and K.G. Rajashekarappa, Engineering Mechanics, New Age, 2012.<br>2. N.H. Dubey, Engineering Mechanics, Mc Graw Hill, 2012 | |
| **Reference Books**<br>1 F. L. Singer, Engineering Mechanics, Harper–Collins, 1994<br>2. B. Bhattacharya, Engineering Mechanics, Oxford University Press, 2008<br>3. A.K.Tayal, Engineering Mechanics, Umesh Publications, 2012.<br>4. R.K.Bansal, Engineering Mechanics, Laxmi Publications, 1996.<br>5. R.K.Rajput, A Text book of Applied Mechanics, Laxmi Publications, 2011.<br>6. S.Timoshenko and D.H.Young, Engineering Mechanics, 4th Ed. , Mc | |

Graw Hill
7. A.Nelson, Engineering Mechanics - Statics and Dynamics, TMG, New Delhi, 2009.

**WEB REFERENCES**

W1. https://nptel.ac.in/courses
W2. http://learnmech.com/

**COs vs. POs MAPPING (**high: 3; medium: 2; low: 1)

| **COs / POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | 2 | | | | 1 | | | | | | | 1 | |
| **CO2** | 1 | 2 | | | | 1 | | | | | | | 1 | |
| **CO3** | 1 | 2 | | | | 1 | | | | | | | 1 | |
| **CO4** | 1 | 3 | | | | 1 | | | | | | | 1 | |
| **CO5** | 1 | 2 | | | | 1 | | | | | | | 1 | |
| **Overall Level of mapping** | **1** | **2** | | | | **1** | | | | | | | **1** | |

**Practical Examination Evaluation Procedure Internal:15 Marks**

1.Continuous Evaluation by submitting the Record book for every experiments:05

2. Conduct the internal examination at the end of the semester:10

**Practical Examination at the time of final Examination:35**

**Question paper pattern:**

Ten questions are given, and student should choose one question (blind option), which carries 50 marks in total.

1. 10 marks are allotted for procedure.
2. 10 marks for conduction of the experiment.
3. 05 marks for results and conclusions.

10 marks for viva voce

| ENGLISH LANGUAGE COMMUNICATION SKILLS LAB | | | |
|---|---|---|---|
| Subject Code | 18CMEGL1050/ 2050 | IA Marks | |
| Number of Practical Hr./week | 02 | Exam Marks | |
| Total Number of Practical Hr | 32 | Exam Hours | |
| **Credits – 01** | | | |

**Objectives:** To enable the students to learn communication skills of Listening, Speaking, Reading and Writing by focusing on:

- Listening Comprehension
- Pronunciation
- Functional English in formal and Informal Situations
- Interpersonal Communication Skills
- Presentation Skills

List of Experiments

**UNIT I:**Listening Comprehension

**UNIT II:** Pronunciation , Stress, Intonation & Rhythm

**UNIT III:** Common Everyday Situations: Conversations & Dialogues, Communication at Workplace

**UNIT IV:** Interpersonal Communication Skills- Group discussions and debates

**UNIT V:**Formal Presentations

**Outcomes:**

By the end of the course the students will be able to acquire basic Proficiency in English by practicing the following:

- Listening Comprehension, Pronunciation, Dialogues, Interpersonal Communication Skills ,Presentation Skills &Discussions and Debate

**Learning Resources:**

- Interact – English Lab Manual for Undergraduate Students by Orient Black Swan
- Ted Talks, Interviews with Achievers and select movies
- Toastmaster's speeches and table topics
- Book Reviews and movie reviews
- Exercises in Spoken English Parts: I-III, CIEFL, Hyderabad.
- Oxford Guide to Effective Writing and Speaking by John Seely
- https://www.ted.com/talk

**Course Outcomes Vs Program Outcomes Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | - | - | - | - | - | - | - | - | - | 2 | - | - |
| **2** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **3** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **4** | - | - | - | - | - | - | - | - | - | 2 | - | - |
| **5** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **6** | - | - | - | - | - | - | - | - | - | 2 | - | - |

| BASIC ELECTRICAL ENGINEERING LABORATORY (Common to All) | | | |
|---|---|---|---|
| Subject Code | 21CMEEL1070/ 21CMEEL2070 | IA Marks | 15 |
| Number of Lecture Hours/Week | 3P | Exam Marks | 35 |
| Total Number of Lecture Hours | 36 | Exam Hours | 03 |
| **Credits-1.5** | | | |

**Course Objectives:**

This course will enable the student to

1. Verify the Kirchhoff's laws, network theorems for a given circuit.
2. Analyze the performance of DC shunt generator.
3. Control the speed of DC motor.
4. Predetermine the efficiency DC machine.
5. Analyze performance of three phase induction motor.
6. Determine the regulation of an alternators.

**List of Experiments(Any ten experiments must be conducted)**

1. Verification of Kirchoff's laws.
2. Verification of Thevenin's Theorem.
3. Verification of Norton's Theorem.
4. Verification of Superposition theorem.
5. Verification of Maximum Power Transfer Theorem.
6. Speed control of D.C. shunt motor.
7. Brake test on DC shunt motor.
8. Calibration of wattmeter.
9. OC & SC tests on single-phase transformer.
10. Brake test on 1-phase Induction motor.
11. Brake test on 3-phase Induction motor.
12. Study experiment on Ear thing.

**COURSE OUTCOMES:**

On completion of the course student will be able to:

1. Verify the Kirchoff's laws.
2. Verify network theorems for a given circuit.
3. Control the speed of DC motor.
4. Analyze performance of single phase induction motor
5. Analyze performance of three phase induction motor.
6. Identify different types of earthling's

**COURSE-OUTCOMES-TO-PROGRAM-OUTCOMES-MAPPING:**

| COs / POs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | | | 2 | | | | | | | | | | | | |
| **CO2** | | | 2 | | | | | | | | | | | | |
| **CO3** | | | 2 | | | | | | | | | | | | |
| **CO4** | | | 2 | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO5** | | | 2 | | | | | | | | | | | | |
| **CO6** | | | 2 | | | | | | | | | | | | |
| **Overall Course** | | | **2** | | | | | | | | | | | | |

**PROGRAMMING FOR PROBLEM SOLVING LAB**

(Common to All)

SEMESTER I

| | | | |
|---|---|---|---|
| Subject Code | 21CMCSL1080 | Internal Marks | 15 |
| Number of Lecture Hours/ Week | 3 | External Marks | 35 |
| Total Number of Hours | 36 | Exam Hours | 03 |

Credits – 1.5

**Course Objectives:**

This course will enable students to

1. To understand the various steps in Program development.
2. To understand the basic concepts in C Programming Language.
3. To learn how to write modular and readable C Programs.
4. To learn to write programs (using structured programming approach) in C to solve problems.
5. To introduce basic data structures such as lists, stacks and queues.

**Exercise 1 (Familiarization with programming environment)**

a) Familiarization of CODE BLOCKS C++ Editor to edit, compile, Execute, Test and debugging C programs.

b) Familiarization of RAPTOR Tool to draw flow charts and understand flow of control.
Acquaintance with basic LINUX commands.

**Exercise 2 (Simple computational problems using arithmetic expressions)**

a) Write a C Program to display real number with 2 decimal places.

b) Write a C Program to convert Celsius to Fahrenheit and vice versa.

c) Write a C Program to calculate the area of triangle using the formula area = $\sqrt{}$ ( s(s−a)( s−b)(s −c ) where =a+b+c/2

d) Write a C program to find the largest of three numbers using ternary operator.

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

**Exercise 3 (Problems involving if-then-else structures)**

a) Write a C Program to check whether a given number is even or odd using bitwise operator, shiftoperator and arithmetic operator.

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

c) Write a C Program to display grade based on 6 subject marks using if…else…if ladder.

d) Write a C program, which takes two integer operands and one operator form the user, performsthe operation & then prints the result using switch control statement.(Consider the operators +, -,*,/, %)

**Exercise 4 (Iterative problems)**

a) Write a C Program to count number of 0's and 1's in a binary representation of a given number.

b) Write a C program to generate all the prime numbers between two numbers supplied by theuser.

c) Write a C Program to print the multiplication table corresponding to number supplied as input

**Exercise 5 (Iterative problems)**

a) Write a C Program to Find Whether the Given Number is i)Armstrong Number ii) Palindrome Number
b) Write a C Program to print sum of digits of a given number

**Exercise 6 (Series examples)**

a) Write a C Program to calculate sum of following series

**b) 1+2+3+…. n b) 1+1/2+1/3+……+1/n c)1+x+x2+x3……+xn**

**Exercise 7 (1D Array manipulation)**

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to search an element in an array (linear search).
c) Write a C Program to print the following pattern using a character array SA SASSASI

**Exercise 8 (Matrix problems, String operations)**

a) Write a C program to add two matrices.
b) Write a C program to multiply two matrices if they are compatible or print an error message
**"Incompatible matrix sizes" otherwise.**
c) Write a C program to check given matrix is symmetric or not.

Implement the following string operations with and without library functions. i)copy ii) concatenate iii) length iv) compare

**Exercise 9 (Simple functions)**

a) Write a C Program demonstrating the following function types
b) With arguments and with return value.
c) With arguments and without return alue
d) Without arguments and without return value.
e) Without arguments and with return value.
f) Write a C Program illustrating call by reference

**Exercise 10 (Recursive functions)**

Write a C Program illustrating the following with Recursion without Recursion

a)Factorial b) GCD c) Power d) Fibonacci

**Exercise 11(Pointers and structures)**

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Note: Understand the difference between the above two programs.

c) Write a C Program to read and print student details using structures.

**Exercise 12 (File operations)**

a) Write a C programto open a file and to print it contents on screen.
b) Write a C program to copy files
c) Write a C program merges two files onto a new file.
d) Write a C program to delete a file.

**Text Books:**

1. Computer Programing ANSI C, E Balagurusamy, Mc Graw Hill Education(Private), Limited (TB1)
2. Programming in C, ReemaThareja, Second Edition, Oxford Higher Education (TB2)

**Reference Books:**

1. Computer Basics and C Programming, V Raja Raman, Second Edition, PHI (RB1) Course Outcomes:
2. Attain knowledge on using CODE BLOCKS and RAPTOR tools in solving problems. Examine and analyze alternative solutions to a problem.
3. Design an algorithmic solution to a problem using problem decomposition and step- wise refinement.
4. Demonstrate conversion of iterative functions to recursive and vice-versa.
5. Implement the concepts of arrays, structures, Unions and files.

**Course Outcomes to Program Outcomes Mapping**

| **CO** | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 1 2** | **PSO 1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | | | | | | | | | | 3 | |
| 2 | 3 | 3 | 3 | | 2 | | | | | | | | 3 | |
| 3 | 3 | 3 | 3 | | 2 | | | | | | | | 3 | |
| 4 | 3 | 3 | 3 | | 2 | | | | | | | | 3 | |
| 5 | 3 | 3 | 3 | | 2 | | | | | | | | 3 | |
| **Course** | **3** | **3** | **3** | | **2** | | | | | | | | **3** | |

**ENGINEERING PHYSICS LAB**
(Common to AI &ML,CSE,CST,EEE & IT)

| | | | |
|---|---|---|---|
| Subject Code | 21AMPHL1060/21CTPHL1060/ 21EEPHL1060 21ITPHL2060/21CSPHL2060 | IA Marks | 15 |
| Number of Practice Hours/Week | 03 | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| | | **Credits – 1.5** | |

**COURSE OBJECTIVES:**

The objectives of this course, help the students

- **To apply** the theoretical knowledge of Physics through hands on the experimental instruments.
- **To improve** the experimental knowledge in the later studies.
- **To understand** the basic need of experiments.
- **To know** how to measure the different physical quantities.
- **To gain** the knowledge about different electrical components and basic electrical circuits.

**TEXT BOOKS:**

1. "*Physics Laboratory Manual"* Prepared by Department of Physics, SITE.

**REFERENCE BOOKS**:


1. S. Balasubrahmanian, M.N. Srinivasan ''A Text book of Practical Physics''- S. Chand Publishers, 2017.
2. Advanced Practical Physics Vol 1& 2 SP Singh & M.S Chauhan Pragati Prakashan, Meerut


**List of Experiments**

1. Determination of the Fermi energy of copper using meter bridge.
2. Determination of the Energy band gap of P-N junction diode.
3. Study of the spectral response of photo cell-Planck's constant.
4. Study of V-I characteristics of LED (Light Emitting Diode) and to determine knee voltage, frequency of the light emitting diode.
5. Determination of the frequency of electrical vibrator-Melde's experiment.
6. Determination of the wavelength of Laser diode using diffraction.
7. Determination of the V-I characteristics of photo diode and to find the variation of photo current as a function of light intensity.
8. Study of the characteristics of a photo voltaic cell (Solar cell) and to find Fill factor and efficiency.
9. Study of the V-I characteristics of Semiconductor diode, and to determine barrier potential and forward resistance.
10. Study of the I/V Characteristics of Zener diode.

**Demonstration experiments:**

1. Determination of the resistivity of a semiconductor using four probes method.
2. Estimation of the Hall coefficient of a semiconductor-Hall effect.

**COURSE OUTCOMES:**

On completion of the course student will able to

1. **Compare** the theory and correlated with experiments.
2. **Design** experiments.
3. **Analyze** the experimental result.
4. **Apply** appropriate techniques to perform the experiments.
5. **Understand** the interaction of the light with semiconductor.
6. **Study** the characteristic curves of the optoelectronic semiconductor devices.

**WEB SOURCES:**http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

**C**

**OURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | P O2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **3** | **2** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 2 | **2** | **1** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 3 | **2** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 4 | **3** | **1** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 5 | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 6 | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Cours e** | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

**ENGINEERING PHYSICS LAB**
(Common for ECE &ECT)

| | | | |
|---|---|---|---|
| Subject Code | 21ETPHL1060/ 21ECL2060 | IA Marks | 15 |
| Number of Practice Hours/Week | 03 | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |

**Credits – 1.5**

**COURSE OBJECTIVES:**

The objectives of this course, help the students

- **To apply** the theoretical knowledge of Physics through hands on the experimental instruments
- **To improve** the experimental knowledge in the later studies
- **To understand** the basic need of experiment**s.**
- **To know** how to measure the different physical quantities.
- **To acquire** ability to use instrumentation techniques.
- **To train** the students to develop techniques based on the principles related to various devices or components.

**List of Experiments**

1. Determination of the dielectric constant of the dielectric material in the given capacitor using a RC charging and discharging circuit.
2. Measuring of the magnetic field induction of circular coil-Stewart-Gee's experiment.
3. Determination of the horizontal component of earth magnetic field using Helmholtz coil galvanometer..
4. Study of the motion of charged particle in electric and magnetic fields and determine the value of e/m by magnetic focusing.
5. Determination of the frequency of the AC Source using Sonometer.
6. Determination of the electromotive force (emf) of an unknown cell using a stretched wire potentiometer.
7. Study of the particle behavior of EM wave and estimation of Planck's constant using photocell.
8. Determination of the frequency of electrical vibrator-Melde's experiment.
9. Determination of the wavelength and frequency of the electromagnetic wave using diffraction.
10. Verification of laws of transverse waves in a stretched string.

**Demonstration experiments:**

1. Estimation of Hall coefficient and estimate the concentration of charge carriers using Hall Effect.
2. Determination of the self inductance and resistance of a coil with air core.

**COURSE OUTCOMES:**

On completion of the course student will able to

7. **Compare** the theory and correlated with experiments
8. **Design** experiments
9. **Analyze** the experimental result
10. **Apply** appropriate techniques to perform the experiments
11. **Apply** the fundamental laws in electromagnetism to understand the behavior of electromagnetic fields.
12. **Calculate** the frequency and wavelength of EM Waves**.**

**Question paper pattern:**

Ten questions are given, and student should choose one question (blind option), which carries 50 marks in total.

a. 15 marks are allotted for procedure including circuit diagrams and model graphs.

b. 15 marks for conduction of the experiment.
c. 10 marks for results and conclusions.
d. 10 marks for viva voce.

**TEXT BOOKS:**"*Physics Laboratory Manual"* Prepared by Department of Physics, SITE.

**REFERENCE BOOKS**:

3. S. Balasubrahmanian, M.N. Srinivasan ''A Text book of Practical Physics''- S. Chand Publishers, 2017.
4. Advanced Practical Physics Vol 1& 2 SP Singh & M.S Chauhan Pragati Prakashan, Meerut

**WEB SOURCES:**http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO 2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **3** | **2** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 2 | **2** | **1** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 3 | **2** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 4 | **3** | **1** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 5 | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 6 | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Course** | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

| ENGINEERING PHYSICS LAB (Common CE & ME) | | | |
|---|---|---|---|
| Subject Code | 21CEPHL1060/21MEPHL1060 | IA Marks | 15 |
| Number of Practice Hr/Week | 03 | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| | | **Credits – 1.5** | |

**COURSE OBJECTIVES:**

The objectives of this course, help the students

- **To apply** the theoretical knowledge of Physics through hands on the experimental instruments
- **To improve** the experimental knowledge in the later studies
- **To understand** the basic need of experiments.
- **To know** how to measure the different physical quantities.
- **To acquire** ability to use instrumentation techniques.
- **To train** the students to develop techniques based on the principles related to various devices or components.

**List of Experiments**

1. Investigation of the Motion of Coupled Oscillators.
2. Determination of the rigidity modulus $\eta$ of wire-Torsional pendulum.
3. Determination of acceleration due to gravity *g* and radius of gyration *K* - Compound pendulum.
4. Determination of the Frequency of an electrically maintained tuning fork by Melde's Experiment.
5. Determination of the velocity of sound in air-Volume resonator.
6. Verification of the laws of transverse vibrations of stretched wire.
7. Determination of the Young's modulus and draw load depression graph in uniform bending.
8. Determination of the Moment of Inertia of a Flywheel.
9. Verification of the parallel axis and perpendicular axis theorems and determine the moment of inertia of a regular rectangular body -Bifilar pendulum.
10. Determination of the frequency of the AC Source using Sonometer.

**Demonstration experiments:**

1. Determination of Young's Modulus, Modulus of rigidity and Poisson's ratio of the material of a given wire by Searle's dynamical method
2. Study of the variation of moment of inertia of a system with the variation in the distribution of mass and hence to verify the theorem of parallel axes (Maxwell' needle method).

**TEXT BOOKS:**

2. "*Physics Laboratory Manual"* Prepared by Department of Physics, SITE.

**REFERENCE BOOKS**:

5. S. Balasubrahmanian, M.N. Srinivasan ''A Text book of Practical Physics''- S. Chand Publishers, 2017.
6. Advanced Practical Physics Vol 1& 2 SP Singh & M.S Chauhan Pragati Prakashan, Meerut.

**WEB SOURCES:**

6. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

**COURSE OUTCOMES:**

On completion of the course student will able to

13. **Compare** the theory and correlated with experiments
14. **Design** experiments
15. **Analyze** the experimental result
16. **Apply** appropriate techniques to perform the experiments
17. **Apply** the knowledge in simple harmonic motions and resonance to understand the rigid body dynamics**.**
18. **Verify** the parallel axis and perpendicular theorems of moment of inertia**.**

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **3** | **2** | **-** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 2 | **2** | **1** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 3 | **2** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 4 | **3** | **1** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 5 | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| 6 | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Course** | **3** | **2** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |

| **ENGINEERING CHEMISTRY LABORATORY** (Common to All) | | | |
|---|---|---|---|
| Subject Code | 21CMCHL1070/ 21CMCHL2070 | IA Marks | 15 |
| Number of Practice Hr/Week | 3 | Exam Marks | 35 |
| Total Number of Practice Hr | 36 | Exam Hours | 03 |
| **Credits – 1.5** | | | |

**List of Experiments**

**(Any 10 experiments must be conducted)**

Determination of HCl using standard Na2CO3 solution
Determination of alkalinity of a sample containing Na2CO3 and NaOH
Determination of surface tension
Determination of viscosity of a liquid by Ostwald viscometer
Determination of chloride content of water
Determination total hardness of water by EDTA.
Determination of $Mg^{+2}$using standard oxalic acid solution.
Determination of $Cu^{+2}$using standard hypo solution.
Determination of the rate constant of first order reaction (Ester hydrolysis)
Determination of strength of strong acid using conductometeric titration.
Determination of strength of weak acid using conductometeric titration .
Determination of Ferrous iron using potentiometer.
Chemical oscillations- Iodine clock reaction
Estimation of Vitamin C.

**Demonstration Experiments**

Thin Layer Chromatography
Determination of $Fe^{+3}$by a colorimetric method.

**Question paper pattern:**

Ten questions are given, and student should choose one question (blind option), which carries 50 marks in total.

a. 10 marks are allotted for procedure including circuit diagrams and model graphs.
b. 10 marks for conduction of the experiment.
c. 05 marks for results and conclusions.
10 marks for viva voce.

**DATA STRUCTURES LAB**

(Common to AI& ML,CSE,CST&IT)

| | | | |
|---|---|---|---|
| Subject Code | **2**1AMAMPL2060/21CSCSPL 2060 21CTCTP2060/21ITITP2060 | IA Marks | 15 |
| Number of Practice Hr/Week | 03 | Exam Marks | 35 |
| Total Number of Practice Hr | 36 | Exam Hours | 03 |

**Credits – 1.5**

**COURSE OBJECTIVES:**

The objectives of this course, help the students

- Demonstrate the different data structures implementation

**List of Experiments**

**Exercise -1 (Arrays and Dynamic memory allocation)**

- Write C program to insert and delete the elements of one dimensional array.
- Write C program to create Dynamic memory allocation using malloc (), calloc ().
- Write C program to create Dynamic memory allocation using realloc ().

**Exercise -2 (Searching)**

- Write C program that use both recursive and non-recursive functions to perform Linear search for a key value in a given list.
- Write C program that use both recursive and non-recursive functions to perform Binary search for a key value in a given list.

**Exercise -3 (Sorting-I)**

- Write C program that implement Bubble sort, to sort a given list of

integers in ascending order.
- Write C program that implement Quick sort, to sort a given list of integers in ascending order.
- Write C program that implement Insertion sort, to sort a given list of integers in ascending order.
- Write C program that implement merge sort, to sort a given list of integers in ascending order.

**Exercise -4(Singly Linked List)**
- Write a C program that uses functions to create a singly linked list.
- Write a C program that uses functions to perform insertion operation on a singly linked list.
- Write a C program that uses functions to perform deletion operation on a singly linked list.
- Write a C program to reverse elements of a single linked list.

**Exercise -5(Queue)**
- Write C program that implement Queue (its operations) using arrays.
- Write C program that implement Queue (its operations) using linked lists.

**Exercise -6(Stack)**
- Write C program that implement stack (its operations) using arrays.
- Write C program that implement stack (its operations) using Linked list.
- Write a C program that uses Stack operations to evaluate postfix expression.

- **Exercise -7(Binary Tree)**

Write a recursive C program for traversing a binary tree in preorder, in order and post order.

**Exercise -8(Binary Search Tree)**
- Write a C program to Create a BST
- Write a C program to insert a node into a BST.
- Write a C program to delete a node from a BST.

**COURSE OUTCOMES:**

By the end of this lab the student can
- Making use of basic data structures such as arrays and linked list to solve problems.
- Demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
- Solve various searching and sorting problems.

**Course Outcomes to Program Outcomes Mapping**

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 2 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 3 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 4 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |
| 5 | 3 | 3 | 3 | | | | | | | | | 2 | | 2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course** | **3** | **3** | **3** | | | | | | | | | **2** | | **2** |

| **ENGINEERING WORKSHOP LAB** | | | |
|---|---|---|---|
| Subject Code | 21CEMEL2080/21ECMEL2080<br>21ETMEL2080/21EEMEL2080/<br>21MEMEL2080 | IA Marks | 15 |
| Number of Lecture Hours/Week | L(0)+T(0)+P(3) | Exam Marks | 35 |
| Total Number of Lecture Hours | 36 | Exam Hours | 3 |

**Credits – 1.5**

**Course objectives:** On completion of the course students should be able to

1. Learn basic use of hand tools along with the techniques and methods applicable to the carpentry trade
2. Learn basic use of hand tools along with the techniques and methods applicable to the fitting trade
3. Learn basic use of hand tools along with the techniques and methods applicable to the forging trade
4. Learn basic use of hand tools along with the techniques and methods applicable to the casting trade
5. Learn basic use of hand tools along with the techniques and methods applicable to the welding trade

**EXPERIMENTS**

1. Preparation of T Lap joint using carpentry.
2. Preparation of Cross Lap joint using carpentry.
3. Preparation of Square fit using mild steel specimen.
4. Preparation of V fit using mild steel specimen.
5. Conversion of round rod to square rod by forging operation.
6. Preparation of *S* hooks by forging operation.
7. Preparation of green sand mould for a single piece pattern
8. Preparation of green sand mould for a split piece pattern
9. Preparation of a Butt joint using arc welding
10. Preparation of a Lap joint using arc Welding

**ADDITIONAL EXPERIMENTS**

1. Preparation of electrical wiring connections using wiring (one lamp controlled by one switch)
2. Preparation of house wiring (stair case wiring)

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

1. Perform the joinery work of wooden pieces using carpentry.
2. Perform the joinery work of metallic pieces using fitting.
3. Produce the required shaped metallic products using black smithy.
4. Make the green sand moulds using different patterns
5. Fabricate different components using welding.

**Question paper pattern:**
Ten questions are given, and student should choose one question (blind option), which carries 50 marks in total.
a. 15 marks are allotted for procedure including circuit diagrams and model graphs.
b. 15 marks for conduction of the experiment.
c. 10 marks for results and conclusions.
d. 10 marks for viva voce.

**COs vs POs MAPPING (**HIGH: 3; MEDIUM: 2; LOW: 1)

| **COs / POs** | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO 1** | **PSO 2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | | | | | | | | 2 | | | | | |
| **CO2** | 2 | | | | | | | | 2 | | | | 2 | |
| **CO3** | 2 | | | | | | | | 2 | | | | 2 | |
| **CO4** | 2 | | | | | | | | 2 | | | | 2 | |
| **CO5** | 2 | | | | | | | | 2 | | | | | |
| **CO6** | 1 | | | | | | | | 1 | | | | 1 | |
| **Course** | **2** | | | | | | | | **2** | | | | **2** | |

| CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & HUMAN RIGHTS<br>(Common to all Branches) | | | |
|---|---|---|---|
| Subject Code | 21CMMSN1090/<br>21CMMSN2090 | IA Marks | 30 |
| Number of Lecture Hr/week | 03 | Exam Marks | 70 |
| Total Number of Lecture Hr | 50 | Exam Hours | 03 |
| **Credits – 00** | | | |

**COURSE OBJECTIVES:**

The objectives of this course help the students to

1. To provide basic information about Indian constitution.
2. To identify individual role and ethical responsibility towards society.
3. To understand human rights and its implications.

| **Unit - I** | **Hours** |
|---|---|
| Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution.<br>Preamble to the Indian Constitution Fundamental Rights & its limitations. | **10** |
| **Unit - II** | |
| Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties.<br>Union Executives – President, Prime Minister Parliament Supreme Court of India. | **10** |
| **Unit – III** | |
| State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91$^{st}$ Amendments. | **10** |
| **Unit –IV** | |
| Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions.<br>Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India<br>Powers and functions of Municipalities, Panchyats and Co - Operative Societies. | **10** |
| **Unit – V** | |
| Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility.<br>Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering. | **10** |

**COURSE OUTCOMES:**

On completion of the course student will

1. Have general knowledge and legal literacy and thereby to take up competitive examinations.
2. Understand state and central policies, fundamental duties.
3. Understand Electoral Process, special provisions.
4. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and

5. Understand Engineering ethics and responsibilities of Engineers
6. Understand Engineering Integrity & Reliability

**Question paper pattern:**

1 Question paper consists of 10 questions.
2 Each full question carrying 14 marks.
3 Each full question will have sub question covering all topics under a unit.
4 The student will have to answer 5 full questions selecting one full question from each unit.

**TEXT BOOKS:**

1. Durga Das Basu: **"Introduction to the Constitution on India",** (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2001
2. Charles E. Haries, Michael S Pritchard and Michael J. Robins **"Engineering Ethics"** Thompson Asia, 2003-08-05.

**REFERENCE BOOKS**:

1. M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.
2. M.Govindarajan, Natarajan, V.S.Senthilkumar, **"Engineering Ethics",** Prentice –Hall of India Pvt. Ltd. New Delhi, 2004
3. Brij Kishore Sharma,**" Introduction to the Constitution of India"**, PHI Learning Pvt. Ltd., New Delhi, 2011.
4. Latest Publications of Indian Institute of Human Rights, New Delhi

| ENVIRONMENTAL SCIENCE | | | |
|---|---|---|---|
| Subject Code | 21CMCHN2090 | IA Marks | 30 |
| Number of Lecture Hours/Week | 2 | Exam Marks | 70 |
| Total Number of Lecture Hours | 32 | Exam Hours | 03 |
| | | **Credits – 00** | |

**COURSE OBJECTIVES:**

The objectives of this course, help the students to

1. Acquire knowledge on global environmental challenges.
2. Learn different types of natural resources
3. Create awareness on biodiversity and ecology.
4. Gain scientific knowledge on environmental pollution
5. Acquire knowledge on water conservation methods and environmental legislation

| **Unit -1** | **Hours** |
|---|---|
| **MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**<br>**Environment -** Definition, Introduction - Scope and Importance - Global environmental challenges, global warming & climate change - Acid rains, ozone layer depletion - Role of Information Technology in Environment and human health. | **6** |
| **Unit -2** | |
| **NATURAL RESOURCES**<br>Renewable and non-renewable resources – Natural resources and associated problems –<br>Forest resources – Use, deforestation - Timber extraction – Mining, dams and other effects on forest and tribal people<br>Water resources – Floods, drought, , dams – benefits and problems<br>Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.<br>Food resources: Effects of modern agriculture - fertilizer-pesticide problems, water logging, eutrophication, biological magnification and salinity.<br>Energy resources: Renewable and non-renewable energy resources<br>Role of an individual in conservation of natural resources. | **6** |
| **Unit – 3** | |
| **ECOSYSTEM AND BIODIVERSITY**<br>**Ecosystem -** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the Forest and grassland ecosystem.<br>**Biodiversity** - Introduction - Definition: genetic, species and ecosystem diversity. – Value of biodiversity: consumptive use, productive use, social, ethical and optional values - Hot-spots ofbiodiversity - Threats to biodiversity: habitat loss - Endangered andendemic | **8** |

| | |
|---|---|
| species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. | |
| **Unit – 4** | |
| **ENVIRONMENTAL POLLUTION**<br>Definition, Cause, effects and control measures of :<br>a. Air pollution<br>b. Water pollution<br>c. Soil pollution<br>d. Noise pollution<br>e. Nuclear hazards<br>Solid waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution. | **6** |
| **Unit – 5** | |
| **SOCIAL ISSUES AND THE ENVIRONMENT**<br>Urban problems related to energy -Water conservation, rain water harvesting, Resettlement and rehabilitation of people its problems and concerns. Environment Protection Act - Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act . | **6** |
| **COURSE OUTCOMES:**<br>On completion of the course student will be able to<br>1. Obtain knowledge on global warming & climate change - Acid rains, ozone layer depletion.<br>2. Preserve several natural resources<br>3. Summarize the concept of ecosystem<br>4. Control different types of pollution<br>5. Understand social issues and environmental legislation | |
| **Question paper pattern:**<br>1. Question paper consists of 10 questions.<br>2. Each full question carrying 14 marks.<br>3. Each full question will have sub question covering all topics under a unit.<br>4. The student will have to answer 5 full questions selecting one full question from each unit. | |
| **TEXT BOOKS:**<br>1. E. Bharucha (2003), "Environmental Studies", University Publishing Company, New Delhi.<br>2. J.G. Henry and G.W. Heinke (2004), "Environmental Science and Engineering", Second Edition, Prentice Hall of India, New Delhi.<br>3. G.M. Masters (2004)" Introduction to Environmental Engineering and Science", Second Edition, Prentice Hall of India, New Delhi | |
| **REFERENCE BOOKS**:<br>1. Text Book of Environmental Studies by Deeksha Dave & P. Udaya Bhaskar, Cengage Learning.<br>2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.<br>3. Environmental Studies, P.N. Palaniswamy, P. Manikandan, A. Geeta and K. Manjula Rani, Pearson Education, Chennai. | |

**COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | 3 | - | - | - | - | - |
| 2 | - | 3 | - | - | - | - | - | - | - | - | - | - |
| 3 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| 4 | - | - | 3 | - | - | - | - | - | - | - | - | - |
| 5 | - | 3 | - | - | - | - | - | - | - | - | - | - |
| **Course** | 2 | 3 | 2 | - | - | - | 2 | - | - | - | - | - |

ACOURSE STRUCTURE for B. Tech

Semester I (First year)

| S.No | Category | Subject Code | Course | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | HS | 21CMEGT1010 | Technical English | 3 | 0 | 0 | 3 |
| 2 | BS | 21CMMAT1020 | Engineering Mathematics – I | 3 | 0 | 0 | 3 |
| 3 | ES | 21CMEET1030 | Basic Electrical Engineering | 3 | 0 | 0 | 3 |
| 4 | ES | 21CMCST1040 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 5 | ES | 21CSNEL1050 | Computer Aided Engineering Graphics | 2 | 0 | 2 | 3 |
| 6 | HS | 21CMEGL1060 | English Communication Skills Lab | 0 | 0 | 3 | 1.5 |
| 7 | ES | 21CMEEL1070 | Basic Electrical Engineering Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | 21CMCSL1080 | Programming for Problem Solving Lab | 0 | 0 | 3 | 1.5 |
| 9 | MC | 21CMESN1090 | Environmental Science | 2 | 0 | 0 | 0 |
| | | | TOTAL | 16 | 0 | 11 | 19.5 |

| Category | CREDITS |
|---|---|
| Basic Science Courses | 3.0 |
| Humanities Science Courses | 4.5 |
| Engineering Science courses | 12.0 |
| TOTAL CREDITS | 19.5 |

Semester II (First year I -II)

| S. No | Category | Subject Code | Course | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | BS | 21CMMAT2010 | Engineering Mathematics - II | 3 | 0 | 0 | 3 |
| 2 | BS | 21CSPHT2020 | Engineering Physics | 3 | 0 | 0 | 3 |
| 3 | BS | 21CMCHT2030 | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 4 | ES | 21CMCST2040 | Python Programming | 1 | 0 | 4 | 3 |
| 5 | ES | 21CSCST2050 | Data Structures | 3 | 0 | 0 | 3 |
| 6 | BS | 21CSPHL2060 | Engineering Physics Lab | 0 | 0 | 3 | 1.5 |
| 7 | BS | 21CMEEL2070 | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | 21CSCSL2080 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | MC | 21CMMSN2090 | Constitution of India, Professional Ethics & Human Rights | 2 | 0 | 0 | 0 |
| | | | TOTAL | 16 | 0 | 11 | 19.5 |

| Category | CREDITS |
|---|---|
| Basic Science Courses | 12.0 |
| Engineering Science courses | 7.5 |
| TOTAL CREDITS | 19.5 |

Semester III (Second year II-I)

| S. No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | BS | 21CDMAT3010 | Probability Distributions & Statistical Methods | 3 | 0 | 0 | 3 |
| 2 | HS | 21CMMST3020 | Engineering Economics and Financial Management | 3 | 0 | 0 | 3 |
| 3 | ES | 21CDCDT3030 | Digital Electronics &Computer Organization | 3 | 0 | 0 | 3 |
| 4 | PC | 21CDDCT3040 | Java Programming | 3 | 0 | 0 | 3 |
| 5 | PC | 21CDCDT3050 | Fundamentals of Data Science | 3 | 0 | 0 | 3 |
| 6 | ES | 21CDCDL3060 | Digital Electronics &Computer Organization Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | 21CDCDL3070 | Java Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | PC | 21CDCDL3080 | Fundamentals of Data Science Lab | 0 | 0 | 3 | 1.5 |
| 9 | SOC | 21CDCDS3090 | Web Application Development –I | 0 | 0 | 3 | 2 |
| 10 | MC | 21CDCDN3100 | Intellectual Property Rights | 2 | 0 | 0 | 0 |
| | | | | | | Total credits | 21.5 |

| Category | CREDITS |
|---|---|
| Basic Science Courses | 3.0 |
| Professional core Courses | 9 |
| Engineering Science Courses | 4.5 |
| Humanities and social sciences | 3 |
| Skill oriented course | 2 |
| TOTAL CREDITS | 21.5 |

Semester IV (Second year II-II)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | BS | 21CDMAT4010 | Discrete Mathematics | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT4020 | Data Base Management Systems | 3 | 0 | 0 | 3 |
| 3 | PC | 21CDCDT4030 | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 |
| 4 | PC | 21CDCDT4040 | Automata Theory & Compiler Design | 3 | 0 | 0 | 3 |
| 5 | PC | 21CDCDT4050 | Operating Systems | 3 | 0 | 0 | 3 |
| 6 | PC | 21CDCDL4060 | Data Base Management Systems Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | 21CDCDL4070 | Operating Systems And LINUX Lab | 0 | 0 | 3 | 1.5 |
| 8 | PC | 21CDCDL4080 | Design and Analysis of Algorithms Lab | 0 | 0 | 3 | 1.5 |
| 9 | SOC | 21CDCDS4090 | Web Application Development–II | 2 | 0 | 0 | 2 |
| 10 | PR | | Summer Internship | | | | |
| | | | | Total credits | | | 21.5 |

| Category | CREDITS |
|---|---|
| Basic Science Courses | 3 |
| Professional core Courses | 16.5 |
| Skill oriented course | 2 |
| Summer Internship | |
| TOTAL CREDITS | 21.5 |

Semester V (Third year III-I)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | PC | 21CDCDT5010 | Software Engineering | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT5020 | Data Warehousing and Mining | 3 | 0 | 0 | 3 |
| 3 | PC | 21CDCDT5030 | Computer Networks | 3 | 0 | 0 | 3 |
| 4 | PE | 21CDCDP504X | Professional Elective -I | 3 | 0 | 0 | 3 |
| 5 | OE | 21CDXXO505X | Open Elective – I | 3 | 0 | 0 | 3 |
| 6 | PC | 21CDCDL5060 | Software Engineering Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | 21CDCDL5070 | Data Mining Lab | 0 | 0 | 3 | 1.5 |
| 8 | SOC | 21CMAHS5080 | Soft Skills & Aptitude Builder – 1 | 2 | 0 | 0 | 2 |
| 9 | PR | 21CDCDR5090 | Summer Internship(Mandatory)after II year (to be evaluated during V Semester) | 0 | 0 | 0 | 1.5 |
| 10 | MC | 21CDCDN5100 | Biology for Engineers | 2 | 0 | 0 | 0 |
| | | | | | Total credits | | 21.5 |

| Category | CREDITS |
|---|---|
| Professional core Courses | 12 |
| Open Electives | 3 |
| Professonal Electives | 3 |
| Skill oriented course | 2 |
| Summer Internship | 1.5 |
| TOTAL CREDITS | 21.5 |

| Professional Elective – I |
|---|

| Code | Course Title |
|---|---|
| A | Object Oriented Analysis and Design |
| B | Social Networks & Semantic Web |
| C | Information Security System |

Semester VI (Third year III-II)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | PC | 21CDCDT6010 | Artificial Intelligence | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT6020 | Machine Learning | 3 | 0 | 0 | 3 |
| 3 | PC | 21CDCDT6030 | Data Wrangling in Data Science | 3 | 0 | 0 | 3 |
| 4 | PE | 21CDCDP604X | Professional Elective -II | 3 | 0 | 0 | 3 |
| 5 | PE | 21CDCDP605X | Professional Elective -III | | | | 3 |
| 6 | OE | 21CDXXO606X | Open Elective – II | 3 | 0 | 0 | 3 |
| 7 | PC | 21CDCDL6070 | Machine Learning Lab | 0 | 0 | 3 | 1.5 |
| 8 | SOC | 21CMAHS6080 | Soft Skills & Aptitude Builder – 2 | 2 | 0 | 0 | 2 |
| 9 | PR | | Research Internship (during summer vacation of 2nd year) | | | | |
| 10 | MC | 21CDCDN6090 | Essence of Indian traditional Knowledge | 2 | 0 | 0 | 0 |
| | | | | | Total credits | | 21.5 |

| Category | CREDITS |
|---|---|
| Professional core Courses | 10.5 |
| Open Electives | 3 |
| Professional Electives | 6 |
| Skill oriented course | 2 |
| TOTAL CREDITS | 21.5 |

| Professional Elective – II | |
|---|---|
| Code | Course Title |
| A | Software Project Management |
| B | Information Retrieval System |
| C | Block Chain Technologies |

| Professional Elective – III | |
|---|---|
| Code | Course Title |
| A | Software Quality Assurance |
| B | Mining Massive Datasets |
| C | Mobile Application Development |

Semester VII (Fourth year IV-I)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | HS | 21CDMST7010 | Management Science | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT7020 | ETL Principles | 3 | 0 | 0 | 3 |
| 3 | PE | 21CDCDP703X | Professional Elective - IV | 3 | 0 | 0 | 3 |
| 4 | PE | 21CDCDP704X | Professional Elective -V | 3 | 0 | 0 | 3 |
| 5 | OE | 21CDXXO705X | Open Elective – III | 3 | 0 | 0 | 3 |
| 6 | OE | 21CDXXO706X | Open Elective – IV | 3 | 0 | 0 | 3 |
| 7 | SOC | 21CDCDS7070 | ETL Design Procedures - Spark | 1 | 0 | 2 | 2 |
| 8 | PR | 21CDCDR7080 | Industrial/ Research internship 2 months(Mandatory) after III year (to be evaluated during VII Semester) | 0 | 0 | 0 | 3 |
| | | | | | Total credits | | 23 |

| Category | CREDITS |
|---|---|
| Professional core Courses | 3 |
| Humanities & social Sciences | 3 |
| Open Electives | 6 |
| Professional Electives | 6 |
| Skill oriented course | 2 |
| Research Internship | 3 |
| TOTAL CREDITS | 23 |

| Professional Elective – IV | |
|---|---|
| Code | Course Title |
| A | Software Testing Methodologies |
| B | Data Visualization |
| C | Cloud Computing |

| Professional Elective – V | |
|---|---|
| Code | Course Title |
| A | Agile Software Development |
| B | Deep Learning |
| C | Introduction to Cyber Security |

Semester VIII (Fourth year IV-II)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | PR | 21CDCDR8010 | Major Project Work | 0 | 0 | 24 | 12 |
| | | | | | | Total credits | 12 |

| Category | CREDITS |
|---|---|
| Project | 12 |
| TOTAL CREDITS | 12 |

| | BS -21 | ES -24 | HS-10.5 | PC-51 | SOC -10 | MC -00 | OE -12 | PE -15 | PROJ -16.5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| I-I | 3 | 12 | 4.5 | | | ✓ | | | | 19.5 |
| I-II | 12 | 7.5 | | | | ✓ | | | | 19.5 |
| II-I | 3 | 4.5 | 3 | 9 | 2 | | | | | 21.5 |
| II-II | 3 | | | 16.5 | 2 | | | | | 21.5 |
| III-I | | | | 12 | 2 | | 3 | 3 | 1.5 | 21.5 |
| III-II | | | | 10.5 | 2 | | 3 | 6 | | 21.5 |
| IV-I | | | 3 | 3 | 2 | | 6 | 6 | 3 | 23 |
| IV-II | | | | | | | | | 12 | 12 |
| TOTAL | 21 | 24 | 10.5 | 51 | 10 | | 12 | 15 | 16.5 | 160 |

III SEMESTER (II-I)

| S. No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | BS | 21CDMAT3010 | Probability Distributions & Statistical Methods | 3 | 0 | 0 | 3 |
| 2 | HS | 21CMMST3020 | Engineering Economics and Financial Management | 3 | 0 | 0 | 3 |
| 3 | ES | 21CDCDT3030 | Digital Electronics &Computer Organization | 3 | 0 | 0 | 3 |
| 4 | PC | 21CDDCT3040 | Java Programming | 3 | 0 | 0 | 3 |
| 5 | PC | 21CDCDT3050 | Fundamentals of Data Science | 3 | 0 | 0 | 3 |
| 6 | ES | 21CDCDL3060 | Digital Electronics &Computer Organization Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | 21CDCDL3070 | Java Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | PC | 21CDCDL3080 | Fundamentals of Data Science Lab | 0 | 0 | 3 | 1.5 |
| 9 | SOC | 21CDCDS3090 | Web Application Development –I | 0 | 0 | 3 | 2 |
| 10 | MC | 21CDCDN3100 | Intellectual Property Rights | 2 | 0 | 0 | 0 |
| | | | | | | Total credits | 21.5 |

| Category | CREDITS |
|---|---|
| Basic Science Courses | 3.0 |
| Professional core Courses | 9 |
| Engineering Science Courses | 4.5 |
| Humanities and social sciences | 3 |
| Skill oriented course | 2 |
| TOTAL CREDITS | 21.5 |

| PROBABILITY DISTRIBUTIONS & STATISTICAL METHODS | | | |
|---|---|---|---|
| Subject Code | 21CDMAT3010 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

1. To apply least squares method to fit a curve.
2. To Analysis the data and evaluate the central tendency of data.
3. To know the Basic Concepts of Probability and corresponding distributions
4. To obtain the estimate of a parameter from sample statistic
5. To test the hypothesis.

| Unit -1 | Hours |
|---|---|
| Curve fitting: Method of least squares – fitting to Straight line – parabola – Exponential and Power curves. | 08 |
| Unit -2 | |
| Statistical Methods: Introduction-Collection and classification of data-Graphical Representation – Comparison of frequency distributions-Measures of central tendency-Measures of dispersion- Coefficient of variation | 10 |
| Unit – 3 | |
| Probability and Distributions:<br>Probability-Condition probability and Baye's theorem- Random variables-Discrete and Continuous random variables-Distribution function-Mathematical Expectation and Variance-Binomial, Poisson, Uniform and Normal distributions | 10 |
| Unit – 4 | |
| Sampling theory<br>Introduction-Population and samples-Sampling distribution of means and Variance (definition only)-Central limit theorem (without proof). | 10 |
| Unit – 5 | |
| Test of Hypothesis:<br>Introduction-Hypothesis-Null and Alternative Hypothesis-Type I and Type II errors-Level of Significance-One tail and two tail tests-Tests concerning one mean and two means (Large and Small samples) z-test, t-distribution, Goodness of fit Test - Tests on proportions: z-test and t-test. | 10 |

| Text Books/ Reference Books: | |
|---|---|
| T1 | Miller and Freund's, Probability and Statistics for Engineers,7/e, Pearson, 2008. |
| T2 | . S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand &Sons Publications, 2012. |
| T3 | B.V.Ramana "Higher Engineering Mathematics" Tata Mc Graw-Hill, 2006. |
| R1 | Shron L.Myers, Keying Ye, Ronald E Walpole, Probability and Statistics for Engineers and the Scientists,8th edition, Pearson 2007. |
| R2 | Jay L Devore, Probability and Statistics for Engineering and the Sciences, |

| | |
|---|---|
| | 8th Edition, Cengage. |
| R3 | Sheldon M.Ross, Introduction to probability and statistics Engineers and Scientists,4th Edition, Academic Foundation, 2011. |
| R4 | Johannes Ledolter and Robert V.Hogg, Applied Staistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010. |

| ENGINEERING ECONOMICS & FINANCIAL MANAGEMENT | | | |
|---|---|---|---|
| Subject Code | 21CMMST3020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 60 | Exam Hours | 03 |
| Credits – 03 | | | |

Course objectives:

- To understand the concept and nature of Managerial Economics and Concept of Demand and Demand forecasting.
- To understand the concept of Production function, Input Output relationship, Cost Conceptsand Concept of Cost-Volume-Profit Analysis.
- To understand the Market structures, significance of various pricing methods and different forms of Business organization and the concepts of Business Cycles.
- To understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation
- To understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods.

| Unit -1: Introduction to Managerial Economics and demand Analysis | Hours |
|---|---|
| Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement- Demand forecasting and its Methods. | 14 |
| Unit -2: Production and Cost Analysis | |
| Production function-Isoquants and Isocost-Law of Variable proportions- Cobb-Douglas Production Function-Economics of Sale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs- Cost Volume Profit analysis- Determination of Break-Even Point (Simple Problems). | 12 |
| Unit – 3: Introduction To Markets, Pricing Policies & forms Organizations and Business Cycles | |
| Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Methods of Pricing: Market Skimming Pricing, And Internet Pricing: Flat Rate Pricing. Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle | 10 |
| Unit – 4: Introduction to Accounting & Financing Analysis | |
| Introduction to Double Entry Systems – Journal entry-Ledger-Trail Balance-Final Accounts-Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis. | 12 |
| Unit – 5: Capital and Capital Budgeting | |
| Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods. | 12 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Managerial Economics and Financial Analysis, Dr. A. R. Aryasri, TMH 2011. |
| T2 | Managerial Economics and Financial Analysis, 1/e, B. Kuberadu, HPH, 2013 |
| T3 | Management Science, Dr. P. Vijaya Kumar & Dr. N. Apparao, Cengage, Delhi, 2012 |
| T4 | Management Science, Dr. A. R. Arya Sri, TNH, 2011. |
| R1 | Financial Accounting for Management, Ambrish Gupta, Pearson Education, New Delhi. |
| R2 | Managerial Economics, 4th Ed, H. Craig Peterson & W. Cris Lewis, PHI. |
| R3 | Essentials of management, Koontz and weihrich, TMH 2011 |
| R4 | Global management systems, Seth& Rastogi, Cengage learning,delhi,2011 |
| R5 | Managerial Economics, V. Maheswari, Sultan Chand |
| R6 | Managerial Economics & Financial Analysis, Dr. B. Kuberudu and Dr. T. V. Ramana, Himalaya Publishing House 2011. |
| W1 | https://www.coursera.org/courses?query=financial%20engineering |
| W2 | https://www.mooc-list.com/categories/economics-finance |

| DIGITAL ELECTRONICS & COMPUTER ORGANISATION | | | |
|---|---|---|---|
| Subject Code | 21CDCDT3030 | IA Marks | 30 |
| Number of Lecture hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits -3 | | | |

Course Objectives:

The course objectives of Computer Organization are to discuss and make student familiar with the

1. Principles and the Implementation of Computer Arithmetic.
2. Operation of CPUs including RTL, ALU, Instruction Cycle and Busses.
3. Fundamentals of different Instruction Set Architectures and their relationship to the CPU Design.
4. Memory System and I/O Organization.

Principles of Operation of Multiprocessor Systems and Pipelining.

| UNIT I : Number Systems | Hours |
|---|---|
| Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Addition, Subtraction, Logic gates, Map simplification, | 10 |
| UNIT II : Digital Electronics<br>Combinatorial Circuits, Flip flops, Decoders, Encoders, Multiplexers | 10 |
| Unit-III : Basic Computer Organization and Design<br>Micro operations, Instruction codes, Instruction cycle, Memory Reference & Input Output Instructions, Instruction formats, Addressing modes, Data Transfer & Manipulation, Program Control. | 10 |
| UNIT IV : Control Unit<br>Hardwired control unit, Control Memory, Address sequencing, Micro program example, Design of control unit | 10 |
| UNIT V<br>Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.<br>Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data<br>transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access. | 08 |

Text Books:

1) Computer System Architecture, M. Morris Mano, Third Edition, Pearson, 2008.
2) Digital Design, 5/e, M. Morris Mano, Michael D Ciletti, PEA

Reference Books:

1) Computer Organization and Architecture, William Stallings, 6/e, Pearson, 2006.
2) Structured Computer Organization, Andrew S. Tanenbaum, 4/e, Pearson, 2005.

3) Fundamentals of Computer Organization and Design, Sivarama P. Dandamudi, Springer, 2006.

Resources:

1) https://nptel.ac.in/courses/106/105/106105163/
2) http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf\

| JAVA PROGRAMMING | | | |
|---|---|---|---|
| Subject Code | 21CDCDT30403040 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

The learning objectives of this course are:

1. Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
2. This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
3. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development.

| Unit -1: | Hours |
|---|---|
| Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.<br><br>Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (= ), Basic Arithmetic Operators, Increment (++) and Decrement (- -)Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, BitwiseLogical Operators.<br><br>Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator ?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement. | 10 |
| Unit -2: | |
| Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.<br><br>Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods,Nesting of | 10 |

| | |
|---|---|
| Methods, Overriding Methods, Attributes Final and Static. | |
| Unit – 3: | |
| Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Arrays, Arrays as Vectors.<br><br>Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.<br><br>Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.. | 10 |
| Unit – 4: | |
| Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java. time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.<br><br>Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, try-with-resources, Catching Subclass Exception, Custom Exceptions, Nested try and catch Blocks, Rethrowing Exception, Throws Clause. | 10 |
| Unit – 5: | |
| String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder.<br><br>Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread- Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race | 08 |

| | |
|---|---|
| Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.<br><br>Applets: Applet class, Applet structure, An Example Applet Program, Applet Life Cycle,paint(), update() and repaint(). Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScrollPane, Split Pane, JTabbedPane, Dialog Box, Pluggable Look and Feel. | |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford. |
| T2 | The complete Reference Java, 8th edition, Herbert Schildt, TMH. |
| T3 | Programming in JAVA, 2nd edition, Sachin Malhotra, Saurabh Choudary, Oxford. |
| R1 | Introduction to java programming, 7th edition by Y Daniel Liang, Pearson |
| R2 | Murach's Java Programming, Joel Murache |
| W1 | https://nptel.ac.in/courses/106/105/106105191/ |
| W2 | https://www.w3schools.com/java/java_data_types.asp |

| FUNDAMENTALS OF DATA SCIENCE | | | |
|---|---|---|---|
| Subject Code | 21CDCDT3050 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course objectives:

1. To provide a comprehensive knowledge of data science using Python.
2. To learn the essential concepts of data analytics and data visualization

| Unit -I: Introduction to Data Science and Numpy Basics | Hours |
|---|---|
| Data science: definition, Datafication, Exploratory Data Analysis, The Data science process, A data scientist role in this process.<br>NumPy Basics: The NumPy ndarray: A Multidimensional Array Object, Creating ndarrays ,Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Data Processing Using Arrays, Expressing Conditional Logic as Array Operations, Methods for Boolean Arrays , Sorting , Unique | 10 |
| Unit -II: Getting Started with Pandas | |
| Getting Started with pandas: Introduction to pandas, Library Architecture, Features, Applications, Data Structures, Series, DataFrame, Index Objects, Essential Functionality Reindexing, Dropping entries from an axis, Indexing, selection, and filtering),Sorting and ranking, Summarizing and Computing Descriptive Statistics, Unique Values, Value Counts, Handling Missing Data, filtering out missing data. | 10 |
| Unit-III: Data Loading, Storage, and File Formats | |
| Data Loading, Storage, and File Formats : Reading and Writing Data in Text Format, Reading Text Files in Pieces, Writing Data Out to Text Format, Manually Working with Delimited Formats, JSON Data, XML and HTML: Web Scraping, Binary Data Formats, Using HDF5 Format, Reading Microsoft Excel Files, Interacting with Databases, Storing and Loading Data in MongoDB . | 10 |
| Unit –IV: Data Wrangling | |
| Data Wrangling: Combining and Merging Data Sets, Database style DataFrame Merges, Merging on Index, Concatenating Along an Axis, Combining Data with Overlap , Reshaping and Pivoting, Reshaping with Hierarchical Indexing, Data Transformation, Removing Duplicates, Replacing Values. | 10 |
| Unit-V: Plotting and Visualization | |
| Plotting and Visualization: A Brief matplotlib API Primer, Figures and Subplots, Colors, Markers, and Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File,Plotting Functions in pandas, Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots. | 08 |

| Text Books/ Reference Books: | |
|---|---|
| T1 | Wes McKinney, “Python for Data Analysis”,O’REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012. |
| T2 | Rachel Schutt & O’neil, “Doing Data Science”, O’REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013. |

| | |
|---|---|
| R1 | Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly Media, 2015 |
| R2 | Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016 |

| Digital Electronics & Computer Organization Lab | | | |
|---|---|---|---|
| Subject Code | 21CDCDL3060 | IA Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

1.Verify the truth tables of Logic gates

2. Verify the NAND and NOR gates as Universal logic gates

3. Construct and verify the truth tables of Half and Full adders

4.Construct and Verify the truth tables of Encoder and Decoder

5. Construct and Verify the truth tables of Multiplexer and Demultiplexer

6. Construct and test of an SR flipflop and JK flipflop

7.a) Write a Machine Language Program to perform Addition of two numbers.

b) Write a Machine Language Program to perform Subtraction of two numbers.

8.a) Write a Machine Language Program to perform Addition of n numbers.

b) Write a Machine Language Program to generate n numbers.

9.a) Write a Machine Language Program to generate n Even numbers.

b) Write a Machine Language Program to generate n Odd numbers.

10.a) Write a Machine Language Program to move data from one block to another block.

b) Write a Machine Language Program to mask 4 high-order bits.

11. a) Write a Machine Language Program to read data at location 4400 and unpack data into 07, 0Eand store in 4401 & 4402.

b) Write a Machine Language Program to Find factorial of given number.

12. a) Write a Machine Language Program to Find largest element among two numbers.

b) Write a Machine Language Program to Find smallest element among two numbers.

| JAVA PROGRAMMING Lab | | | |
|---|---|---|---|
| Subject Code | 21CDCDL3070 | Internal Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | External Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

Course Objectives: This course will enable the students to:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

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 $ax^2+bx=0$. 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.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

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.

Exercise - 3 (Class, Objects)

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.

Exercise - 4 (Methods)

a) Write a JAVA program to implement constructor overloading.
b) Write a JAVA program implements method overloading.

Exercise - 5 (Inheritance)

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

Exercise - 6 (Inheritance - Continued)

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?

Exercise - 7 (Exception)

a) Write a JAVA program that describes exception handling mechanism
b) Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

a) Write a JAVA program that implements Runtime polymorphism
b) Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

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 Exception

Exercise – 10 (Threads)

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 isAlive and join ()
c) Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a) Write a JAVA program Producer Consumer Problem
b) Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)

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

Exercise - 13 (Applet)

a Write a JAVA program to paint like paint brush in applet.
b Write a JAVA program to display analog clock using Applet.

c Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.
b) Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

| FUNDAMENTALS OF DATA SCIENCE LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL3080 | Internal Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | External Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

List of Experiments

1. Creating a NumPy Array
    a. Basic ndarray
    b. Array of zeros
    c. Array of ones
    d. Random numbers in ndarray
    e. An array of your choice
    f. Imatrix in NumPy
    g. Evenly spaced ndarray
2. The Shape and Reshaping of NumPy Array
    a. Dimensions of NumPy array
    b. Shape of NumPy array
    c. Size of NumPy array
    d. Reshaping a NumPy array
    e. Flattening a NumPy array
    f. Transpose of a NumPy array
3. Expanding and Squeezing a NumPy Array
    a. Expanding a NumPy array
    b. Squeezing a NumPy array
    c. Sorting in NumPy Arrays
4. Indexing and Slicing of NumPy Array
    a. Slicing 1-D NumPy arrays
    b. Slicing 2-D NumPy arrays
    c. Slicing 3-D NumPy arrays
    d. Negative slicing of NumPy arrays
5. Stacking and Concatenating Numpy Arrays
    a. Stacking ndarrays
    b. Concatenating ndarrays
    c. Broadcasting in Numpy Array

6. Perform following operations using pandas

a. Creating dataframe
b. concat()
c. Setting conditions
d. Adding a new column

7. Perform following operations using pandas

a. Filling NaN with string
b. Sorting based on column values
c. groupby()

8. Read the following file formats using pandas

a. Text files
b. CSV files
c. Excel files
d. JSON files

9. Read the following file formats
a. Pickle files
b. Image files using PIL
c. Multiple files using Glob
d. Importing data from database
10. Demonstrate web scraping using python
11. Perform following preprocessing techniques on loan prediction dataset
a. Feature Scaling
b. Feature Standardization
c. Label Encoding
d. One Hot Encoding
12. Perform following visualizations using matplotlib
a. Bar Graph
b. Pie Chart
c. Box Plot
d. Histogram
e. Line Chart and Subplots
f. Scatter Plot

| Web Application Development –I | | | |
|---|---|---|---|
| Subject Code | 21CDCDS3090 | IA Marks | 15 |
| Number of Tutorial Hours/Week | (1T+ 2P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 2 | | | |

List of Experiments

List of Experiments

Perform experiments related to the following concepts:

A) HTML

1) Introduction to HTML

2) Browsers and HTML

3) Editor's Offline and Online

4) Tags, Attribute and Elements

5) Doctype Element

6) Comments

7) Headings, Paragraphs, and Formatting Text

8) Lists and Links

9) Images and Tables

B) CSS

1) Introduction CSS

2) Applying CSS to HTML

3) Selectors, Properties and Values

4) CSS Colors and Backgrounds

5) CSS Box Model

6) CSS Margins, Padding, and Borders

7) CSS Text and Font Properties

8) CSS General Topic

| INTELLECTUAL PROPERTY RIGHTS | | | |
|---|---|---|---|
| Subject Code | 21CDCDN3100 | IA Marks | 30 |
| Number of Lecture Hours/Week | 2 | Exam Marks | 70 |
| Total Number of Lecture Hours | 32 | Exam Hours | 03 |
| Credits – 0 | | | |

| Unit -1: | Hours |
|---|---|
| Introduction: Introduction to Intellectual property, types of intellectual property, importance of intellectual property rights, agencies Responsible for Intellectual property Registration, Regulatory – Compliance and Liability Issues. | 08 |
| Unit -2: | |
| Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, Transfer of Rights, protectable matter, selecting and evaluating trade mark, Registrations of Trade Marks, Claims.<br>Trade Secrets: Determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, | 06 |
| Unit – 3: | |
| Copy rights: Fundamental of copy right, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, notice of copy right.<br>Patents: introduction, patent searching process, ownership rights and transfer | 06 |
| Unit – 4: | |
| Cyber Law – Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime. | 06 |
| Unit – 5: | |
| New development of Intellectual Property: Emerging trends in trade mark; copy rights, patent, International overview on intellectual property. | 06 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Intellectual property right, Deborah, E. Bouchoux, cengage learning. |
| T2 | Cyber Law. Text & Cases, South-Western's Special Topics collections |
| T3 | R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi |
| R1 | A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2 nd Edition |
| R2 | Intellectual Property Rights: N K Acharya: ISBN: 9381849309 |

IV SEMESTER (II-II)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | BS | 21CDMAT4010 | Discrete Mathematical Structures | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT4020 | Data Base Management Systems | 3 | 0 | 0 | 3 |
| 3 | PC | 21CDCDT4030 | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 |
| 4 | PC | 21CDCDT4040 | Automata Theory & Compiler Design | 3 | 0 | 0 | 3 |
| 5 | PC | 21CDCDT4050 | Operating Systems | 3 | 0 | 0 | 3 |
| 6 | PC | 21CDCDL4060 | Data Base Management Systems Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | 21CDCDL4070 | Operating Systems And LINUX Lab | 0 | 0 | 3 | 1.5 |
| 8 | PC | 21CDCDL4080 | Design and Analysis of Algorithms Lab | 0 | 0 | 3 | 1.5 |
| 9 | SOC | 21CDCDS4090 | Web Application Development–II | 2 | 0 | 0 | 2 |
| 10 | PR | | Summer Internship | | | | |
| | | | | Total credits | | | 21.5 |

| Category | CREDITS |
|---|---|
| Basic Science Courses | 3 |
| Professional core Courses | 16.5 |
| Skill oriented course | 2 |
| Summer Internship | |
| TOTAL CREDITS | 21.5 |

| DISCRETE MATHEMATICS | | | |
|---|---|---|---|
| Subject Code | 21CDMAT4010 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

- To analyze natural language arguments by means of symbolic propositional logic.
- To Identify and manipulate basic mathematical objects such as sets, functions, and relations.
- To use of basic theorems in number theory to solve exponential problems.
- To solve recurrence relations by using different methods.
- To Apply graph theory concepts to solve real-time problems.

| UNIT I: Mathematical Logic | Hours |
|---|---|
| Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, and Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, and Normal Forms. Theory of Inference for Statement Calculus, Consistency of Premises, and Indirect Method of Proof.<br>Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus. | 10 |
| UNIT II:Set Theory: | |
| Sets Operations on Sets, Principle of Inclusion-Exclusion,<br>Relations Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams,<br>Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions. | 10 |
| UNIT III: Combinatorics and Number Theory. | |
| Number Theory: Properties of Integers, Division Theorem, Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic, Fermat's, and Euler's Theorems (Proofs not required).<br>Combinatorics: Basics of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations. | 10 |
| UNIT IV: Recurrence Relations: | |
| Generating Functions, Function of Sequences, Partial Fractions, | 10 |

| | |
|---|---|
| Calculating Coefficient of Generating Functions, Recurrence Relations, and Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots. | |
| UNIT V: Graph Theory | |
| Introduction to Graphs, Sub graphs, Graph Representations, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Bipartite and Planar Graphs, Graph Coloring and Covering, Chromatic Number. | 08 |

Text Books:

1) Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and R. Manohar, Tata McGraw Hill.
2) Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1) Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India.
2) Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.
3) Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill.

e-Resources:

1)https://nptel.ac.in/courses/106/106/106106094

| DATABASE MANAGEMENT SYSTEMS | | | |
|---|---|---|---|
| Subject Code | 21CDCDT4020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

- To introduce about database management systems
- To give a good formal foundation on the relational model of data and usage of Relational Algebra
- To introduce the concepts of basic SQL as a universal Database language
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

| Unit -1: Database system architecture | Hours |
|---|---|
| Introduction to Databases: Characteristics of the Database Approach, Advantages of using the DBMS Approach, A Brief History of Database Applications. Overview of Database Languages and Architectures: Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Users , Architecture for DBMS. | 10 |
| Unit -2 : Entity Relationship Model | |
| The E-R Models, The Relational Model, Introduction to Database Design, Data base Design and ER Diagrams, Entities Attributes, and Entity Sets, Relationship and Relationship Sets, Conceptual Design with the ER Models, The Relational Model Integrity Constraints Over Relations, Key Constraints, Foreign Key Constraints, General Constraints. | 10 |
| Unit - 3: Relational Algebra | |
| Relational Algebra, Selection and Projection, Set Operation, Renaming, Joins, Division, More Examples of Queries, Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus.<br>The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database. | 10 |
| Unit - 4: 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). | 08 |
| Unit - 5: Transaction Management | |
| Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point. Concurrency control for lost updates, Uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods, lock granularity, lock | 12 |

| | |
|---|---|
| types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering: Wait/Die and Wound/Wait Schemes, Database Recovery management. | |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Introduction to Database Systems, C J Date, Pearson. |
| T2 | Database Management Systems,3rd Edition,Raghurama Krishnan, Johannes Gehrke, TATA Mc Graw Hill. |
| T3 | Database Systems-The Complete Book, H G Molina, J D Ullman, J Widom Pearson. |
| T4 | Database Management Systems,6/e Ramez Elmasri, Shamkant B. Navathe, PEA |
| R1 | DatabaseSystems design, Implementation, and Management,7thEdition,PeterRob&CarlosCoronel |
| R2 | Database System Concepts, 5th edition, Silberschatz, Korth, TMH |
| R3 | The Database Book Principles & Practice Using Oracle/MySQL, Narain Gehani, University Press. |
| W1 | https://onlinecourses.nptel.ac.in/noc18_cs15/preview |
| W2 | https://www.coursera.org/courses?query=database |

| DESIGN AND ANALYSIS OF ALGORITHMS | | | |
|---|---|---|---|
| Subject Code | 21CDCDT4030 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

- The learning objectives of this course are:
- To provide an introduction to algorithms and performance analysis of algorithms.
- To introduce different algorithmic approaches for problem solving through numerous problems

| Unit -1: Introduction | Hours |
|---|---|
| Introduction:What is an Algorithm, Algorithm Specification-Pseudo code Conventions, Recursive Algorithms, Performance Analysis-Space Complexity,Time Complexity, Asymptotic Notations, Practical Complexities, Performance Measurement.<br>Divide and Conquer: The General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort-Performance Measurement. | 10 |
| Unit -2 : The Greedy Method | |
| The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithms, Single Source Shortest Paths | 10 |
| Unit - 3: Dynamic Programming | |
| Dynamic Programming: The General Method, All Pairs Shortest Paths, Single Source Shortest paths General Weights, Optimal Binary Search Trees, 0/1 Knapsack, The Travelling Sales Person Problem and Reliability Design | 10 |
| Unit - 4: Backtracking | |
| Backtracking: The General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, and Hamiltonian Cycles. | 10 |
| Unit - 5: Branch and Bound | |
| Branch and Bound: The Method-Least cost (LC) Search, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem-LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson | 08 |

| | Text(T) / Reference(R) Books: |
|---|---|
| T1 | Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran, “Fundamentals of Computer Algorithms”, 2nd Edition, Universities Press. |
| T2 | Harsh Bhasin, “Algorithms Design & Analysis”, Oxford University Press. |
| R1 | Introduction to Algorithms Thomas H. Cormen, PHI Learning. |
| R2 | The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft,JeffreyD.Ullman |
| W1 | http://nptel.ac.in/courses/106101060/ |

| AUTOMATATHEORY & COMPILER DESIGN | | | |
|---|---|---|---|
| Subject Code | 21CDCDT4040 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Contexts free Languages
- To study the various phases in the design of a compiler
- To understand the design of top-down and bottom-up parsers
- To learn to develop algorithms to generate code for a target machine

| Unit -1: Formal Languages | Hours |
|---|---|
| Formal Languages and Regular Expressions :Languages, operations on languages, regular expressions (re),languages associated with (re), operations on (re), Identity rules for (re), Finite Automata: DFA, NFA, Conversion of regular expression to NFA, NFA to DFA. | 10 |
| Unit -2: Context Free Grammars & Introduction to compilers | |
| Context Free grammars and parsing: Context free Grammars, Leftmost Derivations, Rightmost Derivations, Parse Trees, Ambiguity Grammars, Phases of compiler, Applications of Finite Automata to lexical analysis. | 10 |
| Unit – 3: Parsers | |
| Top-DownParsing,RecursiveDescentParsers:LL(1)Parsers.BottomupParsers: Shift Reduce Parser, LR Parsers: SLR,CLR,LALR | 10 |
| Unit – 4:Intermediate Code Generation & Code Optimization | |
| Intermediate code generation: Three address code, abstract syntax tree, translation of simple statements and control flow statements.<br><br>Code Optimization: Issues in the design of code optimization, Principal sources of optimization, optimization of basic blocks, Loop optimization, peephole optimization | 10 |
| Unit – 5: Code Generation | |
| Code Generation: Issues in the design of code Generation, Machine Dependent Code Generation, object code forms, Register allocation and | 10 |

| | | |
|---|---|---|
| | assignment, DAG representation of basic Blocks,Generating code from DAGs | |

| | |
|---|---|
| Text(T) / Reference(R) Books: | |
| T1 | A Text Book on Automata Theory, Nasir S.F.B, P.K.Srimani, Cambridge university Press |
| T2 | Introduction to Automata Theory,Formal languages and computation, Shamalendu kandar, Pearson |
| T3 | Compilers Principles, echniques and Tools, Aho, Ullman, RaviSethi, PEA |
| T4 | Introduction to theory of computation, 2nd ed, Michelsipser, CENGAGE |
| T5 | Principles of Compiler Design, A.V. Aho. J.D.Ullman;PEA |
| R1 | Theory of Computer Science, Automata languages and computation, 2/e, Mishra, Chandra Shekaran, PHI |
| R2 | Theory of Computation, a problem solving approach, kaviMahesh,Wiley |
| W1 | https://onlinecourses.nptel.ac.in/noc18_cs14/preview |

| OPERATING SYSTEMS | | | |
|---|---|---|---|
| Subject Code | 21CDCDT4050 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:
The learning objectives of this course are:
Introduce the basic concepts of operating systems, its functions and services.
To provide the basic concepts of process management and synchronization.
Familiarize with deadlock issues.
Understand the various memory management skills.
Give exposure over I/O systems and mass storage structures.

| Unit -1: Operating Systems Overview | Hours |
|---|---|
| Computer system organization, Operating system structure, Process, memory, storage management, Protection and security, Distributed systems, Computing Environments, Open-source operating systems, OS services, User operating-system interface. | 10 |
| Unit -2 :System Calls & IPC | |
| System calls, Types, System programs, OS structure, OS generation, System Boot Process concept, scheduling (Operations on processes, Cooperating processes, Inter-process communication), Multi-threading models | 10 |
| Unit – 3: Process Management | |
| Basic concepts, Scheduling criteria, Scheduling algorithms, Thread | 10 |

| | |
|---|---|
| scheduling, Multiple processor scheduling Operating system, Algorithm Evaluation, The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical regions, Monitors. | |
| Unit – 4:Memory Management & Dead lock | |
| System model, Deadlock characterization, Methods for handling deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.<br>Storage Management: Swapping, Contiguous memory allocation, Paging, Segmentation Virtual Memory Background, Demand paging, copy on write, Page replacement and various Page replacement algorithms, Allocation of frames, Thrashing. | 10 |
| Unit – 5:I/O Systems | |
| File concept, Access methods, Directory structure, File system mounting, Protection, Directory implementation, Allocation methods, Free-space management, Disk scheduling, Disk management, Swap-space management, Protection. | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Operating System Concepts Essentials, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, John Wiley & Sons Inc., 2010. |
| T2 | Operating System Concepts, 9th Edition, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, John Wiley and Sons Inc., 2012 |
| T3 | Operating Systems, Second Edition, S Halder, Alex A Aravind, Pearson Education, 2016 |
| T4 | Operating Systems – Internals and Design Principles, 7th Edition, William Stallings, Prentice Hall, 2011 |
| R1 | Modern Operating Systems, Second Edition, Andrew S. Tanenbaum, Addison Wesley, 2001. |
| R2 | Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata McGraw Hill Education, 1996. |
| R3 | Operating Systems: A Concept-based Approach, Second Edition, D M Dhamdhere, Tata McGraw-Hill Education, 2007 |
| R4 | Operating Systems: Internals and Design Principles, Seventh Edition, William Stallings, Prentice Hall, 2011 |
| W1 | https://www.coursera.org/courses?query=operating%20system |
| W2 | https://onlinecourses.nptel.ac.in/noc16_cs10/preview |

| DATABASE MANAGEMENT SYSTEMS LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL4060 | IA Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

*SQL*

Exercise1

Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

Exercise2

Queries using operators in SQL

Exercise3

Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

Exercise4

Queries using Group By, Order By, and Having Clauses

Exercise5

Queries on Controlling Data: Commit, Rollback, and Save point

Exercise6

Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

Exercise7

Queries on Joins and Correlated Sub-Queries

Exercise 8

Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

*PL/SQL*

Exercise 9

Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation

Exercise10

Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

Exercise11

Write a PL/SQL block using SQL and Control Structures in PL/SQL

Exercise12

Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

Exercise13

Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

Exercise14

Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

| Operating Systems & LINUX LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL4070 | IA Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

UNIX Lab- Introduction to UNIX

1. Study of Unix/Linux general purpose utility commands
2. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
3. Study of UNIX/LINUX File System(tree structure).
4. C program to emulate the UNIX ls –l command
5. C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls–l | sort
6. Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit () System calls

Operating Systems Lab

1. Simulate the Following CPU Scheduling Algorithms

A) FCFS B) SJF C) Priority D) Round Robin

2. Multiprogramming-Memory Management- Implementation of fork(), wait(), exec() and exit()
3. Simulate The Following

a. Multiprogramming with A Fixed Number Of Tasks (MFT)

b. Multiprogramming with A Variable Number Of Tasks (MVT)

4. Write a program to implement first fit, best fit and worst fit algorithm for memory management.
5. Simulate Bankers Algorithm for Dead Lock Avoidance

| DESIGN AND ANALYSIS OF ALGORITHMS LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL4080 | Internal Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | External Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

Course Objectives:This course will enable the students to:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

LIST OF EXPERIMENTS:

Exercise 1 (Dynamic Programming Technique)

a) Longest common Subsequence
b) Develop Optimal Binary search trees

Exercise 2 (Dynamic Programming Technique)

a) 0/1 Knap Sack Problem ,
b) The Traveling Salesperson Problem.

Exercise 3 (Greedy Methods)

a) Huffman codes
b) Knap Sack Problems

Exercise 4 (Greedy Methods)

a) Tree Vertex Splitting
b) Job Sequencing with Dead Lines

Exercise 5 (Back Tracking Techniques)

a) 8-Queens Problem
b) Sum of Sub sets

Exercise 6 (Back Tracking Techniques)

a) Graph Coloring.
b) Hamiltonian Cycles

Exercise 7 (Back Tracking Techniques)

a) 0/1 Knap Sack Problem

Exercise 8 (Branch and Bound)

a) 0/1 Knap Sack Problem
b) Traveling Sales Person Problem

Exercise 9 (Graph Algorithms)

a) Breadth First Search
b) Depth First Search

Exercise 10 (Graph Algorithms)

a) Kruskal`s Algorithm
b) Prim`s Algorithms

Exercise 11 (Graph Algorithms)

a) Bellman Ford Algorithm
b) Dijkstra`s Algorithm

Exercise 12 (Graph Algorithms)

a) Floyd- Warshall Algorithm.

| Web Application Development–II | | | |
|---|---|---|---|
| Subject Code | 21CDCDS4090 | IA Marks | 15 |
| Number of Tutorial Hours/Week | (1T+2P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 2 | | | |

List of Experiments

Perform experiments related to the following concepts:

1) Introduction to JavaScript

2) Applying JavaScript (internal and external)

3) Understanding JS Syntax

4) Introduction to Document and Window Object

5) Variables and Operators

6) Data Types and Num Type Conversion

7) Math and String Manipulation

8) Objects and Arrays

9) Date and Time

10) Conditional Statements

11) Switch Case

12) Looping in JS

13) Functions

Semester V (Third year III-I)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | PC | 21CDCDT5010 | Software Engineering | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT5020 | Data Warehousing and Mining | 3 | 0 | 0 | 3 |
| 3 | PC | 21CDCDT5030 | Computer Networks | 3 | 0 | 0 | 3 |
| 4 | PE | 21CDCDP504X | Professional Elective -I | 3 | 0 | 0 | 3 |
| 5 | OE | 21CDXXO505X | Open Elective - I | 3 | 0 | 0 | 3 |
| 6 | PC | 21CDCDL5060 | Software Engineering Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | 21CDCDL5070 | Data Mining Lab | 0 | 0 | 3 | 1.5 |
| 8 | SOC | 21CMAHS5080 | Soft Skills & Aptitude Builder - 1 | 2 | 0 | 0 | 2 |
| 9 | PR | 21CDCDR5090 | Summer Internship(Mandatory)after II year (to be evaluated during V Semester) | 0 | 0 | 0 | 1.5 |
| 10 | MC | 21CDCDN5100 | Biology for Engineers | 2 | 0 | 0 | 0 |
| | | | | | Total credits | | 21.5 |

| Category | CREDITS |
|---|---|
| Professional core Courses | 12 |
| Open Electives | 3 |
| Professonal Electives | 3 |
| Skill oriented course | 2 |
| Summer Internship | 1.5 |
| TOTAL CREDITS | 21.5 |

| Professional Elective - I | |
|---|---|
| Code | Course Title |
| A | Object Oriented Analysis and Design |

| | |
|---|---|
| B | Social Networks & Semantic Web |
| C | Information Security System |

| SOFTWARE ENGINEERING | | | |
|---|---|---|---|
| Subject Code | 21CDCDT5010 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives: In this course the student will be learn about

- The role of software, aim of the software system, different types of process models.
- How to use process models in project, software requirement specification, Requirement and analysis,planningof a software project, estimations, Riskmanagement.
- Role of software architecture, architecture views and Architecture styles for C&C view, evaluating architectures.
- Design concepts, function-oriented design, object oriented design, and metrics

| Unit -1: Software and Software Engineering | Hours |
|---|---|
| The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, software Myths. *Process Models:* A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process. *Requirements Analysis and Specification:* Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification. | 10 |
| Unit -2: Software Design | |
| Overview of the Design Process, How to Characterize of a Design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design. *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. | 10 |
| Unit – 3: Coding and Testing | |
| Coding, Code Review, Software Documentation, Testing, 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 |
| Unit – 4: 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, | 10 |

| | |
|---|---|
| Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case tools, Towards Second Generation CASE Tool, Architecture of a Case Environment. | |
| Unit – 5: Software Maintenance & Reuse | |
| Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management. *Software Reuse:* what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at organization Level. | 08 |

Text(T) / Reference(R) Books:

| | |
|---|---|
| T1 | Software engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition. |
| T2 | Fundamentals of Software Engineering, Third Edition, Rajib Mall, PHI. |
| T3 | Software Engineering, Ian Sommerville, Ninth edition, Pearson education |
| T4 | Software Engineering, Concepts and Practices, Ugrasen Suman, Cengage Learning |
| R1 | Software Engineering A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008 |
| R2 | Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010. |
| R3 | Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press |
| R4 | Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006. |
| R5 | Software Engineering concepts, R. Fairley, TMH. |
| W1 | https://www.edx.org/learn/software-engineering |
| W2 | https://www.coursera.org/courses?query=software%20engineering |

| Data Warehousing and Data Mining | | | |
|---|---|---|---|
| Subject Code | 21CDCDT5020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives: The main objectives are

- Introduce basic concepts and techniques of data warehousing and data mining
- Examine the types of the data to be mined and apply pre-processing methods on raw data
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.

| Unit -1: Introduction | Hours |
|---|---|
| Data Warehousing and Business Analysis: - Data warehousing OLAP & OLTP Components –Building a Data warehouse –Data Warehouse Architecture.<br><br>Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity. | 08 |
| Unit -2: Data Pre-processing | |
| Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization | 10 |
| Unit – 3: 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. Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks | 10 |
| Unit – 4: Association Analysis | |
| Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. | 10 |
| Unit – 5: Cluster Analysis | |
| What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, | 12 |

| | |
|---|---|
| Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Centre-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. | |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson. |
| T2 | Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier |
| R1 | Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning. |
| R2 | Data Mining: Vikram Pudi and P. Radha Krishna, Oxford. |
| R3 | Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford |
| R4 | Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH. |
| R5 | Data Mining: Introductory and Advanced Topics: Dunham, Pearson. |
| W1 | https://www.edx.org/learn/data-mining |
| W2 | https://www.coursera.org/specializations/data-mining |
| W3 | https://www.coursera.org/courses?query=data%20warehouse |

| COMPUTER NETWORKS | | | |
|---|---|---|---|
| Subject Code | 21CDCDT5030 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives

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

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

| Unit -1: Introduction | Hours |
|---|---|
| Network Topologies, WAN, LAN, MAN. OSI Reference Model, TCP/IP Reference Model, Multiplexing (Frequency Division, Wavelength Division, Synchronous Time Division and Statistical Time Division Multiplexing Techniques), Switching Techniques (Circuit-switching, Datagram, Virtual Circuit Networks). | 10 |
| Unit -2:The Data Link Layer | |
| Design Issues, Services Provided to the Network Layer, Framing, Error Control, Flow Control, Error Detection and Correction, Error Correcting Codes, Error Detecting Codes, A Simplex Stop and Wait Protocol for an Error free channel, A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols (A One Bit Sliding Window Protocol-A Protocol Using Go-Back-NA Protocol Using Selective Repeat), Data Link Layer in HDLC: Configuration and transmission modes, frames, control fields. | 10 |
| Unit – 3:The Medium Access Control Sub layer | |
| The Channel Allocation Problem, Static Channel Allocation, Assumptions for Dynamic Channel Allocation, Multiple Access Protocols (Aloha, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited Contention Protocols, Wireless LAN Protocols). | 10 |
| Unit – 4:Routing Algorithms | |
| Routing Algorithms- Shortest-Path Routing, Flooding, Hierarchical | 10 |

| | |
|---|---|
| routing, Broadcast, Multicast and Distance Vector Routing. Congestion Control Algorithms, Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding, IP Addressing, Classless and Class full Addressing, Sub-netting. | |
| Unit – 5: Application Layer | |
| Application Layer:The Domain Name System- The DNS Name Space, Resource Records, Name Servers, Electronic Mail Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery. | 8 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Computer Networks, 5th Edition, Tanenbaum and David J Wetherall, Pearson Edu, 2010. |
| T2 | Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education. |
| R1 | Computer Networks, Mayank Dave, CENGAGE |
| R2 | Data and Computer Communications, Fifth Edition, William Stallings, PHI, 2005. |
| R3 | Computer Networks, A Systems Approach, Fifth Edition, Peterson & Davie, Harcourt, 2011. |
| R4 | Network Management Standards, Second Edition, Ulysses Black, McGraw Hill, 1994 |
| W1 | https://swayam.gov.in/courses/5172-computer-networks |
| W2 | https://www.coursera.org/courses?query=computer%20network |

| Object Oriented Analysis and Design<br><br>Professional Elective-I | | | |
|---|---|---|---|
| Subject Code | 21CDCDP504A | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. Understand how to solve complex problems and
2. Analyze the problems using the object-oriented approach
3. Design Solutions to the problems using object-oriented approach
4. Study the notations of the unified modeling language

| Unit – 1: Introduction | Hours |
|---|---|
| Introduction to OOAD, Activities/ Workflows / Disciplines in OOAD, Introduction to iterative development and the unified process, Introduction to UML, Mapping Disciplines to UML artifacts, why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams. | 10 |

| | |
|---|---|
| Unit – 2: Classes and Objects | |
| Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms. | 10 |
| Unit – 3: Basic Behavioral Modeling | |
| Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams. | 10 |
| Unit – 4: Advanced Behavioral Modelling | |
| Events and signals, state machines, processes and Threads, time and space, state chart diagrams. | 10 |
| Unit – 5: Architectural Modelling | |
| Component, Deployment, Component diagrams and Deployment diagrams. *Case Study:* The Unified Library application. | 08 |

| Text(T) / Reference® Books: | |
|---|---|
| T1 | Object- Oriented Analysis and Design with Applications, Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON. |
| T2 | The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON. |
| T3 | Applying UML and Patterns by CriagLarman, Person |
| R1 | Object-oriented analysis and design using UML, Mahesh P. Matha, PHI. |
| R2 | Head first object-oriented analysis and design, Brett D. McLaughlin, Gary Pollice, Dave West, O‟Reilly. |
| R3 | Object-oriented analysis and design with the Unified process John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning. |
| R4 | The Unified modelling language Reference manual, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley. |
| W1 | https://www.coursera.org/courses?query=uml |
| W2 | https://www.udemy.com/topic/uml/ |

| SOCIAL NETWORKS & SEMANTIC WEB<br><br>Professional Electives-I | | | |
|---|---|---|---|
| Subject Code | 21CDCDP504B | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. To learn Web Intelligence
2. To learn Knowledge Representation for the Semantic Web
3. To learn Ontology Engineering
4. To learn Semantic Web Applications, Services and Technology
5. To learn Social Network Analysis and semantic web

| Unit -1: Web Intelligence | Hours |
|---|---|
| Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web. | 10 |
| Unit -2:Knowledge Representation for the Semantic Web | |
| Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema. | 10 |
| Unit – 3:Ontology Engineering | |
| Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines. | 10 |
| Unit – 4:Semantic Web Applications, Services and Technology | |
| Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods | 10 |
| Unit – 5:Social Network Analysis and semantic web | |
| What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features. | 08 |

| Text(T) / Reference® Books: | |
|---|---|
| T1 | Thinking on the Web – Berners Lee, Godel and Turing, Wiley inter science. |
| T2 | Social Networks and the Semantic Web, Peter Mika, Springer |
| R1 | Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons. |
| R2 | Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group) |
| R3 | Information sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications. |
| R4 | Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD. |

| INFORMATION SECURITY MANAGEMENT<br><br>Professional Elective-I | | | |
|---|---|---|---|
| Subject Code | 21CDCDP504C | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:
1. To introduce the terminology, technology and its applications
2. To introduce the concept of Security Analyst
3. To introduce the tools, technologies& programming languages which is used in day to day security analyst job role.

| Unit -1 - Information Security Management | Hours |
|---|---|
| Information Security Management: Information Security Overview, Threats and Attack<br>Vectors, Types of Attacks, Common Vulnerabilities and Exposures (CVE), Security Attacks,<br>Fundamentals of Information Security, Computer Security Concerns, Information Security<br>Measures etc., Manage your work to meet requirements (NOS 9001). | 10 |
| Unit -2: Fundamentals of Information Security | |
| . Fundamentals of Information Security: Key Elements of Networks, Logical Elements of<br>Network, Critical Information Characteristics, Information States etc., Work effectively with<br>Colleagues (NOS 9002)* | 10 |
| Unit – 3: Data Leakage | |
| Data Leakage: What is Data Leakage and statistics, Data Leakage Threats, Reducing the Risk<br>of Data Loss, Key Performance Indicators (KPI), and Database Security etc., | 10 |
| Unit – 4: Information Security Policies, Procedures and Audits | |
| Information Security Policies, Procedures and Audits: Information Security Policiesnecessity-<br>key elements & characteristics, Security Policy Implementation, Configuration,<br>Security Standards-Guidelines & Frameworks etc. | 10 |
| Unit – 5:Information Security Management | |
| Information Security Management Roles and Responsibilities: Security Roles &<br>Responsibilities, Accountability, Roles and Responsibilities of Information Security Management,team-responding to emergency situation-risk analysis | 08 |

| | |
|---|---|
| process etc. | |

| Text(T) / Reference® Books: | |
|---|---|
| T1 | 1. Management of Information Security, Michael E Whitman and Herbed J Mattord, 2nd<br>Edition, Course Technology, 2007. |
| R1 | 1. http//www.iso.org/isolhomelstandardslmanagement-standardsliso27001.htm |
| R2 | 2. http//www.licsrc.nistmovlpublicationslnistpubs/800-55-Rev1ISP800-55-revl.pdf |

| SOFTWARE ENGINEERING LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL5060 | IA Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

Exercise1

Do the Requirement Analysis and Prepare SRS

Exercise2

Using COCOMO model estimate effort.

Exercise3

Calculate effort using FP oriented estimation model.

Exercise4

Analyze the Risk related to the project and prepare RMMM plan.

Exercise5

DevelopTime-linechartandprojecttableusingPERTorCPMprojectschedulingmethods.

Exercise6

Draw E-R diagrams, DFD, CFD and structured charts for the project.

Exercise7

Design of Test cases based on requirements and design.

Exercise 8Prepare FTRExercise 9

Prepare Version control and change control for software configuration items.

Exercise10DesignSoftware

interfaceExercise11

Mini Project

| DATA MINING LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL5070 | IA Marks | 50 |
| Number of Tutorial Hours/Week | 03(P) | Exam Marks | 50 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

Note: Use python library scikit-learn wherever necessary

Exercise1

Demonstrate the following data preprocessing tasks using python libraries.

a) Loading the dataset

b) Identifying the dependent and independent variables c) Dealing with missing data

Exercise2

Demonstrate the following data preprocessing tasks using python libraries.

a) Dealing with categorical data

b) Scaling the features

c) Splitting dataset into Training and Testing Sets

Exercise3

Demonstrate the following Similarity and Dissimilarity Measures using python

a) Pearson's Correlation

b) Cosine Similarity

c) Jaccard Similarity

d) Euclidean Distance

e) Manhattan Distance

Exercise4

Build a model using linear regression algorithm on any dataset.

Exercise5

Build a classification model using Decision Tree algorithm on iris dataset

Exercise6

Apply Naïve Bayes Classification algorithm on any dataset

Exercise7

Generate frequent itemsets using Apriori Algorithm in python and also generate association rules for any market basket data.

Exercise 8

Apply K- Means clustering algorithm on any dataset.

Exercise9

Apply Hierarchical Clustering algorithm on any dataset.

Exercise10

Apply DBSCAN clustering algorithm on any dataset.

| Soft Skills & Aptitude Builder - 1 | | | |
|---|---|---|---|
| Subject Code | 21CMAHS5080 | IA Marks | 15 |
| Number of Lecture Hours/Week | 1T+2P | Exam Marks | 35 |
| Total Number of Lecture Hours | 32 | Exam Hours | 3 |
| Credits – 2 | | | |
| Section A,Soft Skills | | | |
| Unit – 1: Intrapersonal Communication | | | Hours |
| Introduction to Soft Skills and its Significance<br><br>Personal Effectiveness: Who am I and What am I; My Strengths and Weaknesses; SWOT Analysis; SMART Goal Setting; Being Proactive<br><br>Principles of Personal Vision: Beginning with the End in Mind;<br><br>Time Management: Understanding Priorities; Put First-Things-First<br><br>Activity: Psychometric Tests and SWOT Analysis, SMART Goal Setting | | | 6 |
| Unit 2: Interpersonal Communication | | | |
| Principles of Creative Cooperation and Organisation Skills: Think Win-Win; Seek First to Understand then to be Understood; Synergize; Life-Long Learning<br><br>Emotional Intelligence: Self-Awareness, Self-Regulation, Empathy, Assertiveness, Adoptability, Managing Emotions<br><br>Activity: Resolving a Conflict with your Friend/Colleague/Family Member; Group Discussions & Debates | | | 6 |
| Unit – 3: 21st Century Skills | | | |
| What are 21st Century Skills? Learning Skills- Digital Literacy-Life Skills<br><br>Critical Thinking: Active Listening, Observation, Introspection, Analytical Thinking, Open Mindedness<br><br>Problem Solving: Understanding the Complexity of the Problem, Defining the Problem, Cause and Effect Analysis, Exploring Possible Solutions, Planning Actions, Analysing Results of your Actions, Getting Feedback, Redefining the Problem, The Problem Solving Cycle<br><br>Decision Making: Managing Conflict, Conflict Resolution, Methods of Decision Making, Effective Decision Making in Teams – Methods & Styles | | | 6 |

| | |
|---|---|
| Activity: Case Study | |
| Section B,Aptitude Builder | |
| Unit – 4: Ratios & Percentages | |
| Definition of Ratio, Properties of Ratios, Comparison of Ratios, Problems on Ratios, Compound Ratio, Problems on Proportion, Mean Proportional and Continued Proportion.<br><br>Partnership: Introduction, Relation between Capitals, Period of Investments and Shares<br><br>Number System: Classification of Numbers, Divisibility Rules, Finding the Units Digit, Finding Remainders in Divisions Involving Higher Powers, LCM and HCF Models<br><br>Percentages: Introduction, Converting a Percentage into Decimals, Converting a Decimal into Percentage, Percentage Equivalent of Fractions, Problems on Percentages<br><br>Profit And Loss: Problems on Profit and Loss Percentage, Relation between Cost Price and Selling Price, Discount and Marked Price, Two Different Articles Sold at Same Cost Price, Two Different Articles Sold at Same Selling Price Gain% / Loss% on Selling Price<br><br>Problems on Ages: Introduction, Problems based on Ages<br><br>Averages: Definition of Average, Rules of Average, Problems on Average , Problems on Weighted Average, Finding Average using Assumed Mean Method Alligation and Mixture: Problems on Mixtures, Alligation Rule, Problems on Alligation | 7 |
| Unit – 5: Mental Ability | |
| Difference Series, Product Series, Squares Series, Cubes Series, Alternate Series Combination Series, Miscellaneous Series, Place Values of Letters<br><br>Number and Letter Analogies: Definition of Analogy, Problems on Number Analogy, Problems on Letter Analogy, Problems on Verbal Analogy<br><br>Odd Man Out: Problems on Number Odd Man Out, Problems on Letter Odd Man Out, Problems on Verbal Odd Man Out<br><br>Coding and Decoding: Coding using Same Set of Letter, Coding using Different Set of Letters, Coding into a Number, Problems on R-Model<br><br>Blood relations: Defining the Various Relations among the Members of a Family, Solving Blood Relation Puzzles, Solving the Problems on Blood Relations using Symbols and Notations | 7 |

| | | |
|---|---|---|
| Direction Sense: Solving Problems by Drawing the Paths, Finding the Net Distance Travelled, Finding the Direction, Problems on Clocks ,Problems on Shadows | | |
| | | |
| Section-A: Text (T) / Reference (R ) Books: | | |
| For Units 1, 2, & 3 | | |
| T1 | English and Soft Skills, Dr. S. P. Dhanvel, Orient Blackswan, 2011 | |
| R1 | Seven Habits of Highly Effective People, Stephen R Covey | |
| R2 | Emotional Intelligence, Daniel Goleman, Bantom Book, 2006 | |
| R3 | 21st Century Skills: Learning for Life in our Times, Bernie Trilling, Charles Fadel; John Wiley & Sons | |
| For Units 4&5 | | |
| T1 | R S Agarwal, S Chand, 'Quantitative Aptitude' | |
| T2 | R S Agarwal, S.Chand , 'A Modern Approach to Logical Reasoning' | |
| R1 | Quantitative Aptitude for CAT By Arun Sharma | |
| R2 | GL Barrons, McGraw Hills, Thorpe's Verbal Reasoning, LSAT Materials | |

| BIOLOGY FOR ENGINEERS | | | |
|---|---|---|---|
| Subject Code | 21CDCDN5100 | IA Marks | 30 |
| Number of Lecture Hours/Week | (1T+2P) | Exam Marks | 70 |
| Total Number of Lecture Hours | 24 | Exam Hours | 3 |

Course Objectives:

The learning objectives of this course are:

1. Appreciate the basic organization of organisms and living being.
2. Understand the machinery of the cell that is ultimately responsible for various daily activities.
3. Acquire knowledge about biological problems that requires engineering expertise to solve them.

| Unit -1: Introduction | Hours |
|---|---|
| Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology. How biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. | 02 |
| Unit -2:Classification | |
| Plant Hierarchy of life forms at phenomenological level- classification based on (a) cellularity - Unicellular or multicellular (b) ultra-structure- prokaryotes or eukaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophy, lithotrophs (d) Ammonia excretion – ammoniotelic, uricotelic, ureotelic (e) Habitats- aquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms for the study of biology come from different groups. E. coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. Musculus | 03 |
| Unit – 3:Genetics& Biomolecules | |
| Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics. | 06 |
| Unit – 4:Enzymes& Proteins | |
| Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions - Enzyme classification. Mechanism of enzyme action. -examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis. | 06 |

| | |
|---|---|
| Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements. | |

| | | |
|---|---|---|
| | Unit – 5:Microbiology& Metabolism | |
| | Thermodynamics as applied to biological systems - Exothermic and endothermic versus undergone and exergoinc reactions. Concept of $K_{eq}$ and its relation to standard free energy - Spontaneity - ATP as an energy currency. This should include the breakdown of glucose to $CO_2$ + $H_2O$ (Glycolysis and Krebs cycle) and synthesis of glucose from $CO_2$ and $H_2O$ (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge. | 07 |

| | | |
|---|---|---|
| | Text(T) / Reference(R) Books: | |
| | T1 | Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd |
| | T2 | Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons |
| | T3 | Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers |
| | R1 | Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company |
| | R2 | Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher |
| | W1 | https://ocw.mit.edu/courses/biological-engineering/ |
| | W2 | https://onlinecourses.nptel.ac.in/noc16_ge03/preview |

Semester VI (Third year III-II)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | PC | 21CDCDT6010 | Artificial Intelligence | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT6020 | Machine Learning | 3 | 0 | 0 | 3 |
| 3 | PC | 21CDCDT6030 | Data Wrangling in Data Science | 3 | 0 | 0 | 3 |
| 4 | PE | 21CDCDP604X | Professional Elective -II | 3 | 0 | 0 | 3 |
| 5 | PE | 21CDCDP605X | Professional Elective -III | | | | |
| 6 | OE | 21CDXXO606X | Open Elective - II | 3 | 0 | 0 | 3 |
| 7 | PC | 21CDCDL6070 | Machine Learning Lab | 0 | 0 | 3 | 1.5 |
| 8 | SOC | 21CMAHS6080 | Soft Skills & Aptitude Builder - 2 | 0 | 0 | 3 | 2 |
| 9 | PR | | Research Internship | | | | |
| 10 | MC | 21CDCDN6090 | Essence of Indian traditional Knowledge | 2 | 0 | 0 | 0 |
| | | | | | Total credits | | 21.5 |

| Category | CREDITS |
|---|---|
| Professional core Courses | 10.5 |
| Open Electives | 3 |
| Professional Electives | 6 |
| Skill oriented course | 2 |
| Research Internship | |
| TOTAL CREDITS | 21.5 |

| Professional Elective - II | |
|---|---|
| Code | Course Title |
| A | Software Project Management |
| B | Information Retreival System |
| C | Block Chain Technolgoies |

| Professional Elective - III | |
|---|---|
| Code | Course Title |
| A | Software Quality Assurance |
| B | Mining Massive Datasets |
| C | Mobile Application Development |

| ARTIFICIAL INTELLIGENCE | | | |
|---|---|---|---|
| Subject Code | 21CDCDT6010 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. To provide a strong foundation of fundamental concepts in Artificial Intelligence.
2. To provide a basic exposition to the goals and methods of Artificial Intelligence.
3. To apply the techniques in applications which involve perception, reasoning and learning.

| Unit -1: Introduction to Artificial Intelligence | Hours |
|---|---|
| What Is AI?, The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art, Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents. | 10 |
| Unit -2: Problem solving | |
| Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Local Search Algorithms and Optimization Problems, Searching with Nondeterministic Actions. | 10 |
| Unit – 3: Knowledge Representation | |
| Knowledge-Based Agents, Logic, Propositional Logic: A Very Simple Logic, Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, The Internet Shopping World | 10 |
| Unit – 4:Uncertain Knowledge and Reasoning | |
| Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks. | 10 |
| Unit – 5:AI present and Future | |
| Weak AI: Can Machines Act Intelligently? Strong AI: Can Machines Really Think?, The Ethics and Risks of Developing Artificial Intelligence, Agent Components, Agent Architectures, Are We Going in the Right Direction?, What If AI Does Succeed?. | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” , 3rd Edition, Pearson. |
| T2 | Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill |
| R1 | SarojKaushik, “Artificial Intelligence”, Cengage Learning India, 2011 |
| R2 | David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press 2010. |
| R3 | Trivedi, M.C., “A Classical Approach to Artifical Intelligence”, Khanna Publishing House, Delhi. |
| W1 | https://nptel.ac.in/courses/106105077<br><br>https://nptel.ac.in/courses/10610612 |
| W2 | https://aima.cs.berkeley.edu<br><br>https://ai.berkeley,edu/project_overview.htm |

| MACHINE LEARNING | | | |
|---|---|---|---|
| Subject Code | 21CDCDT6020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. Familiarity with a set of well-known supervised, unsupervised and semi-supervised learning algorithms.
2. The ability to implement some basic machine learning algorithms.
3. Understanding of how machine learning algorithms are evaluated.

| Unit -1: Introduction | Hours |
|---|---|
| Artificial Intelligence, Machine Learning, Deep learning, Types of Machine Learning Systems, Main Challenges of Machine Learning.<br><br>Statistical Learning: Introduction, Supervised and Unsupervised Learning, Training and Test Loss, Tradeoffs in Statistical Learning, Estimating Risk Statistics, Sampling distribution of an estimator, Empirical Risk Minimization. | 10 |
| Unit -2:Supervised Learning(Regression/Classification) | |
| Basic Methods: Distance based Methods, Nearest Neighbours, Decision Trees, Naive Bayes, Linear Models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Binary Classification: Multiclass/Structured outputs, MNIST, Ranking. | 10 |
| Unit – 3:Ensemble Learning and Random Forests | |
| Introduction, Voting Classifiers, Bagging and Pasting,Random Forests, Boosting, Stacking.<br><br>Support Vector Machine: Linear SVM Classification, Nonlinear SVM Classification SVM Regression, Naïve Bayes Classifiers. | 10 |
| Unit – 4:Unsupervised Learning Techniques | |
| Clustering, K-Means, Limits of K-Means, Using Clustering for Image Segmentation, Using Clustering for Preprocessing, Using Clustering for SemiSupervised Learning, DBSCAN, Gaussian Mixtures. Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Using Scikit-Learn, Randomized PCA, Kernel PCA. | 10 |
| Unit – 5:Neural Networks and Deep Learning | |

| | |
|---|---|
| Introduction to Artificial Neural Networks with Keras, Implementing MLPs with Keras, Installing TensorFlow 2, Loading and Preprocessing Data with TensorFlow. | 08 |

| Text(T) / Reference® Books: | |
|---|---|
| T1 | Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, O'Reilly Publications, 2019 |
| T2 | Data Science and Machine Learning Mathematical and Statistical Methods,Dirk P. Kroese, Zdravko I. Botev, Thomas Taimre, Radislav Vaisman,25th November 2020 |
| R1 | Understanding Machine Learning: From Theory to algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge. |
| R2 | Machine Learning Probabilistic Approach, Kevin P. Murphy, MIT Press, 2012 |
| W1 | https://www.tutorialspoint.com/what-is-machine-learning |
| W2 | https://www.analyticsvidhya.com/machine-learning/ |
| W3 | https://www.youtube.com/watch?v=eq7KF7JTinU |

| DATA WRANGLING IN DATA SCIENCE | | | |
|---|---|---|---|
| Subject Code | 21CDCDT6030 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| | CREDITS 3 | | |

Course Objectives:

To learn data wrangling techniques

| Unit – 1: INTRODUCTION TO DATA WRANGLING | Hours |
|---|---|
| INTRODUCTION TO DATA WRANGLING: Data Wrangling- Importance of Data Wrangling -How is Data Wrangling performed- Tasks of Data Wrangling-Data Wrangling Tools-Introduction to Python-Python Basics-Data Meant to be Read by Machines-CSV Data-JSON Data-XML Data | 10 |
| Unit – 2:WORKING WITH EXCEL FILES AND PDFS | |
| WORKING WITH EXCEL FILES AND PDFS: Installing Python Packages-Parsing Excel Files-Parsing Excel Files -Getting Started with Parsing-PDFs and Problem Solving in Python-Programmatic Approaches to PDF Parsing-Converting PDF to Text-Parsing PDFs Using pdf miner-Acquiring and Storing Data-Databases: A Brief Introduction-Relational Databases: MySQL and PostgreSQL-Non-Relational Databases: NoSQL-When to Use a Simple File-Alternative Data Storage. | 10 |
| Unit – 3: DATA CLEANUP | |
| DATA CLEANUP: Why Clean Data?- Data Cleanup Basics-Identifying Values for Data Cleanup-Formatting Data-Finding Outliers and Bad Data-Finding Duplicates-Fuzzy Matching-RegEx Matching-Normalizing and Standardizing the Data-Saving the Data-Determining suitable Data Cleanup-Scripting the CleanupTesting with New Data | 10 |
| Unit – 4: DATA EXPLORATION AND ANALYSIS | |
| DATA EXPLORATION AND ANALYSIS: Exploring Data-Importing Data-Exploring Table Functions-Joining Numerous Datasets-Identifying Correlations-Identifying Outliers-Creating Groupings-Analyzing Data-Separating and Focusing the Data, Presenting Data-Visualizing the Data-Charts-Time-Related Data-Maps-Interactives-Words-Images, Video, and Illustrations-Presentation Tools-Publishing the Data-Open Source Platforms | 10 |
| Unit – 5: WEB SCRAPING | |
| WEB SCRAPING: What to Scrape and How-Analyzing a Web Page-Network/Timeline-Interacting with JavaScript-In-Depth Analysis of a Page-Getting Pages-Reading a Web Page-Reading a Web Page with LXML-XPath-Advanced Web Scraping-Browser-Based Parsing-Screen Reading with Selenium-Screen Reading with Ghost.PySpidering the Web-Building a Spider with Scrapy-Crawling Whole Websites with Scrapy. | 08 |

| Text(T) / Reference® Books: | |
|---|---|
| T1 | Data Wrangling with Python, Jacqueline Kazil& Katharine Jarmul, O'Reilly Media, Inc,2016 |
| T2 | Data Wrangling with Python: Creating actionable data from raw sources,,Dr. TirthajyotiSarkar, ShubhadeepPackt Publishing Ltd,2019 |

| SOFTWARE PROJECT MANAGEMENT<br>(PROFESSIONAL ELECTIVE - II) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP604A | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |
| Course Objectives<br>• To study how to plan and manage projects at each stage of the software development life cycle (SDLC)<br>• 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.<br>• To understand successful software projects that support organization's strategic goals | | | |
| Unit -1: Introduction | | | Hours |
| Project, Management, Software Project Management activities, Challenges in software projects, stake holders, objectives & goals. Project Planning: Step-wise planning, Project scope, Project products & deliverables, Project activities, Effort estimation, Infrastructure. Project Approach: Life cycle models, choosing technology, prototyping, life cycle phases, process artefacts, process work flows. | | | 10 |
| Unit -2:Effort estimation & Activity Planning | | | |
| Estimation techniques, Function point analysis, SLOC, COCOMO, | | | 10 |

| | |
|---|---|
| Usecase-based estimation, Activity identification approaches, network planning models, critical path analysis. | |
| Unit – 3:Risk management | |
| Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach. | 10 |
| Unit – 4:Project Management and Control | |
| Creating framework for monitoring and control, progress monitoring, Cost monitoring, Earned value analysis, defects tracking, issues tracking, status reports, Types of resources, Identifying resource requirements, Resource scheduling. | 10 |
| Unit – 5:Software Quality | |
| Planning quality, defining quality – ISO 9016, Quality measures, quantitative quality management planning, product quality & process quality metrics, statistical process control capability maturity model, enhancing software quality. | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Software Project Management, Bob Hughes & Mike Cotterell, TATA McGraw-Hill |
| T2 | Software Project Management, Walker Royce: Pearson Education, 2005 |
| T3 | Software Project Management in practice, PankajJalote, Pearson |
| R1 | Software Project Management, Joel Henry, Pearson Education |

| Information Retrieval Systems<br>(PROFESSIONAL ELECTIVE - II) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP604B | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

COURSE OBJECTIVES

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

| Unit -1: | Hours |
|---|---|
| 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. | 10 |
| Unit -2: | |
| Inverted Files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques. | 10 |
| Unit – 3: | |
| Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning. | 10 |
| Unit – 4: | |
| 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 | 10 |
| Unit – 5: | |
| Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress | 08 |

| | |
|---|---|
| Inverted Files Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri | |
| Text(T) / Reference(R) Books: | |
| T1 | Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992. |
| T2 | Modern Information Retrieval by Yates Pearson Education. |
| T3 | Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons. |
| R1 | Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997. |
| R2 | Information retrieval Algorithms and Heuristics, 2ed, Springer |

| BLOCKCHAIN TECHNOLOGIES<br><br>Professional Elective-II | | | |
|---|---|---|---|
| Subject Code | 21CDCDP604C | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. To assess blockchain applications in a structured manner.
2. To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
3. To get familiarity with future currencies and to create own crypto token.

| Unit -1: Introduction | Hours |
|---|---|
| Overview of Blockchain, public ledgers, bitcoin, smart contracts, block in a blockchain, transactions, distributed consensus, public vs private blockchain, understanding cryptocurrency to blockchain, permissioned model of blockchain, overviewof security aspects of blockchain, cryptographic hash function, properties of a hash function, hash pointer and Merkle tree, digital signature, public key cryptography, a basic cryptocurrency. | 10 |
| Unit -2:Understanding blockchain with crypto currency | |
| Creation of coins, payments and double spending, bitcoin scripts, bitcoin P2P network, transaction in bitcoin network, block mining, block propagation and | 10 |

| | |
|---|---|
| block relay, distributed consensus in open environments, consensus in a bitcoin network, Proof of Work (PoW)- Basic Introduction, hashcashPoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of burn and proof of elapsed time, the life of a bitcoin miner, Mining- Difficulty, mining pool. | |
| Unit – 3:Permissioned BlockChain | |
| Permissioned model and usecases, design issues for permissioned blockchains, execute contracts, state machine replication, overview of consensus models for permissioned block chain, Distributed consensus in closed environment, paxos, RAFT consensus, Byzantine general problem, Byzantine fault tolerance system, Lamport-Shostak-Pease BFT algorithm, BFT over Asynchronous systems. | 10 |
| Unit – 4:Enterprise application of Blockchain | |
| Cross border payments, Know Your Customer, Food security, Mortgage over blockchain, Blockchain enabled trade, trade finance network, supply chain financing, identity on blockchain. | 10 |
| Unit – 5:Blockchain application development | |
| Hyperledger fabric- architecture, identities and policies, membership and access control, channels, transaction validation, writing smart contract using Hyperledger fabric, writing smart contract using Ethereum, overview of Ripple and Corda. | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Block Chain: Blueprint for a new economy, Melanie Swan, O'Reilly, 2015. |
| T2 | Block Chain: The Block Chain for Beginners- Guide to Block Chain Technology and Leveraging Block Chain Programming, Josh Thompsons |
| R1 | Block Chain Basics, Daniel Drescher, Apress; 1st edition, 2017 |
| R2 | Block Chain and Crypto Currencies, Anshul Kaushik, Khanna Publishing House, Delhi. |
| R3 | Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained, Imran Bhashir, Packt Publishing. |
| W1 | https://www.edx.org/learn/blockchain |
| W2 | https://www.coursera.org/courses?query=blockchain |

| SOFTWARE QUALITY ASSURANCE<br><br>(PROFESSIONAL ELECTIVE – III) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP605A | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives: The student should be able to: Demonstration of software quality assurance

- . Define the scope of software projects
- . Apply software quality assurance using modern software tools
- . Estimate cost of a project and manage budgets quality assurance and testing project.
- Develop software quality assurance and testing project staffing requirements and effectively manage a project.

| Unit -1: FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE | Hours |
|---|---|
| The Role of SQA, SQA Plan, SQA considerations, SQA people, Quality, Management, Software Configuration Management. | 10 |
| Unit -2:MANAGING SOFTWARE QUALITY | |
| Managing Software Organizations, Managing Software Quality, Defect Prevention, Software Quality Assurance Management. | 10 |
| Unit – 3:SOFTWARE QUALITY ASSURANCE METRICS | |
| Software Quality, Total Quality Management (TQM), Quality Metrics, Software Quality Metrics Analysis. | 10 |
| Unit – 4:SOFTWARE QUALITY PROGRAM | |
| Software Quality Program Concepts, Establishment of a Software Quality Program, Software Quality Assurance Planning, An Overview, Purpose & Scope. | 10 |
| Unit – 5:SOFTWARE QUALITY ASSURANCE STANDARDIZATION | |
| Software Standards–ISO 9000 Quality System Standards, Capability Maturity Model and the Role of SQA in Software Development Maturity, SEI CMM Level 5, Comparison of ISO 9000 Model with SEI's CMM. | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Software Quality, Mordechai Ben-Menachem / Garry S Marliss, Vikas Publishing House, Pvt, Ltd., New Delhi. |
| T2 | Managing the Software Process, Watts S Humphrey, Pearson Education Inc. |
| R1 | Handbook of Software Quality Assurance, Gordon G Schulmeyer, Third Edition, Artech House Publishers 2007 |
| R2 | Software Quality Assurance: Principles and Practice, Nina S Godbole, Alpha Science International, Ltd, 2004 |

| | |
|---|---|
| W1 | https://www.udemy.com/software-quality-assurance/ |
| W2 | https://www.coursera.org/courses?query=quality%20assurance |

| Mining Massive Datasets<br><br>Professional Electives-III | | | |
|---|---|---|---|
| Subject Code | 21CDCDP605B | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objective: The course will discuss data mining and machine learning algorithms for analyzing very large amounts of data.

The emphasis will be on MapReduce and Sparkas tools for creating parallel algorithms that can process very large amounts of data.

UNIT I:

Data Mining: Data Mining, Statistical Limits on Data Mining, MapReduce: Distributed File Systems, MapReduce, Algorithms Using MapReduce, Extensions to MapReduce. 10

UNIT II:

Finding Similar Items: Applications of Near-Neighbor Search, Shingling of Documents, Distance Measures, Theory of Locality-Senstive Functions, Applications of LSH Hashing. 10

UNIT III:

Mining Data Streams: Stream Data Model, Sampling Data in Streams, Filtering Streams,

Link Analysis: PageRank, Efficient Computational of PageRank, Link Spam, Hubs and Authorities. 10

UNIT IV:

Frequent Itemsets: Market-Based Model, Market Based and APriori Algorithm, Limited- Pass Algorithms, Clustering: Introduction, Hierarchical Clustering and K-means Algorithm, CURE Algorithm. 10

UNIT V:Dimensionality Reduction: Eigenvalues and Eigenvectors, Principal-Component Analysis, CUR Decomposition, Large-Scale Machine Learning: Machine Learning Model, Perceptrons, SVM's, Nearest Neighbors. 08

Text Books:

1. Jure Leskovec, Anand Rajaraman, Jeffery D. ULLman, Mining of Massive Datasets, Cambridge University Press, 2014.
2. Pattern Recognition and Machine Learning. Christopher Bishop. Springer-Verlag New York.2006.

Reference Books:

1. Machine Learning: A Probabilistic Perspective. Kevin Murphy. MIT Press.2012
2. The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Trevor Hastie, Robert Tibshirani, Jerome Friedman. Springer.2013

| MOBILE APPLICATION DEVELOPMENT<br><br>Professional Electives-III | | | |
|---|---|---|---|
| Subject Code | 21CDCDP605C | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. Provide knowledge on tools required for Mobile Application Development using Android.
2. Discuss android User Interface using Views.
3. Impart Android User Interface for pictures and menus.
4. Introduce knowledge on android databases.

| Unit -1: Started with Android and Android Studio | Hours |
|---|---|
| What Is Android, Required Tools, Launching First Android Application,<br><br>Exploring the IDE, Debugging Applications, and Publishing Applications. | 10 |
| Unit -2:Android User Interface | |

| | |
|---|---|
| Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Creating the User Interface Programmatically, Basic Views, Picker Views, List Views | 10 |
| Unit – 3:Activities, Fragments, and Intents | |
| Understanding Activities, Linking Activities Using Intents, Fragments,<br><br>Displaying Notifications. | 10 |
| Unit – 4:Data Persistence | |
| Saving and Loading User Preferences, Persisting Data to Files, Creating and<br><br>Using Databases. | 10 |
| Unit – 5:Messaging and Location-Based Services | |
| SMS Messaging, Sending Email, Displaying Maps, Getting Location Data, Monitoring a Location. | 08 |

| Text(T) / Reference® Books: | |
|---|---|
| T1 | Beginning Android® Programming with Android Studio, J..F.. DiMarzio, John Wiley & Sons, Inc. (Wrox) |
| T2 | Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) |
| R1 | Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox) |
| R2 | Android Programming: The Big Nerd Ranch Guide, Bill Phillips, Chris Stewart and Kristin Marsicano, Big Nerd Ranch, LLC. |
| W1 | https://developer.android.com/ |
| W2 | https://www.coursera.org/courses?query=mobile%20app%20development |

| MACHINE LEARNING LAB | | | |
|---|---|---|---|
| Subject Code | 21CDCDL6070 | IA Marks | 15 |
| Number of Tutorial Hours/Week | 03(P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 1.5 | | | |

List of Experiments

Requirements: Develop the following program using Anaconda/ Jupiter/ Spider and evaluate ML models.

Experiment-1:

Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

Experiment-2:

For a given set of training data examples stored in a .CSV file, implement and demonstrate the CandidateElimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

Experiment-3:

Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Experiment-4:

Exercises to solve the real-world problems using the following machine learning methods: a) Linear Regression b) Logistic Regression c) Binary Classifier

Experiment-5: Develop a program for Bias, Variance, Remove duplicates , Cross Validation

Experiment-6: Write a program to implement Categorical Encoding, One-hot Encoding

Experiment-7:

Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

Experiment-8:

Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.

Experiment-9:

Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs

| Soft Skills & Aptitude Builder - 2 | | | |
|---|---|---|---|
| Subject Code | 21CMAHS6080 | IA Marks | 15 |
| Number of Lecture Hours/Week | 1T+2P | Exam Marks | 35 |
| Total Number of Lecture Hours | 32 | Exam Hours | 3 |
| Credits - 2 | | | |
| Section A, Soft Skills | | | |
| Unit – 1: Communicative Competence | | | Hours |
| Verbal Reasoning: Reading Comprehension-Text Completion- Sentence EquivalenceSpotting Errors, Sequencing of Sentences, Parallelism in Structure<br><br>E-Mail Etiquette, Reporting NewsActivity: Completing Exercises | | | 6 |
| Unit 2: Career and Employability Skills | | | |
| What is a Career: Career vs Job, Career Values & Grid, Skills vs Strengths, Spotting Skills/Reflection of Present Skills, Meeting the Expectation of your Employer, Matching your Skills with the Required Skills, Preparing Resume, Preparing for Interviews & Structuring Answers<br><br>Activity: Resume Building, Interviews | | | 6 |
| Section B, Aptitude Builder | | | |
| Unit – 3: Time and Work | | | |
| Pipes and Cisterns: Problems on Unitary method, Relation between Men, Days, Hours and Work, Problems on Man-Day-Hours Method, Problems on Alternate Days, Problems on Pipes and Cisterns.<br><br>Time, Distance and Speed, Problems on Trains, Boats and Streams: Relation between Speed, Distance and Time, Converting km/h into m/s and vice versa , Problems on Average Speed, Problems on Relative Speed, Problems on Circular Tracks, Problems on Races<br><br>Problems on Trains: Two Trains Moving in Opposite Direction, Two Trains Moving in same Direction, A Train Crossing a Stationary Object of a Given Length like a Platform or Bridge, A Train Crossing a Stationary Object like a Pole or a Man Boats and Streams: Time Based, which can be considered as a Point Object Speed Based, Distance Based, Average Speed Based | | | 6 |
| Unit – 4: Logical and Analytical Reasoning | | | |
| Seating Arrangement: Linear Arrangement, Circular Arrangement, Tabler, Triangular Arrangement, ComplexArrangement.<br><br>Clocks :Finding the Angle When the Time is Given, Finding the Time When the Angle is Known, Relation between Angles, Minutes and Hours, Position of | | | 7 |

| | |
|---|---|
| Hands of the Clock, Time Gained or Lost by the Clock, Mirror /Water Image-based Time.<br><br>Calendars : Definition of a Leap Year, Finding the Number of Odd Days, Framing the Year Code for Centuries, Finding the Day of any Random Calendar Date<br><br>Syllogisms: Finding the Conclusions using Venn Diagram Method, Finding the Conclusions using Syllogism Method<br><br>Simple Interest: Definitions, Problems on Interest and Amount, Problems when Rate of Interest and Time Period are Numerically Equal<br><br>Compound Interest: Definition and Formula for Amount in Compound Interest, Difference between Simple Interest and Compound Interest for 2 Years on the Same Principle and Time Period. | |
| Unit – 5: Permutations, Probability, Areas and Volumes | |
| Definition of permutation, Problems on Permutations, Definition of Combinations, problems on Combinations<br><br>Probability: Definition of Probability, Problems on Coins, Problems on Dice, Problems on Deck of Cards, Problems on Years<br><br>Mensuration - 2D:Formulas for Areas, Formulas for Volumes of Different Solids, Problems on Areas<br><br>Mensuration - 3D: Problems on Volumes, Problems on Surface Areas | 7 |

| Text (T) / Reference (R ) Books: | |
|---|---|
| For Units 1 & 2 | |
| T1 | Enhance Your Employability Skills, David Winter and Laura Brammar, University of London |
| T2 | R.S. Agarwal, Verbal & Non-Verbal Reasoning, S. Chand & Co., Latest ed. 2003 |
| R2 | How to Prepare for Verbal Ability and Reading Comprehension, Arun Sharma, Meenakshi Upadhay, Mc Graw Hill |
| For Units 3, 4, & 5 | |
| T1 | R S Agarwal, S Chand, 'Quantitative Aptitude' |
| T2 | R S Agarwal, S.Chand , 'A modern approach to Logical reasoning' |
| R1 | Quantitative Aptitude for CAT By Arun sharma |
| R2 | GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials |

| ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE<br><br>Mandatory Course | | | |
|---|---|---|---|
| Subject Code | 21CDCDN6090 | IA Marks | 30 |
| Number of Lecture Hours/Week | 2 | Exam Marks | 70 |
| Total Number of Lecture Hours | 32 | Exam Hours | 03 |
| Credits – 00 | | | |

Course Objectives:

- The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
- Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
- The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system

| Unit -1: | Hours |
|---|---|
| Introduction to Traditional Knowledge: Define Traditional Knowledge- Nature and Characteristics- Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in global economy | 08 |
| Unit -2: | |
| Basic structure of Indian Knowledge System: AstadashVidya- 4 Ved - 4 Upaved (Ayurved,Dhanurved,GandharvaVed&SthapthyaAdi),6vedanga(Shisha,Kalppa,Nirukha,Vykaran,J yothisha&Chand),4upanga(Dharmashastra,Meemamsa,purana&Tharka Shastra). | 06 |
| Unit – 3: | |
| Modern Science and Indian Knowledge System-Indigenous Knowledge, Characteristics- Yoga and Holistic Health care-cases studies. | 06 |
| Unit – 4: | |
| Protection of Traditional Knowledge: The need for protecting traditional knowledge - Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge. | 06 |
| Unit – 5: | |
| Impact of Traditions: Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain &Boudh - Indian Artistic Tradition - Chitrakala, Moorthikala, Vasthukala , Sthapthya, Sangeetha, NruthyaYevamSahithya | 06 |

| Text(T) / Reference® Books: | |
|---|---|
| R1 | Traditional Knowledge System in India, by AmitJha, 2009. |
| R2 | Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012. |
| R3 | Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, BharatiyaVidya |
| R4 | Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan |

| | |
|---|---|
| R5 | Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata. |
| R6 | Pramod Chandra, India Arts, Howard Univ. Press, 1983. |
| R7 | Krishna Chaitanya, Arts of India, Abhinav Publications, 1987 |
| W1 | https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html |

Semester VII (Fourth year IV-I)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | HS | 21CDMST7010 | Management Science | 3 | 0 | 0 | 3 |
| 2 | PC | 21CDCDT7020 | ETL Principles | 3 | 0 | 0 | 3 |
| 3 | PE | 21CDCDP703X | Professional Elective -IV | 3 | 0 | 0 | 3 |
| 4 | PE | 21CDCDP704X | Professional Elective -V | 3 | 0 | 0 | 3 |
| 5 | OE | 21CDXXO705X | Open Elective - III | 3 | 0 | 0 | 3 |
| 6 | OE | 21CDXXO706X | Open Elective - IV | 3 | 0 | 0 | 3 |
| 7 | SOC | 21CDCDS7070 | ETL Design Procedures - Spark | 2 | 0 | 0 | 2 |
| 8 | PR | 21CDCDR7080 | Industrial/ Research internship 2 months(Mandatory) after III year (to be evaluated during VII Semester) | 0 | 0 | 0 | 3 |
| | | | | | Total credits | | 23 |

| Category | CREDITS |
|---|---|
| Professional core Courses | 3 |
| Humanities and Social Science | 3 |
| Open Electives | 6 |
| Professional Electives | 6 |
| Skill oriented course | 2 |
| Research Internship | 3 |
| TOTAL CREDITS | 23 |

| Professional Elective - IV | |
|---|---|
| Code | Course Title |
| A | Software Testing Methodologies |
| B | Data Visualization |
| C | Cloud Computing |

| Professional Elective - V | |
|---|---|
| Code | Course Title |
| A | Agile Software Development |
| B | Deep  Learning |
| C | Introduction to Cyber Security |

| MANAGEMENT SCIENCE | | | |
|---|---|---|---|
| Subject Code | 21CDMST7010 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 50 | Exam Hours | 03 |
| Credits – 03 | | | |

Course objectives:
To understand the concept of Management its nature importance, Management theories, concept of decision making and organization principles and structures.
To understand the concept of production management in the organization. Workstudy, SQC, inventory management and its techniques.
To understand the concept of HRM and its functions, Marketing Management, Strategic management its components.
To understand the concept of project management PERT, CPM and Project Crashing.
To understand the concepts of recent trends in management

| Unit -I: Introduction to Management | Hours |
|---|---|
| Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation–Decision-making process – DesigningorganizationStructure- Principles of organization - Types of organization structure. | 10 |
| Unit -II: Operations Management | |
| Nature &Objectives of OM-Production Methods-Plant Location & LayoutStudy &its significance – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C chart). Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis(HML,SDE, VED, and FSN analysis). | 10 |
| Unit-III: Functional Management & Strategic Management | |
| Functional Management: Concept of HRM, HRD and PMIR- Functions of HRM - Marketing Management- Functions of Marketing, Marketing strategies based on product Life Cycle, Channels of distributions.<br><br>Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives | 10 |
| Unit –IV: Project Management: (PERT/CPM) | |
| Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple | 10 |

| | |
|---|---|
| Problems). | |
| Unit-V: Contemporary Management Practices | |
| Basic concepts of MIS, MRP, Justin- Time (JIT) system, Total Quality Management (TQM), Six sigma , Supply Chain Management,<br><br>Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card. | 10 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science'*Cengage, Delhi, 2012. |
| T2 | Dr. A. R. Aryasri, *Management Science'* TMH 2011. |
| R1 | Koontz &Weihrich: 'Essentials of Management' TMH 2011 |
| R2 | Seth & Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011. |
| R3 | Robbins: Organizational Behaviors, Pearson Publications, 2011 |
| R4 | Kanishka Bedi: Production & Operational Management, Oxford Publications, 2011. |
| R5 | Manjunath: Management Science, Pearson Publications, 2013. |
| R6 | Biswajit Patnaik: Human Resource Management, PHI, 2011. |
| R7 | Hitt and Vijaya Kumar: Strategic Management, Cengage Learning. |

| ETL Principles | | | |
|---|---|---|---|
| Subject Code | 21CDCDT7020 | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |
| Course Objectives:<br>• Develop various applications with ETL principles | | | |
| Unit -1: ETL Data Structures | | | Hours |
| ETL Data Structures: To Stage or Not to Stage, Designing the Staging Area, Data Structures in the ETL System: Flat files, XML Data Sets, Relational Tables, Independent DBMS Working Tables, Third Normal Form Entity/Relation Models, Non-relational Data Sources, Dimensional Data Models, Fact Tables, Dimension Tables, Atomic and Aggregate Fact Tables, Surrogate Key Mapping Tables | | | 10 |
| Unit -2:Extracting | | | |
| Extracting: Logical Data Map, Components of the Logical Data Map, Using Tools for the Logical Data Map, Building the Logical Data Map- Data Discovery Phase, Data Content Analysis, Collecting Business rules in the ETL Processes, Integrating Heterogeneous Data Sources, Challenge of Extracting from Disparate Platforms, Flat files, XML Sources, Web Log Sources, ERP System Sources | | | 10 |
| Unit – 3:Cleaning and Conforming, Delivering Dimension Tables | | | |
| Cleaning and Conforming: Defining Data Quality, Cleaning Deliverables, Known Table Row Counts, Column Nullity, Column Numeric and Date Ranges, Column Length Restriction, Column Explicit Valid Values, Column Explicit Invalid Values, Conformed Dimensions, Designing the Conformed Dimensions, Conformed Facts Delivering Dimension Tables: The Basic Structure of a Dimension, The Grain of a Dimension, Flat Dimensions and Snow flaked Dimensions, Date and Time Dimensions, Big Dimensions, Small Dimensions, Dimensional Roles, Degenerate Dimensions, Slowly Changing Dimensions, Multivalued Dimensions and Bridge Tables | | | 10 |
| Unit – 4:Delivering Fact Tables | | | |
| Delivering Fact Tables: Basic Structure of a Fact Table, Surrogate Key Pipeline, | | | 10 |

SOFTWARE TESTING METHODOLOGIES

(PROFESSIONAL ELECTIVE-IV)

| | |
|---|---|
| Fundamental Grains: Transaction Grain Fact Tables, Periodic Snapshot Fact Table, Accumulating Snapshot Fact Tables, Managing Indexes, Managing Partitions, Outwitting the Rollback Log, Loading the Data, Incremental Loading, Inserting Facts, Updating and Correcting Facts, Negating Facts, updating Facts, Deleting Facts, Fact less Fact Tables | |
| Unit – 5:Operations | |
| Operations: Scheduling and Support, Migrating to Production, Achieving optimal ETL performance: Estimating Load Time, Vulnerabilities of Long-Running ETL processes, Minimizing Risk of Load Failures, Purging Historic Data, Monitoring ETL System: Measuring ETL Specific Performance Indicators, Measuring Infrastructure Performance Indicators, Tuning ETL Processes, ETL System Security | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Ralph Kimball, Joe Caserta, “The Data Warehouse ETL Toolkit: Practical Techniques for Extracting, Cleaning, Conforming, and Delivering Data,” Wiley, 2004. |
| R1 | Silvers, Fon, “Building and Maintaining a Data Warehouse,” Ukraine: CRC Press, 2008. |
| W1 | https://www.coursera.org/learn/extract-transform-and-load-data |

| Subject Code | 21CDCDP703A | IA Marks | 30 |
|---|---|---|---|
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives: The main objectives are

- To study fundamental concepts in software testing and discuss various software testing issues and solutions in software unit, integration, regression and system testing
- To learn how to plan a test project, design test cases and data, conduct testing, manage software problems and defects, generate a test report
- To expose the advanced software testing concepts such as object-oriented software testing methods, web-based and component-based software testing
- To understand software test automation problems and solutions
- To learn how to write software test documents and communicate with engineers in various forms

| Unit -1 | Hours |
|---|---|
| Introduction:<br><br>Purpose of Testing, Dichotomies, Model for Testing, Levels of Testing,Basicdefinitions,SoftwareTestingPrinciples,TheTester‘sRoleinaSoftwareDevelopment, Consequences of Bugs, Taxonomy of Bugs.<br><br>Flow graphs and Path testing:<br><br>Basics Concepts of Path Testing, Predicates, Path Predicates and AchievablePaths, Path Sensitizing, Path Instrumentation, Applications of Path Testing. | 10 |
| Unit -2 | |
| Transaction Flow Testing:<br><br>Transaction Flows, Transaction Flow Testing Techniques.<br><br>Dataflow testing:<br><br>BasicsofDataflowTesting,StrategiesinDataflowTesting,ApplicationofDataflow Testing | 10 |
| Unit – 3 | |
| Paths and Regular expressions:<br><br>PathExpression,ReductionProcedure,Applications,RegularExpressions&Flow Anomaly Detection.<br><br>Syntax Testing:<br><br>Grammarforformats,TestCaseGeneration,ImplementationandApplicationand Testability Tips | 10 |
| Unit – 4 | |

| | |
|---|---|
| LogicBasedTesting:<br><br>Overview,Decision Tables, KV Charts, and Specifications<br><br>State, State Graphs and Transition Testing:<br><br>State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.<br><br>Graph Matrices and Application: -<br><br>Motivationaloverview,matrixofgraph,relations,powerofamatrix,nodereduction algorithm. | 10 |
| Unit – 5 | |
| Software Testing Tools:<br><br>Introduction to Testing, Automated Testing, Concepts of Test Automation,skills needed for automation, scope of automation, challenges in automation,Introduction to testing tools like Win runner, Load Runner, Selenium andworking with selenium | 08 |

Text(T) / Reference(R) Books:

| | |
|---|---|
| T1 | "Softwaretestingtechniques"–BorisBeizer,Dreamtech,secondedition. |
| T2 | "Software Testing"- Yogesh Singh, Camebridge |
| R1 | "The Craft of software testing" - Brian Marick, Pearson Education. |
| R2 | "Software Testing", N.Chauhan, Oxford University Press. |
| R3 | "Introduction to Software Testing", P.Ammann&J.Offutt, Cambridge Univ.Press. |
| R4 | "Effective methods of Software Testing", Perry, John Wiley, 2nd Edition, 1999. |
| R5 | "FoundationsofSoftwareTesting",D.Graham,CengageLearning |
| W1 | https://www.coursera.org/courses?query=software%20testing |
| W2 | https://www.edx.org/course/software-testing-fundamentals-usmx-umuc-stv1-1x-4 |

| DATA VISUALIZATION<br><br>(PROFESSIONAL ELECTIVE-IV) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP703B | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The main objective of this course is to make it easier to identify patterns, trends and outliers in large data sets

| Unit -1 | Hours |
|---|---|
| INTRODUCTION TO VISUALIZATION: Visualizing Data-Mapping Data onto Aesthetics, Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes- Cartesian Coordinates, Nonlinear Axes, Coordinate Systems with Curved Axes, Color Scales-Color as a Tool to Distinguish, Color to Represent Data Values, Color as a Tool to Highlight, Directory of VisualizationsAmounts, Distributions, Proportions, x–y relationships, Geospatial Data | 10 |
| Unit -2 | |
| VISUALIZING DISTRIBUTIONS: Visualizing Amounts-Bar Plots, Grouped and Stacked Bars, Dot Plots and Heatmaps, Visualizing Distributions: Histograms and Density Plots-Visualizing a Single Distribution, Visualizing Multiple Distributions at the Same Time, Visualizing Distributions: Empirical Cumulative Distribution Functions and Q-Q Plots-Empirical Cumulative Distribution Functions, Highly Skewed Distributions, Quantile Plots, Visualizing Many Distributions at Once-Visualizing Distributions Along the Vertical Axis, Visualizing Distributions Along the Horizontal Axis | 10 |
| Unit – 3 | |
| VISUALIZING ASSOCIATIONS & TIME SERIES: Visualizing Proportions-A Case for Pie Charts, A Case for Side-by-Side Bars, A Case for Stacked Bars and Stacked Densities, Visualizing Proportions Separately as Parts of the Total ,Visualizing Nested Proportions- Nested Proportions Gone Wrong, Mosaic Plots and Tree maps, Nested Pies ,Parallel Sets. Visualizing Associations Among Two or More Quantitative Variables-Scatterplots, Correlograms, Dimension Reduction, Paired Data. Visualizing Time Series and Other Functions of an Independent Variable-Individual Time Series , Multiple Time Series and Dose– Response Curves, Time Series of Two or More Response Variables | 10 |
| Unit – 4 | |

| | |
|---|---|
| VISUALIZING UNCERTIANITY: Visualizing Trends-Smoothing, Showing Trends with a Defined Functional Form, De trending and Time-Series Decomposition, Visualizing Geospatial Data-Projections, Layers, Choropleth Mapping, Cartograms, Visualizing Uncertainty-Framing Probabilities as Frequencies, Visualizing the Uncertainty of Point Estimates, Visualizing the Uncertainty of Curve Fits, Hypothetical Outcome Plots | 10 |
| Unit – 5 | |
| PRINCIPLE OF PROPORTIONAL INK: The Principle of Proportional Ink-Visualizations Along Linear Axes, Visualizations Along Logarithmic Axes, Direct Area Visualizations, Handling Overlapping PointsPartial Transparency and Jittering, 2D Histograms, Contour Lines, Common Pitfalls of Color Use-Encoding Too Much or Irrelevant Information ,Using Non monotonic Color Scales to Encode Data Values, Not Designing for Color-Vision Deficiency | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Claus Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", 1st edition, O'Reilly Media Inc, 2019. |
| T2 | OssamaEmbarak, Data Analysis and Visualization Using Python: Analyze Data to Create Visualizations for BI Systems, Apress, 2018 |
| R1 | Tony Fischetti, Brett Lantz, R: Data Analysis and Visualization, O'Reilly, 2016 |

| CLOUD COMPUTING<br><br>(PROFESSIONAL ELECTIVE-IV) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP703C | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. To explain the evolving computer model caned cloud computing.
2. To introduce the various levels of services that can be achieved by the cloud.
3. To describe the security aspects of the cloud.
4. To motivate students to do programming and experiment with the various cloud computing environments.

| Unit -1: Systems Modeling, Clustering and Virtualization: | Hours |
|---|---|
| Scalable Computing over the Internet-The Age of Internet Computing, Scalable computing over the Internet, Technologies for Network-Based Systems, System models for Distributed and Cloud Computing, Performance, Security and Energy Efficiency | 10 |
| Unit -2:Virtual Machines and Virtualization of Clusters and Data Centers | |
| Implementation Levels of Virtualization, Virtualization Structures/ Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation. | 10 |
| Unit – 3:Cloud Platform Architecture | |
| Cloud Computing and Service Models, Public Cloud Platforms, Service Oriented Architecture, Programming on Amazon AWS and Microsoft Azure | 10 |
| Unit – 4: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, and Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds-Fair Queuing, Start Time Fair Queuing. | 10 |
| Unit – 5:Storage Systems | |
| Evolution of storage technology, storage models, file systems and database, distributed file systems, and general parallel file systems. Google file system. | 08 |

Text(T) / Reference(R) Books:

| | |
|---|---|
| T1 | Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier. |
| T2 | Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier. |

| | |
|---|---|
| R1 | Cloud Computing, A Hands-on approach, ArshadeepBahga, Vijay Madisetti, University Press |
| R2 | Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH |
| R3 | Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH |

| AGILE SOFTWARE DEVELOPMENT<br><br>(PROFESSIONAL ELECTIVE-V) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP704A | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The objectives of this subject are to: Organize Agile Software Development, Extreme Programming and Software

- Development Rhythms. Describe their unique features relative to traditional software practices.

- Examine their applications in the real world and addresses their impacts on developing software.

| Unit -1: INTRODUCTION | Hours |
|---|---|
| Introduction: Need of Agile software development, agile context– Manifesto, Principles, Methods, Values, Roles, Artifacts, Stakeholders, and challenges. Business benefits ofsoftware agility | 10 |
| Unit -2: PROJECT PLANNING | |
| Project Planning: Recognizing the structure of an agile team– Programmers, Managers, Customers. User stories– Definition, Characteristics and content. Estimation– Planning poker, Prioritizing, and selectinguser stories with the customer, projecting team velocity for releases and iterations | 10 |
| Unit – 3:PROJECT DESIGN | |
| Project Design: Fundamentals, Design principles–Single responsibility, Open-closed, Liskov substitution, Dependency-inversion, Interface-segregation. | 10 |
| Unit – 4:DESIGN METHODOLOGIES | |
| Design Methodologies: Need of scrum, Scrum practices –Working of scrum, Project velocity, Burn down chart, Sprint backlog, Sprint planning and retrospective, Daily scrum, Scrum roles– Product Owner, Scrum Master, Scrum Team. Extreme Programming- Core principles, values, and practices. Kanban, Feature-driven development, Lean software development. | 10 |

| Unit – 5:TESTING | | |
|---|---|---|
| Testing: The Agile lifecycle and its impact on testing, Test driven development– Acceptance tests and verifying stories, writing a user acceptance test, Developing effective test suites, Continuous integration, Code refactoring. Risk based testing, Regression tests, Test automation. | | 08 |
| Text(T) / Reference(R) Books: | | |
| T1 | Ken Schawber, Mike Beedle, “Agile Software Development with Scrum”, International Edition, Pearson. | |
| T2 | Robert C. Martin, “Agile Software Development, Principles, Patterns and Practices”, First International Edition, Prentice Hall. | |
| T3 | Pedro M. Santos, Marco Consolaro, and Alessandro Di Gioia, “Agile Technical Practices Distilled: A learning journey in technical practices and principles of software design”, First edition, Packt Publisher. | |
| R1 | Lisa Crispin, Janet Gregory, “Agile Testing: A Practical Guide for Testers and Agile Teams, International edition, Addison Wesley. | |
| R2 | Alistair Cockburn, “Agile Software Development: The Cooperative Game”, 2nd Edition, Addison-Wesley | |
| W1 | “Agile Software Development”, https://www.edx.org/course/agile-software-development Accessed on August 27, 2021. | |
| W2 | “Agile Software Development”, https://www.coursera.org/learn/agile-software-development Accessed on August 27, 2021 | |
| | | |

| DEEP LEARNING<br><br>Professional Electives-V | | | |
|---|---|---|---|
| Subject Code | 21CDCDP704B | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. Learn deep learning methods for working with sequential data.
2. Learn deep recurrent and memory networks.
3. Learn deep Turing machines.
4. Apply such deep learning mechanisms to various learning problems.
5. Know the open issues in deep learning, and have a grasp of the current research directions.

| Unit -1: Fundamentals of Deep Learning | Hours |
|---|---|
| Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient Boosting Machines, Fundamentals of Machine Learning: Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting. | 10 |

| | |
|---|---|
| Unit -2:Introducing Deep Learning | |
| Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. | 10 |
| Unit – 3:Neural Networks | |
| Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification. | 10 |
| Unit – 4:Convolutional Neural Networks | |
| Nerual Network and Representation Learing, Convolutional Layers, Multichannel Convolution Operation, Recurrent Neural Networks: Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. | 10 |
| Unit – 5:Interactive Applications of Deep Learning | |
| Machine Vision, Natural Language processing, Generative Adversial Networks, Deep Reinforcement Learning.Deep Learning Research: Autoencoders, Deep Generative Models: Boltzmann Machines Restricted Boltzmann Machines, Deep Belief Networks. | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Deep Learning- Ian Goodfellow, Yoshua Bengio and Aaron Courvile, MIT Press, 2016 |
| T2 | Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications, ISBN: 9781617294433 |
| T3 | Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821 |
| T4 | Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412 |
| R1 | Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009. |
| R2 | Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013. |
| R3 | Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004. |
| W1 | Swayam NPTEL: Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview |

| INTRODUCTION TO CYBER SECURITY<br><br>(Professional Electives-V) | | | |
|---|---|---|---|
| Subject Code | 21CDCDP704C | IA Marks | 30 |
| Number of Lecture Hours/Week | 3 | Exam Marks | 70 |
| Total Number of Lecture Hours | 48 | Exam Hours | 03 |
| Credits – 03 | | | |

Course Objectives:

The learning objectives of this course are:

1. The Cyber Security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
2. Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

| Unit -1: Introduction to Cybercrime | Hours |
|---|---|
| Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens | 10 |
| Unit -2: Cyber offenses | |
| How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cyber Cafe, and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing. *Cybercrime Mobile and Wireless Devices:*Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, *Mobile Devices:* Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops. | 10 |
| Unit – 3: Tools and Methods Used in Cybercrime | |
| Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, *Phishing, and Identity Theft:* Introduction, Phishing, Identity Theft (IDTheft) | 10 |
| Unit – 4: Cybercrimes and Cyber security | |
| Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information | 10 |

| | |
|---|---|
| Security Blueprint, Security education, Training and awareness program, Continuing Strategies? | |
| Unit – 5: Understanding Computer Forensics | |
| Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Ant forensics | 08 |

| Text(T) / Reference(R) Books: | |
|---|---|
| T1 | Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley. |
| T2 | Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning. |
| R1 | Information Security, Mark Rhodes, Ousley, MGH. |
| W1 | https://www.edx.org/learn/cybersecurity |
| W2 | https://www.cyberdegrees.org/resources/free-online-courses/ |

| ETL DESIGN PROCEDURES-SPARK | | | |
|---|---|---|---|
| Subject Code | 21CDCDS7070 | IA Marks | 15 |
| Number of Tutorial Hours/Week | 1T+02(P) | Exam Marks | 35 |
| Total Number of Practice Hours | 36 | Exam Hours | 03 |
| Credits – 2 | | | |

Course Objective:

- Get exposure on Spark for ETL

List of Experiments:

1. Write a program to create a SparkSession and read the data from CSV file

2. Write a program to group record of Supermarket's sales data of Kaggle Dataset by Gender

3. Write a program to create a Spark Session and display DataFrame of employee.json

4. Write a program to perform various operations of SparkSQL

5. Write a program to create a new data pipeline with ApacheSpark

6. Write a program to Run SQL queries on the data in Parquet table

7. Write a program to develop Parquet table to a platform data container.

8. Write a program to Run SQL queries on the data in NoSQL table

9. Write a program to change the data in an existing Delta Lake table

10. Write a program to create a new ingestion pipeline with ApacheSpark

Semester VIII (Fourth year IV-II)

| S.No | Category | Code | Course Title | Hours | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1 | PR | | Major Project Work | 0 | 0 | 24 | 12 |
| | | | | | | Total credits | 12 |

| Category | CREDITS |
|---|---|
| Project | 12 |
| TOTAL CREDITS | 12 |

OPEN ELECTIVES COURSES OFFERED BY CSE (DATA SCIENCE)

TO

OTHER DEPARTMENTS

V SEM OPEN ELECTIVE COURSES

| S. No | Subject Code | Name of the subject | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| 1. | 21XXCSO50XA | Data Structures through C | 3 | 0 | 0 | 3 |
| 2. | 21XXCSO50XB | Operating Systems Concepts | 3 | 0 | 0 | 3 |
| 3. | 21XXCSO50XC | Java Programming | 3 | 0 | 0 | 3 |

VI SEM OPEN ELECTIVE COURSES

| S. No | Subject Code | Name of the subject | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| 1. | 21XXCSO60XA | R Programming | 3 | 0 | 0 | 3 |
| 2. | 21XXCSO60XB | Designing Data Base Management Systems | 3 | 0 | 0 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | 21XXCSO60XC | APP Technologies | 3 | 0 | 0 | 3 |

VII SEM OPEN ELECTIVE COURSES

| S. No | Subject Code | Name of the subject | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| 1. | 21XXCSO70XA | Web Technologies | 3 | 0 | 0 | 3 |
| 2. | 21XXCSO70XB | Artificial Intelligence | 3 | 0 | 0 | 3 |
| 3. | 21XXCSO70XC | Software Engineering | 3 | 0 | 0 | 3 |