SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

Approved by A.I.C.T.E., New Delhi, Affiliated to JNT University, Ananthapuramu
Accredited by NBA (ECE & CSE), Accredited by NAAC (Grade-A)
An ISO 9001:2015 Certified Institution, 2(f) &12(B) recognition by UGC Act, 1956
NH-40, NANDYAL-518501 (Dist), A.P.

Learn - Grow - Empower

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

MASTER OF COMPUTER APPLICATION

Regular Two Year PG Degree Course
(Applicable for the Batches Admitted from 2023-24)

R-23

www.srecnandyal.edu.in

SANTHIRAM ENGINEERING COLLEGE: NANDYAL

ACADEMIC RULES & REGULATIONS

(Effective for the students admitted into I year from the Academic Year 2023-2024)

Santhiram Engineering College offers **Two Years (Four Semesters)** full-time Master of Computer Applications Post Graduate Degree programme under Choice Based Credit System (CBCS).

1. Award of the MCA Degree:

A student will be declared eligible for award of degree, if he/she fulfils the following academic regulations:

i. Effective for students admitted into first year from the Academic year 2023-2024.
ii. Pursues a course of study for not less than two academic years and not more than four academic years.
iii. Registers for 102 credits and secures all 102 credits.
iv. A Student who secures highest percentage of marks in the batch will be honoured with gold medal.
v. A Student who secures second highest percentage of marks in the batch will be honoured with silver medal.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within four academic years from the year of their admission, shall forfeit their seat in MCA course and their admission stands cancelled.

3. Programme of Study:

The following program of study is offered at present for specialization in the MCA is given Table1:

Table 1: Programs Offered

S.No	Name of the Specialization	Program code
1	Master of Computer Applications (MCA)	00

4. Eligibility for Admissions:

i. Admission to the MCA programme shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University for each programme, from time to time.
ii. Admissions shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying Examination / the merit rank obtained by the qualified student in an entrance test conducted by A.P. State Government (APICET) for MCA programmes/an entrance test conducted by university/ on the basis of any other exams approved by the University, subject to reservations as laid down by the Govt. from time to time.

5. Programme related terms:

i. ***Credit:*** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
4 Week MOOCs course	1 credit

ii. ***Academic Year:*** Two consecutive (one odd + one even) semesters constitute one academic year.

iii. ***Choice Based Credit System (CBCS):*** The CBCS provides choice for students to select from the prescribed courses.

6. Programme Pattern:

i. Total duration of the of MCA programme is two academic years
ii. Each academic year of study is divided into two semesters.
iii. Each Semester shall be of 16 weeks duration (exclusive of Mid Examinations), with a minimum of 90 days per Semester.
iv. The student shall not take more than four academic years to fulfill all the academic requirements for the award of MCA degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in MCA programme.
v. The medium of instruction of the programme (including examinations and project reports) will be in **English** only.
vi. All subjects/courses offered for the MCA programme are broadly classified as given in Table 2.

Table 2: Subject Course Classification

S.No	Course Group/Category	Course Description
Core Courses (CC)		
1	Foundational & Professional Core Courses (PC)	Includes subjects related to the parent discipline
Choice Based Credit System (CBCS)		
2	Professional Electives - PE	Includes elective subjects related to the parent discipline / Department / Branch of Engineering
3	General Elective - GE	Elective subjects which include inter disciplinary subjects or subjects in an area outside the parent discipline which are of importance in the context of special skill development.
Research		
4	IPR / Research Methodology	To Understand importance and process of creation of patents through research
5	Seminar	Ensures preparedness of students to undertake major projects / Dissertation, based on core contents related to specialization.
6	Internship/Mini Project	Industry oriented Internship / Mini Project
7	Project Work	Major Project
Skill Development Courses		
8	Skill Courses (SC)	Courses that focus on imparting skills to students to make them employable
Comprehensive Viva Voce		
9	Viva Voce	To test the student's learning and understanding during the course of their specialization
Mandatory Non-Credit Courses (MC)		
10	Audit Courses	Covering subjects of developing desired attitude among the learners

vii. A faculty advisor/mentor shall be assigned to advise students on the programme, its Course Structure and Curriculum, Choice of Courses, based on his/her competence, progress, pre-requisites and interest.
viii. The list of standard MOOCs providers including SWAYAM & Evaluation procedure for these courses shall be approved by its corresponding Board of Studies and Academic Council.
ix. The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies.

x. The Project work shall be initiated at the beginning of the IV Semester and the duration of the Project work is for one semester.

xi. Preferably 25% course work for the theory courses in every semester shall be conducted in the blended mode of learning.

7. Semester Structure:

Each academic year is divided into TWO semesters (one odd + one even). Each semester shall be of 16 weeks duration exclusive of Mid examinations, with a minimum of 90 instructional days per semester.

Apart from the regular semester end examinations, the college will also schedule and conduct **supplementary examinations** for all courses. Such students, who are writing supplementary examinations as supplementary candidates, may have to write more than one examination per day.

8. Attendance Requirements:

i. A student shall be eligible to appear for the Semester end examinations if he/she acquires
   a) a minimum of 50% attendance in each course and
   b) 75% of attendance in aggregate of all the subjects.

ii. Condonation of shortage of attendance in aggregate up to 10% (65% above and below 75%) in each semester may be granted by the College Academic Committee.

iii. Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class.

v. A stipulated fee shall be payable towards condonation of shortage of attendance.

vi. A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester. They may seek re-admission into that semester when offered next.

vii. If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

viii. If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

9. Assessment and Evaluation Methodology:

The performance of a student in each course shall be evaluated based on Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). The evaluation pattern is given in Table 4.

Table 4: Evaluation Pattern

S.No	Category of Course	Marks		
		CIE	SEE	TOTAL
1	Theory courses	40	60	100
2	Laboratory courses	40	60	100
3	Skill Courses	40	60	100
4	Mandatory Non-Credit Courses	40	***	40
5	Technical Seminar	100	***	100
6	Comprehensive Viva Voce	***	100	100
7	Summer break Short Term Internship	50	***	50
8	Industrial Oriented Internship	***	100	100
9	Project work	100	100	200

10. Evaluation – Distribution and Weightage of Marks:

A candidate shall be deemed to have secured the minimum academic requirement in a subject if he/she secures a minimum of 40% of marks in the Semester End Examinations and a minimum aggregate of 50% of the total marks in the Internal Evaluation and Semester End Examination taken together.

10.1 Theory Courses:

a. Continuous Internal Evaluation (CIE):

i. There shall be six units in each of the theory subjects.

ii. For each theory course, during the semester, there shall be two CIEs. Each CIE will be evaluated for 40 marks. The first CIE will be conduct for around 50% [3 Units] of the syllabus and the second CIE will be conduct for the remaining 50% [3 Units] of the syllabus.

The duration of CIE examination is 120 minutes (20 Minutes for Objective & 100 Minutes for Subjective).

a. There shall be 3 questions and all questions are compulsory.

b. Questions 1-3 contains **THREE (totally three questions from 1 to 6)** either or type questions of which student has to answer one from each either-or type question. Each question carries 10 marks. The evaluation for each subjective midterm examination is totally 30 Marks.

c. The first midterm will be conducted for 50% [3 units] of the syllabus and the Second midterm will be conducted for the remaining syllabus [3 units].

d. Objective paper shall be set for maximum of 20 bits for 10 marks. The time duration for the objective paper is 20 minutes. There shall be online/offline examination conducted during the respective mid examinations by the college.

e. If the student is absent for the CIE examination, no re-exam shall be conducted and marks for that examination shall be considered as zero.

iii. The internal assessment for theory subject during a semester is as given in Table 5.

Table 5: Continuous Internal Evaluation for Theory courses

Mid-term	Type	Final Evaluation	Marks
MID-I	Objective & Subjective Test	Final mid marks are evaluated as **(Max. of Mid-I & Mid-II) * 0.8 + (Min. of Mid-I & Mid-II) * 0.2**	40 M
MID-II	Objective & Subjective Test		

b. Semester End Examinations (SEE):

The following pattern shall be followed in the Semester End Examination:

i. Six questions shall be set from each of the six units with either-or type for 10 marks each.

ii. All the questions have to be answered compulsorily.

iii. Each question may consist of one, two or more bits.

iv. A candidate has to secure a minimum of 40% of marks in the Semester end exam and 50% marks (combining both internal and external) to be declared successful. If he/she fails to obtain the minimum marks, he/she has to reappear for the same during the supplementary examinations as and when conducted.

v. ***There shall be online evaluation for semester theory end examinations. The evaluation is completely online. A minimum of 50% of theory courses shall be sent for online external evaluation. Remaining courses evaluation shall be done by online internal evaluation.***

10.2. Practical Courses:

a. Continuous Internal Evaluation (CIE):

The Continuous Internal Evaluation (CIE) for each laboratory course is based on the following parameters given, in Table 6.

Table 6: Laboratory/Practical/Skill-oriented Courses Internal Assessment

Parameter	Marks
Day to day work	10
Record	10
Internal Laboratory Examinations	20
Total Marks:	**40**

b. Semester End Examinations (SEE):

i. For laboratory/practical, the semester end examination shall be evaluated by a committee consisting of one External examiner and two internal examiners, and the components for evaluation as given in Table 7.

Table 7: External Assessment for Laboratory/Practical

External evaluation committee:	Components	Marks
1. External Examiner 2. Internal Examiner-I 3. Internal Examiner-II	Writing the Program	20
	Expected Output	10
	Successful Program Execution on System	20
	Viva Voce	10
	Total Marks:	**60**

ii. The Head of the Department shall appoint the internal examiners and External examiner shall be appointed by the Principal from a panel contains three members submitted by the Head of the Department.

iii. A candidate has to secure a minimum of 50% of marks to be declared successful. If he/she fails to obtain the minimum marks, he/she has to reappear for the same during the supplementary examinations as and when conducted.

10.3 Skill Courses:

a. Continuous Internal Evaluation (CIE):

i. The course shall be evaluated through continuous internal evaluation during the semester for 40 marks.

ii. Day-to-day work in the class / laboratory shall be evaluated for 40 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test.

b. Semester End Examination:

i. The Semester end examination shall be evaluated for 60 marks.

ii. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

If a student chooses to take a certificate course/Skill Course, student shall follow the following procedure:

i. The student shall be given an option to choose either the skill courses being offered by college or to choose a certificate course being offered by industries/professional bodies or any other accredited bodies.
ii. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency.
iii. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.
iv. The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the college at the beginning of the semester.
v. If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the college.
vi. A candidate has to secure a minimum of 50% of marks to be declared successful. If he/she fails to obtain the minimum marks, he/she has to reappear for the same during the supplementary examinations as and when conducted.
vii. The duration of the certificate course done either online or offline must be of minimum 30 hours.
viii. Any certificate is valid for only one time during the course work to get credits / marks.

10.4 Comprehensive Viva-Voce:

i. Comprehensive Viva-Voce examination is conducted in all the subjects of four semesters of the course for 100 marks at the end of fourth semester externally by a committee consisting of Head of the department along with two senior faculty members of the department.
ii. A student shall acquire Two credits assigned to the Comprehensive Viva–voce when he/she secures 50% or more marks for the total of 100 marks. If he/she fails to obtain the minimum marks, he/she has to reappear for the same as and when supplementary examinations are conducted.
iii. There shall be **no internal marks** for the Comprehensive Viva-Voce.

10.5 Mandatory Non-Credit Course:

There shall be **no semester end examination for Mandatory Non-Credit Course (Audit Courses)** with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the audit course only when he/she secures 50% or more in the Continuous Internal Assessment.

The duration of CIA examination for non-credit course is 120 minutes and question paper pattern for CIA as follows,

i. There shall be THREE questions and all questions are compulsory.
ii. Questions 1-3 contains **THREE (totally three questions from 1 to 6)** either/ or type questions of which student has to answer one from each either-or type question. Each question carries 10 marks. The evaluation for each subjective midterm examination is totally 30 Marks.
iii. The first midterm will be conduct for around 50% of the syllabus and the rest of the

midterm will be conduct for the remaining syllabus.

iv. If the student is absent for the CIE examination, no re-exam shall be conducted and marks for that examination shall be considered as zero.

v. A candidate has to secure a minimum of 50% of marks to be declared successful. If he/she fails to obtain the minimum marks, he/she has to reappear for the same during the supplementary examinations as and when conducted.

vi. Final or consolidated CIE marks will be calculated by considering the marks secured by the student in both the CIEs with 80% weightage given to the better CIE and 20% to the other.

10.6 Technical Seminar:

i. Technical Seminar is conducted in the II semester for internal evaluation of 100 marks.

ii. The assessment of seminar shall be evaluated by a committee consisting of Head of the department, supervisor along with two senior faculty members.

iii. The student has to secure a minimum of 50% of marks, to be declared successful. If he fails to obtain the minimum marks, he/she has to reappear for the same as and when supplementary examinations are conducted.

iv. There is no Semester End Examination Evaluation.

10.7 Summer Break Short Term Internship:

i. Summer break short Term Internship either onsite or virtual with a minimum of six to eight weeks duration, done at the end of First year is mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, software MNCs or any industries in the areas of concerned specialization.

ii. Evaluation of the Summer Break Short Term Internship shall be through the departmental committee in III Semester. A student will be required to submit a summer break short Term internship report along with internship completed certificate to the department and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 40% and 60% weightages, respectively.

iii. The Internal evaluation of the Summer Break short Term Internship as given in Table 8 and there shall be no Semester End Examination evaluation.

Table 8: Internal Assessment of Summer break short term Internship

External evaluation committee :	Components	Marks
1. Supervisor 2. Senior Faculty Member 3. Internship Coordinator 4. Head of the Department	Internship Report	20
	Presentation	30
	Total Marks:	**50**

iv. The College shall facilitate and monitor the student internship program. Completion of internship is mandatory and secure minimum 50% or more marks along with internship certification. If any student fails to complete, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

10.8 Industrial Oriented Internship:

i. Industrial Oriented Internship either onsite or virtual II year II Semester (i.e., IV Semester) is mandatory. It shall be completed in collaboration with local industries, software MNCs or any industries in the areas of concerned specialization.
ii. Evaluation of the Industrial Oriented Internship shall be through the departmental committee in IV Semester. A student will be required to submit an internship report to the department and appear for an oral presentation before the departmental committee. A certificate from industry shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages, respectively.
iii. It shall be evaluated for 100 external marks. There shall be no internal marks.
iv. The Assessment for the Industrial Oriented Internship as given in Table 9
v. A student shall secure minimum 50% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted.

Table 9: Assessment of Industrial Oriented Internship

External evaluation committee:	**Components**	**Marks**
1. Supervisor 2. Internship Coordinator 3. Head of the Department	Internship Report	40
	Seminar	60
	Total Marks:	**100**

10.9. Project work:

The evaluation of the Project work is for 200 marks with 100 marks for internal evaluation and 100 marks for external evaluation.

a. Continuous Internal Evaluation (CIE):

i. A candidate is permitted to register for the Project Work in III Semester after satisfying the attendance requirement in all the subjects, both theory and laboratory (in I & II semesters).
ii. A candidate is initiated at the beginning of the IV Semester and the duration of the Project work is for one semester.
iii. Continuous assessment of Project Work will be monitored by the PRC.
iv. A Project Review Committee (PRC) shall be constituted with the Head of the Department as Chairperson, Project Supervisor and Project Coordinator of the MCA department.
v. The internal evaluation of Project work is 100 marks
vi. A candidate is permitted to submit Project Thesis with the approval of PRC.
vii. The candidate shall submit status report by giving seminars in two phases in IV semester during the project work period. These seminar reports must be approved by the PRC before submission of the Project Thesis.
viii. The Project Work Review – I & Review-II in IV semester is evaluated by PRC for 30 internal marks for each review evaluated by the PRC and the supervisor will evaluate the work for the other 40 marks. The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature survey in the same domain and progress of the Project Work.
ix. The distribution of the marks for Continuous internal Assessment is given in the Table 10.

Table 10: Project work Internal Assessment

Project Review committee	Components	Marks
1. Supervisor 2. Project Coordinator 3. Head of the Department	Review – I	30
	Review – II	30
	Supervisor	40
	Total Marks:	**100**

x. A candidate to secure a minimum of 50% of marks in each review assessed by PRC. If the candidate fails to fulfil requirements, they must reappear the project review after two weeks.

b. Semester End Examination:

i. External evaluation of final Project work viva voce in IV semester shall be for 100 marks.

ii. Make any changes and incorporate the suggestions advised by the PRC Committee in project thesis and submit the same for plagiarism checking to examination section with stipulated fee. The candidate allows the similarity content less than 30% and should be include in dissertation, if candidate fails the requirement, then the project thesis is rejected for further proceedings.

iii. Research paper related to the Project Work shall be published in conference proceedings/UGC recognized journal. A copy of the published research paper shall be attached to the dissertation.

iv. The Project Viva voce examinations shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who has adjudicated the dissertation.

v. The External examiner shall be appointed by the Principal from a panel contains three members submitted by the Head of the Department.

vi. Project Thesis Evaluation (Viva voce) in IV Semester is evaluated for external evaluation of 100 marks. The marks distribution of the Semester end evaluation as follows by the Table 11.

Table 11: Project work External Assessment

Committee constituted by the Department	Components	Marks
1. External Examiner 2. Project Coordinator 3. Head of the Department	Viva-Voce	60
	Project Report	40
	Total Marks:	**100**

The candidate has to secure a minimum of 50% marks in Viva voce examination. If candidate fails to fulfill the requirements as specified, he will reappear for the Project Viva voce examination only after three months. In the reappeared examination also, if candidate fails to fulfill the requirements, he will not be eligible for the award of the degree.

10.10 Co-Curricular Activities:

The college shall be introducing Co-Curricular activities in IV semester with TWO credits. The student must be participating in Co-Curricular / extra-curricular activities such as publishing a paper or participating in a National / International workshops / symposium / seminar / training organized by any private institution / Govt. organization / Training centers in virtual/offline mode. The student has to participate in Co-Curricular activities during their program duration and submit the certificate at the end of the IV semester. If he/she fails to submit will not be eligible for the

award of degree. In such cases, the student shall repeat and submit the Co-Curricular activity.

The guidelines for awarding the credits to co-curricular activities are given in below table

S.No	Name of the Activity	Maximum Credits
1	Participation in the one-week workshop/training programs for National	1.0
2	International workshops / training program Participation (Minimum of 6 days)	2.0
3	Participation in State level/National level Hackathon/seminar/conferences	1.0
4	Meritorious certificate in State level / National level Hackathon/Seminar /conferences	2.0
5	Participation in International Hackathons/seminar/conferences held outside India	2.0
6	Academic Award/Research Award from State level/National level Agencies	1.0
7	Academic Award/Research Award from International Agencies	2.0
8	Research /Review publications indexed in UGC Care list Journals	1.0
9	Research /Review publications indexed in Scopus/Web of Science Journals	2.0
10	Patent filing	1.0

Note:

i). Credit shall be awarded only for the first author. Certificate of attendance and participation in a Conference/Seminar is to be submitted for awarding credit.

ii). Certificate of attendance and participation in workshops and training programs (Internal or External) is to be submitted for awarding credit. The total duration should be at least one week.

iii). Participation in any activity shall be permitted only once for acquiring required credits under Co-curricular activities.

10.11 Massive Open Online Courses (MOOCs):

1. There are Three Elective Courses offered by Department/ discipline of the college during the program.
2. The student has to register at least any one elective course and complete the course through MOOCs for credit transfer and award the degree.
3. The student can enroll and complete the MOOC course(s) in advance.
4. The MOOCs offering agencies/ organizations must be approved by BOS.
5. The courses offered by the agencies/ organizations must be approved by Head of the department in consultation with the internal subject experts.
6. *A MOOC course, online assignment, programming assignment (if any) and proctor exam marks together taken as Final Marks (i.e.,100 marks) for that subject for credit transfer.*
7. The MOOCs offered by SWAYAM / other online platforms approved by BOS are registered for 12 weeks with the acceptance of Head of the Department. However, a student shall choose Elective course from the list in such a manner that he/she has not studied the same course in any form during the Program.
8. Attendance will not be monitored for MOOCs. Student has to pursue and acquire a

certificate for MOOCs only from the organizations/agencies approved by the BOS in order to earn the credits for Elective courses.

9. The Head of the Department shall notify the list of such courses at the beginning of the semester. However, credits obtained through MOOCs will be shown against in the appropriate semester.
   i. The college shall invite registration forms from the students at the beginning of the semester for offering Program elective & General elective courses. There shall be no limit on the minimum and maximum number of registrations based on class/ section strength. Examination fee, if any, will be borne by the student.
   ii. The student must complete ATLEAST ONE MOOCs for the award of MCA degree during their program. However, the pass certificate should be submitted in the appropriate semester for credit transfer. If students register for the courses through MOOCs and if he/she fails to complete this course, the college shall conduct offline examination during the same semester.
   iii. Students who have qualified in the proctored examinations conducted by the SWAYAM/ organization/ agency approved by the BOS can apply for credit transfer as specified are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the college. The college level committee will allot equivalent marks/ grades/ credits based on the assessment certificate submitted.

Credit Transfer Policy:

As per University Grants Commission (Credit Framework for Online Learning Courses through any agency include SWAYAM) Regulation, 2016, the Institution shall allow up to 40% of the total courses being offered in a particular Programme in a semester through the Online Learning courses through online agencies including SWAYAM and the list approved by the BOS.

i. The College shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses through SWAYAM.
ii. The online learning courses available on the SWAYAM platform will be considered for credit transfer. SWAYAM course credits are as specified in the platform.
iii. Student registration for the MOOCs shall be only through the institution, it will be mandatory for the student to share necessary information with the institution.
iv. The institution shall select the courses to be permitted for credit transfer through SWAYAM. However, while selecting courses in the online platform institution would essentially avoid the courses offered through the curriculum in the offline mode.
v. The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer in the forthcoming Semester.
vi. The institution shall also ensure that the student has to complete the course and produce the course completion certificate as per the academic schedule given for the regular courses in that semester.
vii. The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
viii. The Institution shall ensure no overlap of SWAYAM MOOC exams with that of the Semester End Examination schedule. In case of delay in SWAYAM results, the marks sheet will be re-issued for such students.

ix. Students pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

x. It is permitted to register MOOCs courses in advance, which are offered as General Electives.

xi. The student has to submit the certificate of qualifying the MOOCS (through SWAYAM) along with the undertaking form to consider that certificate for credit transfer.

xii. Once after submitting the undertaking form, the student shall not be permitted to write the same course again in MOOCs or as the regular course mode.

xiii. However, the student can write the examination as a regular course without submitting the undertaking form, by which he can finalise the option of submitting MOOCs certificate after the results are declared. In such case, the marks sheet of that particular student(s) will be re-issued.

xiv. The Department shall submit the following to the examination section of the Institution:

a. List of students who have passed MOOC courses related to a particular semester along with the certificates of completion.

b. Undertaking form filled by the students for credit transfer.

11. Re-registration for Improvement of Internal Evaluation Marks:

A candidate shall be given one chance to re-register for each theory subject provided the internal marks secured by a candidate are less than 50% and has failed in the end examination.

Following are the conditions for Re-Registration of Theory Courses for improvement of internal evaluation Marks:

i. The candidate should have completed the course work and obtained examinations results for I, II and III semesters.

ii. The candidate should have passed all the subjects for which the Internal Evaluation marks secured are more than 50%.

iii. Out of the subjects the candidate has failed in the examination due to Internal Evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **THREE** theory subjects for Improvement of Internal evaluation marks.

iv. The candidate has to re-register for the chosen subjects and fulfil the academic requirements.

v. For re-registration of each theory subject, the candidate has to pay the requisite fee along with the requisition letter through the concerned Head of the department

vi. In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

12. Award of Grading:

a. As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed.

b. After each course is evaluated, the marks obtained in each course will be converted to a corresponding letter grade as given in Table 12, depending on the range in which the marks obtained by the student fall.

Table 12: Structure of Grading of Academic Performance

Range in which the % marks in the subject fall	Grade Assigned	Grade points
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50 -59	D (Average)	6
< 50	F (Fail)	0
Absent	AB (Absent)	0

c. A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

d. Toppers of the batch will be announced/declared based on the cumulative percentage at the end of the Degree.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

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

$$SGPA = \left(\frac{\sum(C_i \; X \; G_i)}{\sum C_i}\right)$$

Where, C_i is the number of credits of the i^{th} subject and

G_i is the grade pointscored by the student in the i^{th} course.

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

$$CGPA = \left(\frac{\sum(C_i \; X \; S_i)}{\sum C_i}\right)$$

Where, S_i is the SGPA of the i^{th} semester and

C_i is the total number of creditsup to that semester.

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

iv. While computing the SGPA the subjects in which the student is awarded Zerograde points will also be included.

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

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

vii. As per AICTE regulations, conversion of CGPA into equivalent percentage is as follows:

Equivalent Percentage = (CGPA – 0.50) X 10

13. Award of Class:

After a student has satisfied, the requirements prescribed for the completion of the program and is eligible for the award of MCA Degree, he/she shall be placed in one of the following three classes as presented in the Table 13.

Table 13: Award of Class

Class Awarded	CGPA Secured	% Marks to be secured
First Class with Distinction	≥ 7.5	≥70
First Class	≥ 6.5 < 7.5	≥ 60 < 70
Pass Class	≥ 5.5 < 6.5	≥ 50 < 60

14. Withholding of Results:

The result of a candidate shall be withheld if:

a. He/she has not cleared any dues to the Institution/ Hostel/ University.

b. A case of disciplinary action against him/her is pending disposal.

15. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

For the rejoined students, the equivalent substitute subjects will be suggested by the BOS.

16. Ragging:

Ragging of any kind is strictly prohibited. A Student who indulges in ragging shall be punished as per the provisions of the Ragging Act.

17. Amendment of Regulations:

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

18. General Instructions:

The academic regulations should be read as a whole for purpose of any interpretation.

a. Malpractices rules-nature and punishments are appended.

b. Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.

c. There shall be no places transfer from any college to this Autonomous Institution.

d. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

RULES FOR

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	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.
(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 handed over to the examination of the autonomous college.
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 for four consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical 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 four consecutive semesters from class work and all examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	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 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 only.
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 Controller of Examinations / Assistant Controller of Examinations, 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. If the candidate physically assaults the invigilator/ Controller of Examinations / Assistant Controller of Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the policeand 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 theexamination 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 theparticular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college expulsion from the examination hall and cancellation of the performance in that 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. Thecandidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	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 subjectsthe candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of thesubjects 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 only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.
12.	If any malpractice is detected, which is not covered inthe above clauses 1 to 11 shall be reported to the College for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved inencouraging malpractices)
3. A show cause notice shall be issued to the college.
4. Impose a suitable fine on the college.
5. Shifting the examination centre from the college to another college for a specific periodof not less than one year.

Note:-

Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he has to register for End Examinations in that subject/subjects consequently and has to fulfil all the norms required for the award of Degree.

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MCA I Semester
Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

MCA I Sem. - Course Structure

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week				Marks		
				Lecture	Tutorial	Practical	Credits	Internal	External	Total
1	23F00101	BS	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	3	1	0	4	40	60	100
2	23F00102	PC	C PROGRAMMING AND DATA STRUCTURES	3	1	0	4	40	60	100
3	23F00103	PC	DATABASE MANAGEMENT SYSTEMS	3	1	0	4	40	60	100
4	23F00104	PC	COMPUTER ORGANIZATION & OPERATING SYSTEMS	3	1	0	4	40	60	100
5	23F00105	PC	SOFTWARE ENGINEERING	3	1	0	4	40	60	100
6	23F00106	PC	C PROGRAMMING AND DATA STRUCTURES LAB	0	1	2	2	40	60	100
7	23F00107	PC	DATABASE MANAGEMENT SYSTEMS LAB	0	1	2	2	40	60	100
8	23F00108	HS	COMMUNICATION & SOFT SKILLS LAB	00	01	02	2	40	60	100
9	23F00109	SC	SDC-1-PYTHON PROGRAMMING	1	0	2	2	40	60	100

MCA I Semester Syllabus

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MCA I Sem.

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(23F00101) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Course Category	**Basic Science (BS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Evaluate elementary mathematical arguments and identify fallacious reasoning.
2. Explain the general Properties of prime numbers ,GCD, Fermat's and Euler's for solving the problems.
3. Understand the general properties of Algebraic Systems, Semi Groups, Monoids, Groups Normal subgroups.
4. Formulate problems and solve recurrence relations.
5. Apply Graph Theory in solving computer science problems.
6. Make use of probabilities of events in finite sample spaces from experiments.

UNIT-I MATHEMATICAL LOGIC

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms.(PDNF, PCNF).

UNIT-II ELEMENTARY NUMBER THEORY

Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple. The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem

UNIT-III ALGEBRAIC STRUCTURES

Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism. (Without proofs for Homomorphism, Isomorphism

UNIT-IV RECURRENCE RELATIONS

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots.

UNIT-V INTRODUCTION TO GRAPH THEORY

Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs. Algorithms for Spanning Trees.

UNIT-VI PROBABILITY THEORY

Sample Space and Events, Probability, Probability axioms, Some Elementary Theorems, Conditional probability, Baye's theorem and their problems.

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TEXT BOOKS:

1. Joe L. Mott. Abraham Kandel and Theodore P. Baker, “Discrete Mathematics for Computer Scientists & Mathematicians”, 2nd Edition, Pearson, 2008. (for Units III to V).
2. J P Trembly and R Manohar, “Discrete Mathematical Structures with Applications to Computer Science”, 1st Edition, McGraw Hill, 2017
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012

REFERENCE BOOKS:

1. Ralph P. Grimaldi and B.V. Ramana, “Discrete and Combinatorial Mathematics, an Applition”, 5th Edition, Pearson, 2016.
2. Narsingh Deo, “Graph Theory with Applications to Engineering”, Prentice Hall, 1979.
3. D.S. Malik and M.K. Sen, “Discrete Mathematics theory and Applications”, Ist Edition, Cenegage Learning, 2012.
4. C L Liu and D P Mohapatra, “Elements of Discrete Mathematics, A computer Oriented approach”, 4th edition, MCGRAW-HILL, 2018.
5. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.

e-Resources and Digital Material:

1. http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf
2. https://archive.nptel.ac.in/courses/111/107/111107058/

COURSE OUTCOMES:

1. Simplify and evaluate basic logic statements using truth tables.
2. Use elementary number theory including divisibility properties, prime numbers GCD and perform modulo arithmetic.
3. Understand the various algebraic structures and their properties
4. Find the generating functions for a sequence
5. Represent a graph using adjacency list and adjacency matrix and apply graph theory to problems in computer networks
6. Make use of probabilities of events in finite sample spaces from experiments.

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(23F00102) C PROGRAMMING AND DATA STRUCTURES

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To illustrate the basic concepts of C programming language.
2. To discuss the concepts of Functions, Arrays, Pointers and Structures.
3. To familiarize with Stack, Queue and Linked lists data structures.
4. To explain the concepts of non-linear data structures like graphs and trees.
5. To learn different types of searching techniques.
6. To learn different types of sorting techniques.

UNIT-I INTRODUCTION TO C LANGUAGE

C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, array

UNIT-II FUNCTIONS

Functions, types of functions, Recursion and argument passing, pointers, storage allocation, pointers to functions, expressions involving pointers, Storage classes – auto, register, static, extern, Structures, Unions, Strings, string handling functions, and Command line arguments.

UNIT-III DATA STRUCTURES

Overview of data structures, stacks and queues, representation of a stack, stack related terms, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

UNIT-IV LINKED LISTS

Linked Lists – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

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UNIT-V TREES AND GRAPHS

Trees - Tree terminology, representation, Binary trees, representation, binary tree traversals. binary tree operations,
Graphs - graph terminology, graph representation, elementary graph operations,
Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees.

UNIT-VI SEARCHING AND SORTING TECHNIQUES

Sorting Techniques - Insertion sort, Selection sort, Bubble sort, Quick sort, Heap sort, and Merge sort
Searching Techniques - Linear Search, Binary Search
At the end of this unit, the students will be able to
• Design the different sorting techniques (L6)
• Apply programming to solve searching and sorting problems. (L3)

TEXT BOOKS:

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
4. B.A. Forouzon and R.F. Gilberg, COMPUTER SCIENCE: A Structured Programming Approach Using C, Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg & Behrouz A. Forouzan, “Data Structures: A Pseudocode Approach with C”, Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E. Balaguruswamy, “C and Data Structures”, 4th Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T. Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc20_cs06/preview

COURSE OUTCOMES:

1. Analyse the basic concepts of C Programming language.
2. Design applications in C, using functions, arrays, pointers and structures.
3. Apply the concepts of Stacks and Queues in solving the problems.
4. Explore various operations on Linked lists.

5. Demonstrate various tree traversals and graph traversal techniques.
6. Design searching and sorting methods

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MCA I Sem.

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(23F00103) DATABASE MANAGEMENT SYSTEMS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Train in the fundamental concepts of data base management systems and construct ER Diagram for any customized applications.
2. Demonstrate basic database concepts, including the structure and operation of the relational data model.
3. Provide knowledge on Basic database queries using SQL and applying advanced database queries using Structured Query Language (SQL).
4. Evaluating logical database design principles and database normalization.
5. Demonstrate the concept of a database transaction, concurrency control, and data object locking and protocols.
6. Demonstrate the concepts of object-based databases.

UNIT-I INTRODUCTION TO DATABASE DESIGN

Introduction: A Historical Perspective, File Systems versus a DBMS, Data Models, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS, Data base users and administrators, Data base languages.
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Extended ER Model, Conceptual Design with the ER Model.

UNIT-II INTRODUCTION TO THE RELATIONAL MODEL, RELATIONAL ALGEBRA, RELATIONAL CALCULUS

Introduction to the Relational Model: Structure of Relational databases, Integrity Constraint Over relations ,Enforcing Integrity constraints, Querying relational data, Logical database Design.
Relational Algebra – Selection and projection set operations, renaming, Joins, Division, Examples of Algebra queries.
Relational calculus – Tuple relational Calculus, Domain relational calculus.

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UNIT-III INTRODUCTION TO SQL, ADVANCED SQL

Introduction to SQL: The Form of a Basic SQL Query, examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, set – Comparison Operators, Aggregate Operators, NULL values, Comparison using Null values, Logical connectivity ‘s – AND, OR and NOT, Join, Outer Joins – Disallowing NULL values, Complex Integrity Constraints in SQL, Introduction to Views, Destroying /altering Tables and Views.
Advanced SQL: Functions and procedures, Triggers, Recursive Queries, Accessing SQL from a programming language, Recursive queries, OLAP.

UNIT-IV SCHEMA REFINEMENT AND NORMAL FORMS, QUERY PROCESSING & OPTIMIZATION

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependency, different types of dependencies, Decomposition, Properties of Decomposition, Normalization, FIRST, SECOND, THIRD normal forms, Higher Normal Forms-BCNF, FOURTH normal form, FIFTH normal form.
Query Processing &Optimization:
Basic steps in query processing, Query optimization, measures of query cost, selection operation, projection operation, other Operations.

UNIT-V INTRODUCTION TO TRANSACTION MANAGEMENT, RECOVERY SYSTEM

Introduction to Transaction Management: Transaction States, ACID properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control,2PL, Serializability, Introduction to Lock Management, dealing with Deadlocks, Concurrency control without locking. Timestamp Based Protocols, Validation-Based Protocols, Multiple Granularity.
Recovery System: Failure Classification, Recovery and Atomicity, Log - Based Recovery - Recovery with Concurrent Transactions, Buffer Management - Failure with loss of non-volatile storage Crash Recovery- ARIES, Advance Recovery systems - Remote Backup system.

UNIT-VI SPATIAL DATABASES

Object Based Databases: Introduction, Complex data types, structured types and inheritance in SQL, Table Inheritance, Array and multi set types in SQL, Object identity and reference types in SQL, persistent programming languages, object-oriented vs object relational databases.
XML: Structure of XML Data, XML document Schema, Querying and transformation, Storage of XML data, XML applications.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition.

2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

e-Resources and Digital Material:

1. http://ndl.iitkgp.ac.in/document/TVBkSVpKTGZKMXhTTXJaYkIyeisrUWpvdGVGRzdVbjJhY1BJS05XTHNTbUd4ZjFsZFpMVHprQlo0VG9mTTFCQU5rbjBiMUhoK0IrdUw2S1JWYkx4Q2c9PQ
2. http://ndl.iitkgp.ac.in/document/TVBkSVpKTGZKMXhTTXJaYkIyeisrUWpvdGVGRzdVbjJhY1BJS05XTHNTbUd4ZjFsZFpMVHprQlo0VG9mTTFCQUlzS25NRDdZa005L3NFY1dsS2poYmc9PQ
3. http://ndl.iitkgp.ac.in/document/TVBkSVpKTGZKMXhTTXJaYkIyeisrUWpvdGVGRzdVbjJhY1BJS05XTHNTbUd4ZjFsZFpMVHprQlo0VG9mTTFCQWFQS2ZHNTVJRFVic2JOaXNZOEJtMXc9PQ
4. http://ndl.iitkgp.ac.in/document/TVBkSVpKTGZKMXhTTXJaYkIyeisrUWpvdGVGRzdVbjJhY1BJS05XTHNTbUd4ZjFsZFpMVHprQlo0VG9mTTFCQUQrSUJFa1U2NWpDWHFnZUlFL0FnL2c9PQ

COURSE OUTCOMES:

1. Design a database for a real world information system
2. Analyze and apply the principles and practices of good database design
3. Construct efficient SQL queries to retrieve and manipulate data as required
4. Students will learn about functional dependency and the need for schema refinement to remove redundancy of data.
5. Students will learn about transaction management and crash recovery.
6. Students will familiar about specialty databases.

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MCA I Sem.

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(23F00104) COMPUTER ORGANIZATION & OPERATING SYSTEMS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To impart basic concepts of computer architecture and organization.
2. To explain various addressing modes
3. To familiarize the basic functions of an Operating System
4. To help students in understanding Dead Locks
5. To facilitate students in learning about memory Management.

UNIT-I STRUCTURE OF COMPUTERS

Basic Structure of Computers: Computer Types, Functional units, Basic Operational concepts, Bus structures, Software, Performance, multiprocessor and multi computers, Historical perspective.

UNIT-II MACHINE INSTRUCTIONS

Numbers, Arithmetic Operations, and Characters, Memory locations and addresses, Memory operations, Instructions and Instruction sequencing, Addressing Modes

UNIT-III MICRO PROGRAMMED CONTROL

Processing Unit: Fundamental Concepts, Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control

Micro Programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

UNIT-IV INTRODUCTION TO OPERATING SYSTEM CONCEPT

Types of Operating Systems, Operating Systems Concepts, Operating System Operations. Operating Systems Structures- Operating System Services, User Operating-System Interface, Introduction to System calls, Types of System Calls.

Process Management: Process concept, Process State Diagram, Process control block, Process Scheduling, Inter process Communication, Scheduling- Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-V PROCESS SYNCHRONIZATION AND DEADLOCKS

The Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Principles of deadlock: System Model, Deadlock characterization, Deadlock handling, Deadlock Prevention, Detection and Avoidance, Recovery Starvation, Critical Regions form Deadlock

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UNIT-VI MEMORY MANAGEMENT

Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation Virtual Memory Management- Demand Paging, Page-Replacement Algorithms, Thrashing, Disk Scheduling.

TEXT BOOKS:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th ed, McGraw Hill.
2. Operating System concepts, 7th ed, Abraham Siliberschatz, Galvin, John Wiley & Sons, Inc
3. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy.

REFERENCE BOOKS:

1. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,
2. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

e-Resources and Digital Material:

1. https://swayam.gov.in/

COURSE OUTCOMES:

1. Students will learn the basic structure of computers from the evolution of computers to new generation of computers.
2. Students will learn how the addressing is implemented and various addressing modes
3. To understand how to write micro programmed control sequence for processors.
4. To Know the working environment of OS, system call and its types, Inter-Process Communication and various Scheduling Algorithms
5. To Know the concept of critical section and Synchronization, Semaphores and the concept of deadlock.
6. Understand the memory management, demand paging and disk Scheduling

Remarks:

NONE

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MCA I Sem.

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(23F00105) SOFTWARE ENGINEERING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To impart the understanding on the Software Engineering Principles and Process models
2. To understand the software requirement modeling
3. To understand the significance of design.
4. To understand the quality control and how to ensure good quality software
5. Software testing methodologies overview: various testing techniques including white box testing black box testing etc.
6. To understand the implementation issues, validation and verification procedures

UNIT-I SOFTWARE AND SOFTWARE ENGINEERING, PROCESS MODELS, AGILE DEVELOPMENT

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

Process Models: The waterfall model, Incremental process models, Evolutionary process models, spiral model, The Unified process, Agile Development: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models

UNIT-II REQUIREMENTS MODELING

Requirements Modeling: Requirements Analysis, Scenario- Based Modeling, Data Modeling Concepts, Class-Based Modeling, Flow-Oriented Modeling, Creating a Behavioral Model.

UNIT-III DESIGN CONCEPT

Design Concepts: Design with Context of Software Engineering, Design Process, Design Concepts, Design Model, Software Architecture, Architecture Styles, Architectural Design.

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UNIT-IV FUNCTION-ORIENTED 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.

UNIT-V CODING AND TESTING

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Integration Testing, Validation testing, Testing Object-Oriented Programs, System Testing.

UNIT-VI SOFTWARE RELIABILITY AND QUALITY MANAGEMENT AND RISK MANAGEMENT

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.
Risk management: software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM plan.

TEXT BOOKS:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw-Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, fifth Edition, PHI,2018.

REFERENCE BOOKS:

1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010
4. Somerville, "Software Engineering", Pearson 2.
5. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
6. JalotePankaj, "An integrated approach to Software Engineering", Narosa

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/105/106105182/
2. http://peterindia.net/SoftwareDevelopment.html

COURSE OUTCOMES:

1. Student will understand software engineering principles and process models
2. Student will Analyze requirements modelling strategies, process and design models, and risks and testing strategies to develop application software.
3. Student will Use design principles to design and develop a quality software product.

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4. Focus on the fundamentals of modelling a software project.
5. Software testing methodologies overview: various testing techniques including white box testing black box testing etc.
6. Students will learn about software reliability and quality models and how to choose an appropriate model for their project will learn about risk management

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MCA I Sem.

L	T	P	C
0	1	2	2

(23F00106) C PROGRAMMING AND DATA STRUCTURES LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To get familiar with the basic concepts of C programming.
2. To design programs using arrays, strings, pointers and structures.
3. To illustrate the use of Stacks and Queues
4. To apply different operations on linked lists.
5. To demonstrate Binary search tree traversal techniques.
6. To design searching and sorting techniques.

Week l

Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.

ii) To find the GCD (greatest common divisor) of two given integers.

iii) To solve Towers of Hanoi problem.

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices ii) Multiplication of Two Matrices

Week 3

a. Write a C program to find the roots of a quadratic equation using if-else.

b. Write a C program to input electricity unit charges and calculate total electricity bill according to the given condition:

For first 50 units Rs. 0.50/unit

For next 100 units Rs. 0.75/unit

For next 100 units Rs. 1.20/unit

For unit above 250 Rs. 1.50/unit

An additional surcharge of 20% is added to the bill

c. Write a program that declares Class awarded for a given percentage of marks,

where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% Distinction. Read percentage from standard input

d. Write a menu driven C program to implement a simple arithmetic calculator.

e. Write a C program to display number of days in month using switch case (The input is month number 1 -12).

WEEK 4

a. Write a C program to display the following patterns:

```
(i)         (ii)                     (iii)

* * * *          1                         1

*    *         2   3                     2    2

*    *       4    5    6               3    3    3

* * * *     7    8    9   10         4    4    4    4
```

b. Write a C program to generate the prime numbers between x and y where x and y areStarting and ending values to be supplied by the user.

Week 5

a. Write a C program to implement the following with and without string functions:

(i) Reverse a string (ii) Concatenate two strings. Iii) Copying a string iv) Length of a String

Week 6

a)Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn‘t contain T.

b) Write a C program to count the lines, words and characters in a given text.

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Week 7

a) Write a C Program to perform various arithmetic operations on pointer variables.

b) Write a C Program to demonstrate the following parameter passing mechanisms:

i) call-by-value ii) call-by-reference

Week 8

Write a C program that uses functions to perform the following operations:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 9

Write C programs that implement stack (its operations) using

i) Arrays

ii) Pointers

Week 10

Write C programs that implement Queue (its operations) using

i) Arrays

ii) Pointers

Week 11

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

Week 12

Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 13

Write a C program that uses functions to perform the following operations on Doubly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 14

Write a C program that uses functions to perform the following operations on circular linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 15

Write a C program that uses functions to perform the following:

i) Creating a Binary Tree of integers

ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 16

Write C programs that use both recursive and non-recursive functions to perform the following

searching operations for a key value in a given list of integers:

i) Linear search

ii) Binary search

Week 17

Write a C program that implements the following sorting methods to sort a given list of integers in

ascending order

i) Bubble sort

ii) Selection sort

iii) Insertion sort

iv)Quick Sort

TEXT BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, COMPUTER SCIENCE: A Structured Programming Approach Using C, Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, C and Data Structures, 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, Problem Solving Using C, PHI, 2nd Edition 2009.

COURSE OUTCOMES:

1. Demonstrate basic concepts of C programming language.
2. Develop C programs using functions, arrays, structures and pointers.
3. Illustrate the concepts Stacks and Queues.
4. Design operations on Linked lists.
5. Apply various Binary tree traversal techniques.
6. Develop searching and sorting methods.

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MCA I Sem.

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0	1	2	2

(23F00107) DATABASE MANAGEMENT SYSTEMS LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To implement the basic knowledge of SQL queries.
2. To construct database models for different database applications.
3. To apply normalization techniques for refining of databases.
4. To practice various triggers, procedures, and cursors using PL/SQL.
5. To design and implementation of a database for an organization.

Week-1 Queries using DDL and DML

Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables), examples using SELECT command.

Week-2 : Nested Queries

Queries (along with sub-Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.

Week-3 : Queries using Aggregate Functions

Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Week-4 : Programs on PL/SQL

1. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

2. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

Week-5: PL/SQL Programs using Control Statements

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1. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

2. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

Week-6: TRIGGERS

1. Create a row level trigger for the employee table that would fire for INSERT or UPDATE or DELETE operations performed on the EMPLOYEE table. This trigger will display the salary difference between the old values and new values.

2. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

Week-7: PROCEDURES

1.1. Write the PL/SQL programs to create the procedure for factorial of given number.

2.2. Write the PL/SQL programs to create the procedure to find sum of N natural numbers.

3.3. Write the PL/SQL programs to create the procedure to find Fibonacci series

4.4. Create the procedure for palindrome of given number.

Week-8: CURSORS

1.1. Write a PL/SQL block that will display the employee details along with salary using cursors.

2.2 To write a Cursor to display the list of employees who are working as a Managers or Analyst.

3.3 To write a Cursor to find employee with given job and dept no

Week-9: SQL FUNCTIONS

Write SQL Queries using Number functions, Date functions, Character Functions and conversion functions.

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Week-10 : Indexing

Create a table and perform the search operation on table using indexing and non-indexing techniques.

Week-11 : Case Study for University Database Application

Drawing of ER model of university database application considering the constraints

A university has many departments.

Each department has multiple instructors (one person is HOD). Here the HOD refers to the head of department.

An instructor belongs to only one department.

Each department offers multiple courses, each subject is taught by a single instructor.

A student may enroll for many courses offered by different departments.

For the above case study, do the following.

1. Analyze the data required.

2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-12 : Case Study for Bus Reservation System

A Bus Reservation System ERD is a comprehensive database diagram illustrating the relationships between entities within a bus reservation system. It depicts the various entities such as buses, passengers, routes, and ticket reservations. It also shows the various relationships among these entities, such as how a passenger can book a ticket or how buses are related to a particular route.

For the above case study, do the following.

1. Analyze the data required.

2. Normalize the attributes.

Create the logical data model using E-R diagrams

TEXT BOOKS:

1. Oracle: The Complete Reference by Oracle Press.
2. SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande
3. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition.

REFERENCE BOOKS:

1. RamezElmasri, Shamkant, B. Navathe, “Database Systems”, Pearson Education, 6th Edition, 2013.
2. Peter Rob, Carles Coronel, “Database System Concepts”, Cengage Learning, 7th Edition, 2008.

e-Resources and Digital Material:

1. http://www.scoopworld.in
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

COURSE OUTCOMES:

1. Implement SQL queries using DDL,DML,TCL and DCL commands and apply the constraints on relations.
2. Implement PL/SQL programs to solve problems.
3. Implement Triggers on relations
4. Implement procedures and cursors using PL/SQL.
5. Implement Indexing technique on relation.
6. Design and implement database for any real world problem

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MCA I Sem.

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(23F00108) COMMUNICATION & SOFT SKILLS LAB

Course Category	**Humanities & Social Sciences (HS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To cultivate students interpersonal and teamwork skills, enabling them to collaborate effectively with colleagues, clients, and stakeholders in technical environments.
2. To engage students in activities that require them to analyze technical information, think critically, and present logical solutions to problems.
3. To encourage students to reflect on their communication strengths and weaknesses, and provide opportunities for self-assessment and feedback to facilitate ongoing improvement.
4. To familiarize students with industry-specific communication practices and preparing them for professional environments and career opportunities.

TASK-I: PHONETICS

Phonetics; Speech organs -Consonants-Vowels -Word Accent; Rules of Word Accent - Rhythm –Intonation; Falling Tone, Rising Tone Falling Rising Tone, Rising Falling Tone.

TASK -II: LISTENING AND SPEAKING

Listening Skills; -Types of Listening Skills.

Presentations Skills- Effective Presentation Skills.

Public Speaking- Tips for Improving Public Speaking Skills.

Group Discussion- process of Group Discussion – Evaluation of Group Discussion –consensus of Group Discussion.

Debates- Effective skills for debates.

TASK -III READING AND WRITING

Letters-Parts of a letter- Formats of a letter-Types of letters.

Repots: Types-Parts of Report. -Agenda-memos –circulars.

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Resume format and sample.

Reading- Types- Comprehensions.

TASK -IV: BASIC GRAMMAR

Parts of Speech- Proper Noun-Collective Noun- Common Noun- Material Noun- Abstract Noun- Countable Noun- Uncountable Noun- and Concrete Noun.

Tenses-Present Tense-Past Tense-Future Tense.

Verb Forms-Sub-Verb Agreement-Error rectification.

TASK -V: DECISION MAKING AND PROBLEM SOLVING

Decision Making: Meaning, Nature, Types and Models, Group and Ethical decision making.

Problem Solving: Critical thinking- decision-making- creativity, and information processing.

TASK -VI: INTERVIEW

Interview; Preparation, Adaptability and Flexibility, Research and Questions, Professionalism and Etiquette, frequently asked questions.

TEXT BOOKS:

1. Technical Communication" by Mike Markel "Technical Writing 101: A Real-World Guide to Planning and Writing Technical Content" by Alan S. Pringle and Sarah S. O Keefe
2. Technical Communication: A Practical Approach" by William S. Pfeiffer and Kaye A. Adkins.
3. Placement & Personality Development (English, Paperback, Krishna K. V. S. G. Murali)

REFERENCE BOOKS:

1. ”Scientific Writing and Communication: Papers, Proposals, and Presentations” by Angelika H. Hofmann
2. ”Exercises in Technical Communication” by Sandy Bartell and Dianna L. Bartell ”Technical Communication Today” by Richard Johnson-Sheehan
3. ”Technical Writing: A Practical Guide for Engineers and Scientists” by Phillip A. Laplante

4. ”Technical Writing Process: The Simple, Five-Step Guide That Anyone Can Use to Create Technical Documents Such as User Guides, Manuals, and Procedures” by Kieran Morgan.

e-Resources and Digital Material:

1. https://www.exoticindiaart.com/book/details/textbook-of-elementary-
2. https://www.youtube.com/c/TechnicalBusinessWriting

COURSE OUTCOMES:

1. Get Knowledge about the articulatory mechanisms involved in speech production, including the movements and positions of the vocal organs.(L3)
2. Determine what is required for the design and creation of an attractive and effective presentation.(L6)
3. Demonstrate a professional attitude towards their writing by focusing on the need for appropriate format.
4. Create a summary of the content through critical thinking.
5. Apply effective strategies with brevity, and clarity in designing and developing decision making skills.
6. Develop the confidence, knowledge, and skills necessary to navigate job interviews successfully.

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MCA I Sem.

L	T	P	C
1	0	2	2

(23F00109) SDC-1-PYTHON PROGRAMMING

Course Category	**Skill Oriented Course (SC)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. Acquire programming skills in core Python
2. To understand the importance of Object-oriented Programming
3. To understand how to use modules and packages
4. To understand how to work with data in Python

1. OPERATORS

a. Read a list of numbers and write a program to check whether a particular element is present or not using membership operators.

b. Read your name and age and write a program to display the year in which you will turn 100 years old.

c. Read radius and height of a cone and write a program to find the volume of a cone.

d. Write a program to compute distance between two points taking input from the user (Hint: use Pythagorean theorem)

2. CONTROL STRUCTURES

a. Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if elif else statement.

b. Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.

c. Write a Program to find the sum of a Series 1/1! + 2/2! + 3/3! + 4/4! +.+ n/n!. (Input :n = 5, Output : 2.70833)

d. In number theory, an abundant number or excessive number is a number for which the sum of its proper divisors is greater than the number itself. Write a program to find out, if the given number is abundant. (Input: 12, Sum of divisors of 12 = 1 + 2 + 3 + 4 + 6 = 16, sum of divisors 16 > original number 12)

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3: LIST

a. Read a list of numbers and print the numbers divisible by x but not by y (Assume x = 4 and y = 5).

b. Read a list of numbers and print the sum of odd integers and even integers from the list.(Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)

c. Read a list of numbers and print numbers present in odd index position. (Ex: [10, 25, 30, 47, 56, 84, 96], The numbers in odd index position: 25 47 84).

d. Read a list of numbers and remove the duplicate numbers from it. (Ex: Enter a list with duplicate elements: 10 20 40 10 50 30 20 10 80, The unique list is: [10, 20, 30, 40, 50, 80])

4: TUPLE

a. Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples.

test_list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6,

Output : [(6, 24, 12), (60, 12, 6)]

b. Given a list of tuples. Write a program to filter all uppercase characters tuples from given list of tuples. (Input: test_list = [(GFG, IS, BEST), (GFg, AVERAGE), (GfG,), (Gfg, CS)], Output : [(GFG, IS, BEST)]).

c. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple.

(Input : tuple = (’a’, ’a’, ’c’, ’b’, ’d’), list = [’a’, ’b’], Output : 3)

5: SET

a. Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).

b. Write a program to perform union, intersection and difference using Set A and Set B.

c. Write a program to count number of vowels using sets in given string (Input : Hello World, Output: No. of vowels : 3)

d. Write a program to form concatenated string by taking uncommon characters from two strings using set concept (Input : S1 = "aacdb", S2 = "gafd",

Output : "cbgf").

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6: DICTIONARY

a. Write a program to do the following operations:

i. Create a empty dictionary with dict() method

ii. Add elements one at a time

iii. Update existing keys value

iv. Access an element using a key and also get() method

v. Deleting a key value using del() method

b. Write a program to create a dictionary and apply the following methods:

i. pop() method

ii. popitem() method

iii. clear() method

c. Given a dictionary, write a program to find the sum of all items in the dictionary.

d. Write a program to merge two dictionaries using update() method.

7: STRINGS

a. Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one

half of the string is the reverse of the other half or if a string appears same when read forward or backward.

b. Write a program to read a string and count the number of vowel letters and print all letters except ’e’ and ’s’.

c. Write a program to read a line of text and remove the initial word from given text. (Hint: Use split() method, Input : India is my country. Output : is my country)

d. Write a program to read a string and count how many times each letter appears. (Histogram).

8: USER DEFINED FUNCTIONS

a. A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.

b. Write a function merge_dict(dict1, dict2) to merge two Python dictionaries.

c. Write a fact() function to compute the factorial of a given positive number.

d. Given a list of n elements, write a linear_search() function to search a given element x in a list.

9: BUILT-IN FUNCTIONS

a. Write a program to demonstrate the working of built-in statistical functions mean(), mode(), median() by importing statistics library.

b. Write a program to demonstrate the working of built-in trignometric functions sin(), cos(), tan(), hypot(), degrees(), radians() by importing math module.

c. Write a program to demonstrate the working of built-in Logarithmic and Power functions exp(), log(), log2(), log10(), pow() by importing math module.

d. Write a program to demonstrate the working of built-in numeric functions ceil(), floor(), fabs(), factorial(), gcd() by importing math module.

10. CLASS AND OBJECTS

a. Write a program to create a BankAccount class. Your class should support the following methods for

i) Deposit

ii) Withdraw

iii) GetBalanace

iv) PinChange

b. Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).

c. Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info() method and also using dictionary (__dict__).

d. Access modifiers in Python are used to modify the default scope of variables. Write a

program to demonstrate the 3 types of access modifiers: public, private and protected.

11. FILE HANDLING

a. Write a program to read a filename from the user, open the file (say firstFile.txt) and then perform the following operations:

i. Count the sentences in the file.

ii. Count the words in the file.

iii. Count the characters in the file.

b. Create a new file (Hello.txt) and copy the text to another file called target.txt. The target.txt file should store only lower-case alphabets and display the number of lines copied.

c. Write a Python program to store N students records containing name, roll number and branch. Print the given branch students details only.

TEXT BOOKS:

1. Reema Thareja, Python Programming - Using Problem Solving Approach, Oxford Press, 1st Edition, 2017.
2. Larry Lutz, Python for Beginners: Step-By-Step Guide to Learning Python Programming, CreateSpace Independent Publishing Platform, First edition, 2018

REFERENCE BOOKS:

1. Reema Thareja, Python Programming - Using Problem Solving Approach, Oxford Press, 1st Edition, 2017.
2. Larry Lutz, Python for Beginners: Step-By-Step Guide to Learning Python Programming, CreateSpace Independent Publishing Platform, First edition, 2018
3. http://vlabs.iitkgp.ernet.in/se/
4. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

e-Resources and Digital Material:

1. http://vlabs.iitkgp.ernet.in/se/
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php
3. https://python-iitk.vlabs.ac.in

COURSE OUTCOMES:

1. Explore the use of Object-oriented concepts to solve Real-life problems
2. Write programs on Python Data Structures
3. Can handle strings related problems
4. Write python programs on functions

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5. Write programs to read from files and write data to files.
6. Solve mathematical problems using Python programming language

Remarks:

MCA II Semester
Course Structure

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MCA II Sem. - Course Structure

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week			Credits	Marks		
				Lecture	Tutorial	Practical		Internal	External	Total
1	23F00201	PC	ADVANCED DATA STRUCTURES & ALGORITHMS	3	1	0	4	40	60	100
2	23F00202	PC	OBJECT ORIENTED PROGRAMMING WITH JAVA	3	1	0	4	40	60	100
3	23F00203	PC	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	3	1	0	4	40	60	100
4	23F00204	PC	COMPUTER NETWORKS	3	1	0	4	40	60	100
5	23F00205	PC	CLOUD COMPUTING	3	1	0	3	40	60	100
6	23F00206	PC	CYBER SECURITY	3	0	0	3	40	60	100
7	23F00207	PC	DATA MINING	3	0	0	3	40	60	100
8	23F00208	PC	ADVANCED DATA STRUCTURES & ALGORITHMS Lab	0	1	2	2	40	60	100
9	23F00209	PC	OBJECT ORIENTED PROGRAMMING WITH JAVA Lab	0	1	2	2	40	60	100
10	23F00210	PC	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING Lab	0	1	2	2	40	60	100
11	23F00211	PC	SDC-2-CHAT GPT PROMPT ENGINEERING	1	0	2	2	40	60	100
12	23F00212	SC	TECHNICAL SEMINAR	0	0	4	2	100	0	100
13	23F00213	HS	UNIVERSAL HUMAN VALUES (AUDIT COURSE)	0	0	0	0	40	0	40

MCA II Semester Syllabus

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(23F00201) ADVANCED DATA STRUCTURES & ALGORITHMS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Learn asymptotic notations, and analyze the performance of different algorithms.
2. Understand and implement various data structures.
3. Learn and implement greedy, divide and conquer, dynamic programming and backtracking algorithms using relevant data structures.
4. Understand non-deterministic algorithms, polynomial and non-polynomial problems.

UNIT-I INTRODUCTION TO ALGORITHMS

Introduction to Algorithms:
Algorithms, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh, Omega, Theta notation and Little oh notation, Polynomial Vs Exponential Algorithms, Average, Best and Worst-Case Complexities, Analyzing Recursive Programs.

Learning Outcomes:
To Know about performance analysis of algorithms.
To Know about various Asymptotic notations
To understand the difference between Polynomial Vs Exponential Algorithms

UNIT-II TREES PART-I

Binary Search Trees: Definition and Operations, AVL Trees: Definition and Operations, Applications. B Trees: Definition and Operations.

Learning Outcomes:
To Know about the Binary Search Trees
To know about AVL Trees

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UNIT-III TREES PART-II

Red-Black Trees, Splay Trees, Applications.
Hash Tables: Introduction, Hash Structure, Hash functions, Linear Open Addressing, Chaining and Applications.

Learning Outcomes:
To Know about the Red-Black Trees and Splay Trees
To know about Hash Tables

UNIT-IV DIVIDE AND CONQUER, GREEDY METHOD

Divide and conquer: General method, applications-Binary search, Finding Maximum and minimum, Quick sort, Merge sort, Strassens matrix multiplication.
Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Learning Outcomes:
To Solve the problems using Divide and conquer Techniques
To Solve the problems using Greedy methods.

UNIT-V DYNAMIC PROGRAMMING & BACKTRACKING

Dynamic Programming: General method, applications- 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, Reliability design.

Learning Outcomes:
To Understand Dynamic Programming.
To Know various applications based on Dynamic Programming.

UNIT-VI BACKTRACKING
Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
Introduction to NP-Hard and NP-Complete problems: Basic Concepts.

Learning Outcomes:
To know about Backtracking techniques to solve real world problems
To know about NP-Hard and NP-Complete problems.

TEXT BOOKS:

1. Data Structures and algorithms: Concepts, Techniques and Applications, G A V Pai.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.

REFERENCE BOOKS:

1. Classic Data Structures by D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.

e-Resources and Digital Material:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html

COURSE OUTCOMES:

1. Analyze the complexity of algorithms and apply asymptotic notations.
2. Understand various trees and their applications
3. Apply non-linear data structures and their operations.
4. Understand and apply greedy, divide and conquer algorithms.
5. Develop dynamic programming algorithms for various real-time applications.
6. Illustrate Backtracking algorithms for various applications.

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(23F00202) OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To understand object-oriented concepts and problem-solving techniques
2. To obtain knowledge about the principles of inheritance and polymorphism
3. To understand the Java runtime exceptions and I/O streams
4. To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
5. To design the GUIs using applets and swing controls.
6. Database Connectivity Architecture

UNIT-I INTRODUCTION

Introduction: Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

Learning Outcomes:

To Know about Object Oriented Programming
To Know about concept of classes and Objects
To understand the difference between Method Overloading and Overriding

UNIT-II INHERITANCE, PACKAGES, INTERFACES

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class.
Packages: Basics, finding packages and CLASSPATH, Access Protection, Importing packages.
Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Learning Outcomes:

To Know about basics of inheritance
To know about the concept of packages
To know about the concept of Interfaces

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UNIT-III EXCEPTION HANDLING, STREAM BASED I/O (JAVA.IO)

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses.
Stream based I/O (java.io) – The Stream Classes-Byte streams and Character streams, reading console Input and Writing Console Output, File class, Reading and Writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

Learning Outcomes:
To Know about basics of Exception Handling mechanism
To know how to handle the exceptions
To know how to create own exceptions
To know how to work with input and output streams

UNIT-IV MULTITHREADING, THE COLLECTIONS FRAMEWORK (JAVA.UTIL)

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.
The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collectionclasses- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

Learning Outcomes:
To write programs on multithreading
To understand the concept of inter process of communication
To know the various classes in collections framework.

UNIT-V APPLET, GUI PROGRAMMING WITH SWINGS

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets
GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog.
Learning Outcomes:
To Understand the architecture of an applet
To write GUI Applications using swings
To understand various Layout managers.
To solve the menu based programs

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UNIT-VI ACCESSING DATABASES WITH JDBC

:

Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Learning Outcomes:

To know about different types of drivers

To understand the basic architecture of JDBC

To know how to create a new database and table with JDBC.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

REFERENCE BOOKS:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, Karthik and Gajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ. Press
7. Java Programming and Object-oriented Application Development, R.A. Johnson, Cengage Learning.

e-Resources and Digital Material:

1. https://www.w3schools.com/java/java_oop.asp
2. http://peterindia.net/JavaFiles.html

COURSE OUTCOMES:

1. Solve real-world problems using OOP techniques.
2. Apply code reusability through inheritance, packages and interfaces
3. Solve problems using java collection framework and I/O classes.
4. Develop applications by using parallel streams for better performance.
5. Develop applets for web applications.
6. Build GUIs and handle events generated by user interactions and Use the JDBC API to access the database

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(23F00203) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Gain a historical perspective of AI and its foundations.
2. Understand and study the fundamental concepts of artificial intelligence in problem solving.
3. Different Language models in Natural Language Processing.
4. To introduce the basic concepts and techniques of machine learning and the need for Machine learning techniques for real world problem.
5. To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms.
6. To gain skills of how to combine multiple machine learning algorithms to solve the selected problem.

UNIT-I INTRODUCTION TO AI

Introduction: What is AI? The Foundations of AI, History of AI, State of the Art.
Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents
Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed

Learning Outcomes:
Student should be able to
Understand the basic Foundations for Artificial Intelligence.
Understand different types of AI agents & role of agents and interaction with the environment to establish goals.

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UNIT-II SOLVING PROBLEMS BY SEARCHING

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

Student should be able to

Identify and formulate search strategies to solve problems by applying suitable search strategy.

Apply difficult real-life problems in a state space representation so as to solve those using AI techniques like searching

UNIT-III NATURAL LANGUAGE PROCESSING

Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

Learning Outcomes:

Student should be able to

Understand different language models used to interact with machines

Develop Natural Language Interface for Machines.

UNIT-IV MACHINE LEARNING

Introduction: Human Learning, Types of Human Learning, Machine Learning, Types of Machine Learning, Problems Not to Be Solved Using Machine Learning, Applications of Machine Learning, State-of-The-Art Languages/Tools in Machine Learning, Issues in Machine Learning

Preparing to Model: Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing.

Learning Outcomes:

Student should be able to

Understand basic concepts of Machine Learning and basic Machine learning activities.

Understand about data used for Machine learning tasks.

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UNIT-V SUPERVISED LEARNING

CLASSIFICATION & REGRESSION:

Supervised Learning: Classification: Introduction, Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms-k-Nearest Neighbour(kNN), Decision tree, Random forest model, Support vector machines.
Supervised Learning: Regression: Introduction, Example of Regression, Types of Regression Algorithms.

Learning Outcomes:

Student should be able to

Identify machine learning techniques suitable for a given real world problem.
Design and make modifications to existing machine learning algorithms to suit an individual application to improve classification accuracy.

UNIT-VI UNSUPERVISED LEARNING & REINFORCEMENT LEARNING

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering Different types of clustering techniques, Partitioning methods, Hierarchical clustering, Density-based methods, Finding Pattern using Association Rule-Definition of common terms, Association rule.
Reinforcement Learning: Introduction, Types of RL, Applications of RL.

Learning Outcomes:

Student should be able to
Understand different Unsupervised Learning tasks
Understands about Reinforcement learning

TEXT BOOKS:

1. Stuart J.Russell, Peter Norvig, “Artificial Intelligence A Modern Approach”, 3rd Edition, Pearson Education, 2019.
2. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

REFERENCE BOOKS:

1. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, First Edition, 2011.
2. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009. 2. George F. Luger.
3. MACHINE LEARNING An Algorithmic Perspective 2nd Edition, Stephen Marsland, 2015, by Taylor & Francis Group, LLC
4. Introduction to Machine Learning, Second Edition, Ethem Alpaydın, the MIT Press, Cambridge, Massachusetts, London, England.

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e-Resources and Digital Material:

1. http://nptel.ac.in/courses/106106126/
2. https://www.coursera.org/learn/machine-learning
3. http://nptel.ac.in/courses/106105077/
4. https://onlinecourses.nptel.ac.in/noc23_cs18/preview
5. https://onlinecourses.nptel.ac.in/noc23_cs87/preview

COURSE OUTCOMES:

1. Explain the role of agents and interaction with the environment to establish goals.
2. Identify and formulate search strategies to solve problems by applying suitable search strategy.
3. Explain about different language models and its importance to interact with machines.
4. Understanding basic concepts of Machine Learning and types of data used in dataset.
5. Solve real world problems by using appropriate Classifications and Regression Algorithms.
6. Design Applications for Unsupervised Machine Learning Techniques and basics of Reinforcement Learning.

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(23F00204) COMPUTER NETWORKS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To introduce basic concepts in Computer Networks
2. Describe the general principles of data communication and its components
3. To expose state-of-the-art technologies in computer network protocols
4. Describe sub netting and routing mechanisms
5. Describe the layers of the OSI model and TCP/IP
6. Describe computer architectures, and applications.

UNIT-I INTRODUCTION

Computer network and its history, progress and application, Internet, Network architecture, Networking devices. OSI Model, TCP/IP Protocol stack, Networking in different OS.

Learning Outcomes:

Students will be able to :

1. Independently understand basic computer network technology.
2.Understand layers in OSI Model
3. Connect networks with different operating systems.

UNIT-II PHYSICAL LAYER

Data communication technologies, Analog and digital communication. Encoding mechanisms, Packet Switching, Circuit Switching.

Learning Outcomes:

Students will be able to:

1. Understand Data Communications System and its components.
2.Understand encoding mechanisms.

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UNIT-III DATA LINK LAYER

Framing, HDLC, PPP, Error detection, Error Correction, MAC Protocols, Reliable Transmission, Ethernet, 802.3, 802.5, 802.11, PPP, ATM.

Learning Outcomes:
Students will be able to :
1. Identify the different types of network topologies and protocols.
2. To explain different types of network topologies and protocols usage

UNIT-IV THE NETWORK LAYER

IP addressing schemes, IPV4, Sub netting, IPV6, shift from IPV4 to IPV6, ICMP, DHCP, ARP.
Routing Protocols: Distance-vector and link-state routing. RIP, OSPF, BGP Multicasting.

Learning Outcomes:
Students will be able to :
1. Understand and building the skills of sub netting and routing mechanisms.
2. To know the differences between protocols.

UNIT-V TRANSPORT LAYER

Connection Oriented and connection less service, TCP and UDP, Port Addressing, Remote Procedure Call, Flow Control vs Congestion Control, Quality of Service.

Learning Outcomes:
Students will be able to :
1. Enumerate the layers of the OSI model and TCP/IP.
2. Explain the function(s) of each layer.

UNIT-VI APPLICATION LAYER PROTOCOLS

Application Layer Protocols: World wide web and HTTP, HTTPS, Domain names: DNS, File Transfer: FTP, Electronic mail: SMTP, Peer to peer networking, Torrent, VPN. Session management, Data compression techniques.

Learning Outcomes:
Students will be able to :
1.Familiarity with the basic protocols of computer networks,
2. How it can be used to assist in network design and implementation.

TEXT BOOKS:

1. James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the Internet”, Pearson Education, Seventh Edition, 2017

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REFERENCE BOOKS:

1. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, Second Edition, 2015.
2. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.
3. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Morgan Kaufmann Publishers, Fifth Edition, 2011
4. Narasimha Karumanchi “Elements of Computer Networking: An Integrated Approach (Concepts, Problems and Interview Questions)”, Career Monk Publisher, 2014.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106105080
2. https://www.geeksforgeeks.org/protocols-application-layer/
3. https://www.tutorialspoint.com/data_communication_computer_network/application_protocols.htm
4. https://www.geeksforgeeks.org/ip-addressing-classless-addressing/

COURSE OUTCOMES:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Understand and building the skills of subnetting and routing mechanisms
5. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer And Identify the different types of network devices and their functions within a network
6. Familiarity with the basic protocols of computer networks, and how they can be used To assist in network design and implementation)

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(23F00205) CLOUD COMPUTING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Define cloud services and models.
2. Demonstrate design the architecture for new cloud application
3. Explain business continuity options in a virtualized environment
4. To introduce the various levels of services that can be achieved by cloud.
5. Describe infrastructure framework and service management activities in Cloud computing.
6. Understand and address security concerns commonly found in Cloud computing environments.

UNIT-I BASICS OF CLOUD COMPUTING

Introduction: What Is the Cloud? The Emergence of Cloud Computing, The Global Nature of the Cloud, Cloud Based Service Offerings, Benefits of Using a Cloud Model, What About Legal Issues When Using Cloud Models?, What Are the Key Characteristics of Cloud Computing?, Challenges for the Cloud, Cloud based services and Applications.

Learning Outcomes:

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

• Outline the Cloud characteristics and models.

• Classify different models, different technologies in cloud.

UNIT-II VIRTUALIZATION

Virtualization, Load Balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined networking, Network function virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing.

Learning Outcomes:

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

• Identify and differentiate various infrastructure components of classic and virtualized data center.

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UNIT-III CLOUD SERVICES AND PLATFORMS

Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private Cloud Software.

Learning Outcomes:

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

Summarize the Services and Platform of cloud.

UNIT-IV CLOUD APPLICATION DESIGN AND SECURITY

Cloud Application Design: Reference Architecture for Cloud Applications, Cloud ApplicationDesign Methodologies, Data Storage Approaches.

Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization,Identity Access Management, Data Security, Key Management, Auditing.

Learning Outcomes:

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

?? Design and build cloud applications.

UNIT-V APPLICATIONS IN CLOUD

Cloud for Industry, Healthcare &Education: Cloud Computing for Healthcare, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

Migrating into a Cloud: Introduction, Broad Approaches to migrating into the cloud, the seven-step model of migration into a cloud.

UNIT-VI PYTHON FOR CLOUD

Python for Cloud: Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for MapReduce, Python packages of Interest, Python web Application Frame work, Designing a RESTful web API.

Cloud Application Development in Python: Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App

Learning Outcomes:

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

?? analyze web services using python web application framework.

TEXT BOOKS:

1. Cloud Computing implementation, management and security by Joh n W.Ruttinghouse, James F. Ransome. CRC Press, Taylor & Franc is group, 2010.

2. Cloud computing A hands-on Approach‖ By ArshdeepBahga, Vijay Madisetti, Universities Press, 2016 6
3. Cloud Computing Principles and Paradigms: By Raj kumarBuyya, James Broberg, AndrzejGoscinski, wiley, 201

REFERENCE BOOKS:

1. Cloud Application Architectures by George Reese. Oreilly publishers
2. Cloud computing and SOA convergence in your enterprise, by David S. Linthicum, Addison- Wesley.
3. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud,George Reese, O'Reilly, SPD, rp2011.

e-Resources and Digital Material:

1. Cloud computing - Course (nptel.ac.in)

COURSE OUTCOMES:

1. Ability to create cloud computing environment
2. Describe virtualization technology at server, storage, network, desktop, and application layers of IT infrastructure.
3. Define cloud services and platforms
4. Compare different cloud services.
5. Design applications for an organization which use cloud environment.
6. Analyze web services using python web application framework

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(23F00206) CYBER SECURITY

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Students to understand importance of security of digital data over internet
2. Students to learn how to use mobiles, tabs, and computers to protect or secure data
3. Students to learn Digital Forensics and it's process to investigate procedure
4. To enable students to learn ethics of the hackers

UNIT-I INTRODUCTION TO CYBER SECURITY

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy

Learning Outcomes:

Understanding basics of the cyber security
Understanding computer threats

UNIT-II ETHICAL HACKING

Ethical Hacking , Ethical Hacking phases, Computer Forensics , Current trends in Web Security ,Information System Control and Audit , Cloud Computing and Security , Big Data Security, Antispyware Software, Antivirus Software, Cyber-Attack, Drive-by download, Keylogging

Learning Outcomes:

Understanding ethical hacking and list of security terms
Understanding Digital Information security measures

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UNIT-III CYBERSPACE AND THE LAW & CYBER FORENSICS

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

Learning Outcomes:

Understanding crime over internet and Forensics
Understanding Digital crime investigation with Forensics tools

UNIT-IV CYBERCRIME

Mobile and Wireless Devices:
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, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

Learning Outcomes:

Understanding security challenges
Understanding Digital devices and security and challenges

UNIT-V CYBER SECURITY

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations

Learning Outcomes:

Understanding security for business doing over internet
Understanding how to do business securily over internet

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UNIT-VI PRIVACY ISSUES

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. MiniCases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

Learning Outcomes:

Understanding and taking care of Digital Assets

Understanding the importance of Digital Data

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Cuber Security for Beginners: Andra, and with the Heimdal Security team

e-Resources and Digital Material:

1. http://nptel.ac.in/courses/106106129

COURSE OUTCOMES:

1. Students able to understanding cyber security over internet
2. Students will analyze ethics of ethical hacker
3. Students will understand forensic process for digital crime
4. Students apply knowledge with security tool to use electronic gadgets for communication
5. Students able to analyze importance of security, when browsing over the internet for marketing in business
6. Students able to able to analyze privacy issues and importance of security

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(23F00207) DATA MINING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Familiarize with mathematical foundations of data mining tools.
2. Introduce classical models and algorithms in data warehouses and data mining.
3. Investigate the kinds of patterns that can be discovered by association rule mining, Classification and clustering.
4. Explore data mining techniques in various applications like social, scientific and Environmental context.

UNIT-I INTRODUCTION TO DATA MINING

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Pre-processing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

Learning Outcomes:
To Summarize the data processing steps.
To Apply data cleaning process.
To know the distinction between similarity and dissimilarity measures.
To know the statistical description of the data.

UNIT-II ASSOCIATION RULE MINING

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

Learning Outcomes:
To Understand the multiprogramming.
To Know the Scheduling of Process.
To understand the correlation analysis.
To understand the concept of graph pattern in mining.

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UNIT-III CLASSIFICATION

Classification: Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

Learning Outcomes:
To know the classification of data.
To understand decision induction.
To Understand the Bayesian classification.

UNIT-IV CLUSTERING AND APPLICATIONS

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

Learning Outcomes:
To Understand the partition methods.
To know outlier analysis.
To Understand the cluster analysis.
To Know the working environment of grid based methods.

UNIT-V ADVANCED CONCEPTS

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data––Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

Learning Outcomes:
To Understand Time series data.
To Know the patterns in mining.
To distinguish the multimedia and web data.
To Understand the text mining.

UNIT-VI WEKA TOOL

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database –Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

Learning Outcomes:
To Understand the WEKA Tool.
To Understand the WEKA Tool.
To Know the accessing of data using clusters.
To Know the association rules.
To Understand algorithms.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

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REFERENCE BOOKS:

1. K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
2. Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

e-Resources and Digital Material:

1. https://swayam.gov.in/explorer?searchText=data+mining

COURSE OUTCOMES:

1. Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
2. Apply preprocessing methods for any given raw data..
3. Extract interesting patterns from large amounts of data
4. Discover the role played by data mining in various fields
5. Choose and employ suitable data mining algorithms to build analytical applications.
6. Evaluate the accuracy of supervised and unsupervised models and algorithms.

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MCA II Sem.

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(23F00208) ADVANCED DATA STRUCTURES & ALGORITHMS LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Learn data structures for various applications.
2. Implement different operations of data structures by optimizing the performance.
3. Develop applications using Greedy, Divide and Conquer, dynamic programming.
4. Implement applications for backtracking algorithms using relevant data structures.

1. Write a program to implement the following operations on Binary Search Tree:

a) Insert b) Delete c) Search d) Display

2. Write a program to perform a Binary Search for a given set of integer values.

3. Write a program to implement Splay trees.

4. Write a program to implement Merge sort for the given list of integer values.

5. Write a program to implement Quicksort for the given list of integer values.

6. Write a program to find the solution for the knapsack problem using the greedy method.

7. Write a program to find minimum cost spanning tree using Prims algorithm

8. Write a program to find minimum cost spanning tree using Kruskals algorithm

9. Write a program to find a single source shortest path for a given graph.

10.Write a program to find the solution for job sequencing with deadlines problems.

11. Write a program to find the solution for a 0-1 knapsack problem using dynamic programming.

12. Write a program to solve Sum of subsets problem for a given set of distinct numbers using backtracking.

13. Implement N Queens problem using Back Tracking.

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TEXT BOOKS:

1. Y Daniel Liang, “Introduction to Programming using Python”, Pearson.
2. Benjamin Baka, David Julian, “Python Data Structures and Algorithms”, Packt Publishers,2017.
3. Rance D. Necaise, “Data Structures and Algorithms using Python”, Wiley Student Edition.

REFERENCE BOOKS:

1. Python Programming Using Problem Solving Approach. Reema Thareja. OXFORD UNIVERSITY PRESS 2017

e-Resources and Digital Material:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

COURSE OUTCOMES:

1. Understand and apply data structure operations.
2. Understand and apply non-linear data structure operations.
3. apply Greedy, divide and conquer algorithms.
4. Develop dynamic programming algorithms for various real-time applications
5. Illustrate and apply backtracking algorithms, .
6. Able to understand non-deterministic algorithms

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MCA II Sem.

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(23F00209) OBJECT ORIENTED PROGRAMMING WITH JAVA LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Recognize the Java programming environment.
2. Develop efficient programs using multithreading.
3. Design reliable programs using Java exception handling features
4. Extend the programming functionality supported by Java.
5. Select appropriate programming constructs to solve a problem.
6. Establish database connectivity in java and implement GUI applications.

Week-1

a. Installation of Java software, study of any Integrated development environment, Use Eclipse or Netbeans platform and acquaint with the various menus. Create a test project, add a test class and run it.

See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

b. Write a Java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.

c. Develop a Java application to generate Electricity bills. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Commute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

First 100 units - Rs. 1 per unit

101-200 units - Rs. 2.50 per unit

201 -500 units - Rs. 4 per unit

> 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

First 100 units - Rs. 2 per unit

101-200 units - Rs. 4.50 per unit

201 -500 units - Rs. 6 per unit

> 501 units - Rs. 7 per unit

d. Write a Java program to multiply two given matrices.

Week-2

a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.

b. Write Java program on dynamic binding, differentiating method overloading and overriding.

c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen) using Interfaces.

Week-3

a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read, display it only if its not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.

b. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing. By using StringToknizer class.

Week-4

a. Write a Java program to implement user defined exception handling.

b. Write java program to create a package and add 2 classes in it.

Week-5

a. Write a Java program that creates a user interface to perform integer division. The user

enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

b. Write a Java program that creates three threads. First thread displays Good Morning every one second, the second thread displays Hello every two seconds and the third thread displays Welcome every three seconds.

Week-6

a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.

b. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Week-7

a. Write a java program that displays the number of characters, lines and words in a text file.

b. Write a java program that reads a file and displays the file on the screen with line number before each line.

Week-8

a. Write a Java program that correctly implements the producer-consumer problem using the concept of inter thread communication.

b. Develop a Java application for stack operation using Buttons and JOptionPane input and Message dialog box.

c. Develop a Java application to perform Addition, Division, Multiplication and subtraction using the JOptionPane dialog Box and Textfields.

Week-9

a. Develop a Java application for the blinking eyes and mouth should open while blinking.

b. Develop a Java application that simulates a traffic light. The program lets the user select one of the three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with STOP or READY or GO should appear above the

buttons in the selected color.

Initially, there is no message shown.

Week-10

a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.

b. Develop a Java application by using JtextField to read decimal values and converting a decimal number into a binary number then print the binary value in another JtextField.

Week-11

a. Develop a Java application that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.

b. Develop a Java application to demonstrate the key event handlers.

Week-12

a. Develop a Java application to find the maximum value from the given type of elements using a generic function.

b. Develop a Java application that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

c . Develop a Java application for handling mouse events.

Week-13

a. Develop a Java application to establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using java and display the information of the students at front end.

TEXT BOOKS:

1. P. J. Deitel, H. M. Deitel, “Java for Programmers”, Pearson Education, PHI, 4th Edition, 2007.
2. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.

REFERENCE BOOKS:

1. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press, 2nd Edition, 2007

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e-Resources and Digital Material:

1. https://java-iitd.vlabs.ac.in/
2. http://peterindia.net/JavaFiles.html

COURSE OUTCOMES:

1. Recognize the Java programming environment.
2. Develop efficient programs using multithreading.
3. Design reliable programs using Java exception handling features.
4. Extend the programming functionality supported by Java.
5. Select appropriate programming constructs to solve a problem.
6. Establish database connectivity in java and implement GUI applications.

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MCA II Sem.

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(23F00210) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To teach the methods of implementing algorithms using artificial intelligence techniques
2. To illustrate search algorithms
3. To demonstrate the building of intelligent agents
4. Make use of Data sets in implementing the machine learning algorithms
5. Implement the machine learning concepts and algorithms in any suitable language of choice.

Week 1: Write a program to implement DFS and BFS

Week 2: Write a program to implement 8 puzzle problem.

Week 3: Write a Program to find the solution for traveling salesman Problem

Week 4: a. Write a program to implement A* Algorithm

b. Write a program to implement Hill Climbing Algorithm

Week 5: Build a bot that provides all the information related to your college.

Week 6: Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

Week 7: Data Extraction, Wrangling

a. Loading different types of datasets in Python

b. Basic Data Set Handling commands

c. Basic Statistical Function for Data Exploration

d. Basic plots for Data Exploration

Week 8: Supervised Learning

a. Implementation of Decision tree classification

b. Implementation of K-nearest Neighbour

Week 9: Supervised Learning

a. Implementation of Linear Regression

b. Implementation of Logistic regression

Week 10: Unsupervised Learning

a. Implementing K-means Clustering

b. Implementing Hierarchical Clustering

Week 11: Dimensionality Reduction

a. Implementation of PCA

b. Implementation of LDA

Week 12: Create any Sample Project using Machine Learning

TEXT BOOKS:

1. David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002

REFERENCE BOOKS:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.

e-Resources and Digital Material:

1. Machine Learning A-Z (Python & R in Data Science Course)
2. Udemy
3. Machine Learning
4. Coursera
5. https://www.tensorflow.org/
6. https://pytorch.org
7. https://github.com/pytorch

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COURSE OUTCOMES:

1. Apply various AI search algorithms
2. Design chatbots and virtual assistants
3. Gain knowledge about basic concepts of Machine Learning
4. Identify machine learning techniques suitable for a given problem & Solve the problems using various machine learning techniques
5. Apply Dimensionality reduction techniques
6. Design application using machine learning techniques.

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MCA II Sem.

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(23F00211) SDC-2-CHAT GPT PROMPT ENGINEERING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. The students will be able to learn
2. Introduction to ChatGPT's architecture and underlying mechanisms
3. Unveiling the power of prompts: crafting effective inputs to get desired outputs
4. Understand the nuances of architecture and hyperparameter choices
5. Exploring advanced prompt engineering techniques

Module-1

-Introduction to Chat GPTs architecture and underlying mechanisms.

Module-2

- Unveiling the power of prompts: crafting effective inputs to get desired outputs.

Module-3

- Understanding the role of context and context window.

Module-4

- Exploring advanced prompt engineering techniques.

Module-5

- Evaluation and feedback on participants prompt engineering skills.

Module-6

- Building the foundation: creating your own language model using Python.

Module-7

- Understand the nuances of architecture and hyperparameter choices.

Module-8

- Fine-tuning your model for improved accuracy and relevance.

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Module-9

- Hands-on exercises and troubleshooting common issues.

Module-10

- Collaborative problem-solving and creativity under time constraints

TEXT BOOKS:

1. The Art of Prompt Engineering with Chatgpt: A Hands-On Guide

COURSE OUTCOMES:

1. Apply various ChatGPT’s architecture and underlying mechanisms
2. Crafting effective inputs to get desired outputs.
3. Unveiling the power of prompts: crafting effective inputs to get desired outputs.
4. Exploring advanced prompt engineering techniques.
5. creating your own language model using Python
6. Understand the nuances of architecture and hyperparameter choices

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MCA II Sem.

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(23F00213) UNIVERSAL HUMAN VALUES (AUDIT COURSE)

Course Category	**Humanities & Social Sciences (HS)**
Course Enrichment Relevance	**Human Values**

COURSE OBJECTIVES:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

UNIT-I COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION

Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validationas the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT-II UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

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UNIT-III UNDERSTANDING HARMONY IN THE FAMILY

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship Understanding the meaning of Trust; Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

UNIT-IV UNDERSTANDING HARMONY IN THE SOCIETY-HARMONY IN HUMAN-HUMAN RELATIONSHIP

Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT-V UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE

Understanding the harmony in the Nature Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and selfregulation in nature Understanding Existence as Co-existence of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT-VI IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and ecofriendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

TEXT BOOKS:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

2. R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004. The Story of Stuff (Book).
3. Mohandas Karamchand Gandhi “The Story of My Experiments with Truth”
4. E. FSchumacher. “Small is Beautiful” Slow is Beautiful –Cecile Andrews

e-Resources and Digital Material:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004. The Story of Stuff (Book).
3. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule”
4. Vivekananda - Romain Rolland(English)
5. Mohandas Karamchand Gandhi “The Story of My Experiments with Truth”
6. J C Kumarappa “Economy of Permanence”

COURSE OUTCOMES:

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different dayto-day settings in real life, at least a beginning would be made in this direction.

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Highlights of the College:

- Received Autonomous Status.
- Accredited by NBA for the Departments of ECE and CSE.
- Accredited by NAAC with Grade-A (3.2 score)
- Recognized as Q-Mentor College by APSCHE, for guiding HEIs for accreditation.
- Listed as one of the Best Engineering College with AA+ Grade by Career 360 in the year 2023.
- Recognized in GOLD CATEGORY by AICTE-CII Survey for the years 2017 & 2018 and also in PLATINUM CATEGORY in the year 2020.
- Received TWO University Gold Medals from JNTUA, Ananthapuramu.
- Received NINE Prathibha Awards from the Govt of A.P.
- SIX Patents were granted and SIX patents were approved under AICTE-KAPILA Scheme.
- Received around 50 Lakhs worth of funding projects under various schemes of UGC, AICTE, IEEE, IE and etc.

SREC VISION:

To become a nucleus for pursuing technical education and pool industrial research and developmental activities with social-conscious and global standards.

SREC MISSION:

- To provide Advanced Educational Programs and prepare students to achieve success and take leading roles in their chosen fields of specialization by arising a self-sustained University.
- To establish postgraduate programs in the current and Advanced Technologies.
- To establish an R&D Consultancy through developing Industry Institute Interaction, building up exceptional infrastructure.
- To propel every individual, realize and act for the technical development of the society.

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