ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES
RAJAMPET
(An Autonomous Institution)

ACADEMIC REGULATIONS (R20), COURSE STRUCTURE AND SYLLABI

For the students admitted to

M.C.A., Regular Two Year Degree Programme from the Academic Year 2020-2021

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instil high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

Mission

Our mission is to educate students from the local and rural areas and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world-class quality of Technical education and take care of character building.

ACADEMIC RULES AND REGULATIONS OF TWO-YEAR M.C.A

REGULAR DEGREE PROGRAMME

APPLICABLE FOR THE STUDENT BATCHES ADMITTED FROM THE ACADEMIC YEAR 2020-2021

CONTENTS

1. PREAMBLE

Annamacharya Institute of Technology and Sciences (Autonomous), Rajampet, relentlessly aims to achieve academic excellence by implementing new initiatives in teaching-learning and evaluation processes. Based on the directions of the University Grants Commission (UGC), New Delhi, All India Council for Technical Education (AICTE), New Delhi and Jawaharlal Nehru Technological University Anantapur (JNTUA) Anantapuramu, the institute is developed the curriculum for Master of Computer Applications (MCA) Course to match the needs, expectations, and skillsets of students of the region, in the post-graduate programme offered from the academic year 2020-21.

2. APPLICATION AND COMMENCEMENT

- The regulations are quite comprehensive and include definitions of key terms, semester system, credit system, grading system and other relevant details.
- The regulations detailed herein shall apply to all the regular post-graduate programme offered by the Institute.
- The regulations shall be applicable and come into force to the student batches admitted from the academic year 2020-21.
- The Institute may revise, amend or change the regulations, scheme of examinations and syllabi, from time to time, if found necessary and on approval by the Academic Council of the Institute, keeping the recommendations of the Board of Studies in view.
- Any or all such amendments shall be effective from such date and to such batches of students including those already undergoing the programme, as may be approved through Academic Council of the Institute.
- These regulations shall be called R20 Regulations.

3. PROGRAMMES OFFERED BY THE INSTITUTE

The following M.C.A programmes are offered by the Institute from 2020-2021.

SNo	Name of the Program	Programme Code
1	Master of Computer Applications (2 Year Degree) (Regular Entry Scheme)	1F

4. ELIGIBILITY FOR ADMISSION

The eligibility criteria for admission into the MCA Post Graduate programme offered at AITS shall be as prescribed by the Government of Andhra Pradesh. The criteria are given below:

- Admission to the above programmes shall be made subject to the eligibility and qualifications as prescribed from time to time.
- **Regular Entry Scheme**: Candidates for admission to the first semester of the Four semester

MCA degree programme must have a B.C.A / B.Sc / B.Com Degree with Mathematics as one of the subject at 10+2 level or at graduation level.

- Admissions shall be made on the basis of Rank earned by the candidate in the relevant ICET examination / merit rank obtained by the qualifying candidate in the entrance test (ICET) conducted by the Government of Andhra Pradesh for MCA & MBA programmes or as decided by APSCHE subject to the reservations as prescribed by the university / State Government / on the basis of any other order of merit as decided by APSCHE from time to time
- Seats in each programme in the Institute are classified into two categories i.e., **Category – A** and **Category – B** as per the GOs of Andhra Pradesh.

Category – A Seats

These seats shall be filled through counselling as per the rank secured by a candidate in the Common Entrance Test (ICET) conducted by the Government of Andhra Pradesh and as per other admission criteria laid down in the GOs.

Category – B Seats

These seats shall be filled by the Institute as per the GOs issued by the Government of Andhra Pradesh from time to time

5. MEDIUM OF INSTRUCTION

The medium of instruction shall be **English** for all the courses including their content delivery and examinations, seminars, presentations and project evaluation as prescribed in the programme curriculum.

6. M.C.A PROGRAMME STRUCTURE

The structure of the M.C.A Programme on offer at AITS are based on the **Choice Based Credit System (CBCS)** as defined by the UGC and the curriculum / course structure in line with AICTE.

Semester Scheme

- The **M.C.A** Programme offered at AITS follow **semester scheme** pattern.
- The duration of a **M.C.A** Programme shall be of 2 **academic** years**.**
- Each academic year shall have **2 semesters** i.e., odd and even semesters and shall be counted as first semester, second semester, and so on up to fourth semester.
- Each semester shall consist of **16 weeks** of academic work excluding internal examinations.
- Each semester is structured to provide credits totalling to **90 credits** for the entire M.C.A. Programme.
- Each semester shall have **Continuous Internal Evaluation (CIE)** and **Semester End Examination (SEE)** for both Theory and Lab courses.
- A student after securing admission into a 2 year M.C.A Programme at AITS shall pursue and acquire the M.C.A. Degree in a **minimum period of Two academic years i.e., 4 semesters**

and a **maximum period of Four academic years i.e., 8 semesters** starting from the date of commencement of I year I semester, failing which the student shall forfeit the seat in **M.C.A**. Programme.

7. COURSES AND CREDIT STRUCTURE

Credit: A credit is 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/project per week.

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

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

Each course is assigned certain number of credits based on following criterion

Type of Class	Semester	
	Periods per Week	Credits
Theory (Lecture/Tutorial)	01	01
	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project Work	-	16
Comprehensive Viva-Voce	-	02

Every course of the M.C.A. programme shall be offered by a specific section / department. The unique codes of the section / department offering the courses are given in the Table.

Course offering Department	**Code**
Basic Science Courses	C
Humanities Courses	
Master of Computer Applications	F
Master of Business Administration	E

M.C.A Programme of study shall be designed to have theory and laboratory courses. In addition, a student shall carry out project work and comprehensive viva-voce courses as prescribed in the curriculum of the Programme.

7.1 Types of Courses

Type of courses	Course category	Code	Range of credits
Foundation Courses	Humanities	HS	5
	Basic Sciences	BS	3
Core Courses	Professional Core	PC	52
Electives Courses	Professional Electives	PE	09
	MOOCs	-	03
Project	Comprehensive Viva Voce	-	2
	Project work	PW	16
Mandaotry Courses	Mandatory	MC	-
		Total Credits	90

7.1.1 Foundation Courses

Basic Science Courses and Humanities courses are termed as Foundation Courses and are mostly offered at I Year – I Semester.

7.1.2 Professional Core Courses

Professional Core Course is to be completed by all students of respective programme before they can move on to the next semester.

7.1.3 Professional Core Electives

University Grants Commission has come up with the Choice Based Credit System (CBCS) in which the students have a choice to choose from the prescribed courses, which are referred as Professional elective courses.

Students have to register for a total of 4 professional core electives courses (PE-1 to PE-4) from the list of track-wise professional elective course as prescribed in the course structure of the programme. The following points are considered for a Professional Elective Course.

- The selection of course based on the choice for students shall be on 'first come first serve' through on line and off line registration.
- The Head of the department or concerned shall decide, whether or not to offer such course keeping in view the resources available in the department offering the course.

7.1.4 Mandatory Courses

- A student shall pursue mandatory courses as specified in the course structure of the M.C.A. Programme.
- These courses are among the compulsory courses and do not carry any credits.

- A student has to secure 40 marks out of 100 in the Internal Examination, shall be necessary requirement for the student to qualify for the **award of Degree**.
- Result of mandatory courses shall be declared with **"Pass"** or **"Fail"** performance in the Comprehensive Marks Memo.
- No marks or letter grade shall be allotted.

Attendance in the mandatory course shall be considered while calculating aggregate attendance.

7.1.5 Massive Open Online Courses

- MOOCs (Massive Open Online Courses) are introduced to meet with the global requirements and to inculcate the habit of self-learning and in compliance with the UGC guidelines
- A student shall be permitted to pursue up to a maximum of one electives courses under MOOCs during programme. Each of courses must be of minimum 12 weeks in duration.
- Students interested in pursuing MOOCs shall register for the course and submit this information at their department office at the start of the corresponding semester.
- Course content for the selected MOOCs shall be drawn from the respective MOOCs offering Portal.
- Course progress shall be monitored by the Mentors designated by the HoD.
- Grade obtained through the evaluation of the MOOC shall be considered for the CGPA calculation.
- Three credits shall be awarded to the student upon successful completion of MOOC.
- In case a student fails to complete the MOOCs he/she shall re-register for the same with the same provider, already offered that course. In case that provider discontinues to offer the course, Institution shall conduct an offline examination in the same format, which student already appeared in online examination, as per the MOOC syllabus.

8. EVALUATION PROCESS

The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks for both Theory and Lab Courses.

- For a Theory course, the distribution shall be 40 marks for Internal Evaluation and 60 marks for End-Examinations. The distribution is detailed in 8.1.1.
- For a Lab course, the distribution shall be 40 marks for Internal Evaluation and 60 marks End-Examinations. The distribution is detailed in 8.1.2
- For the project work, the evaluation procedure is detailed in 9.0.
- Comprehensive Viva-Voce shall be evaluated for 100 marks, the evaluation procedure is detailed in 9.2.

8.1 Internal Evaluation

8.1.1 Theory Internal Examinations

For a Theory Course, 40 marks are allotted for Internal Evaluation. Two mid-term examinations (Theory Internal Examinations) shall be conducted for a Theory Course during a semester and they shall be evaluated for 40 marks. First midterm examination shall be conducted as per the syllabus of I & II units. The second midterm examination shall be conducted as per the syllabus of III, IV and V units.

The question paper shall be of subjective type in which four questions with an internal choice are to be answered. 80 % weightage for the best performance and 20 % for other shall be considered.

For Example:

Marks obtained in I mid-term examination: 19

Marks obtained in II mid-term examination: 10

Final Internal Marks: (19x0.8) + (10x0.2) = 17.2

If the student is absent for any one midterm examination, the final internal marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other.

For Example:

Marks obtained in first mid: 0 (Absent); Marks obtained in second mid: 18

Final Internal Marks: (18x0.8) + (0x0.2) = 14.4

8.1.2 Laboratory Internal Examinations

For Lab Course, there shall be a continuous internal evaluation during the semester for 40 marks. Out of the 40 marks, day-to-day performance of the student in the laboratory shall be evaluated for 20 marks by the concerned laboratory teacher based on experimental correctness/record/viva. Two Lab Internal examinations shall be conducted for 20 marks by the concerned teacher. Performance of one best out of two tests to be considered.

8.2 External Evaluation

8.2.1 Theory End Examinations

As specified in 8.0, Theory End Evaluation is done for 60 marks. End examination of theory subjects shall be conducted at the end of semester. There shall be Regular and Supplementary End Examinations. Theory End Examination shall be conducted for 60 marks and is of 3 hours duration. The question paper shall be of subjective type with 5 questions, one question from each unit, with internal choice. All questions carry equal marks of 12 each.

8.2.2 Laboratory End Examinations

As specified in 8.0, Lab End Evaluation is done for 60 marks, in the form a Lab End Examination that shall be conducted for 3 hours in respective Laboratory. Each lab course will have its own evaluation procedure and weightage.

8.2.3 Supplementary Theory/Laboratory End Examinations

- Supplementary examination shall be conducted along with regular Semester End Examinations.
- During Semester End Examinations of even semester, supplementary examinations of odd semester shall be conducted and during semester end examinations of odd semester, supplementary examinations of even semester shall be conducted.
- The same schedule is applicable to Supplementary Lab End Examinations. Supplementary examination shall be conducted along with the next batch of students or separately.
- In case of seminars and comprehensive viva-voce examinations, supplementary seminar / comprehensive viva-voce will be conducted along with the next batch of students. If the next batch of students is not available, a separate supplementary examination will be conducted.

8.2.4 Revaluation and Recounting

Students may visit Examination Section Webpage for Norms and Procedures for Revaluation and Recounting of Answer Scripts.

- The students who wishes to apply for Revaluation/Recounting of his/her answer-books(s) must submit his/her application on the prescribed form together with the requisite fee to the Controller of Examinations before expiry of 15 days excluding the date of the declaration of his/her examination result. Application not received in the prescribed form or by the due date or without the requisite fee shall be rejected.
- After Recounting / Revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a notice.
- No Revaluation / Recounting for Laboratory Examination.
- The students are informed to be more careful in furnishing the information while applying for Recounting / Revaluation. The applications with insufficient information will be summarily rejected and the student has to forfeit the amount paid in this connection.

8.2.5 Challenge Evaluation

- Applications are invited from the students, who wish to apply for Challenge Valuation in the subjects of the M.C.A Regular and Supplementary examinations
- The student will apply for Challenge valuation in a specified application and should be routed through the HOD concerned.
- The students who have applied for the revaluation for a paper(s) of an examination are only eligible for the Challenge Valuation of that paper(s) of that examination.
- A Fee of Rs. 10000/- (Ten Thousand Rupees Only) for each paper is to be paid within the last date for challenge valuation.

- A Xerox copy of the answer script will be provided to the student on receipt of the payment of fee and date and time of the valuation will be informed to the student, so that valuation will be done in the presence of the teacher attended in support of the student nominated by the HOD concerned.
- The HOD concerned will nominate a teacher of the concerned subject to observe the valuation in support of the student. This will be done on the request of the student.
- If the marks obtained in the challenge valuation are more than or equal to 15% of the maximum marks with respect to the original marks obtained in the first valuation, then the marks obtained in the Challenge valuation will be awarded to the student and the institute will pay back Rs 9,000 (Nine thousands rupees only) to the student. If the student status changes from fail to pass, an amount of Rs. 5000 will be refunded to the student. Otherwise there will not be any change in the result of the student and original marks will be retained and the student will forfeit the fee paid.
- No Challenge valuation for Laboratory Examination

9. PROJECT EVALUATION

Every student shall be required to submit thesis/dissertation after taking up a topic approved by the Departmental Committee.

- The Departmental Committee (DC) consisting of HOD, Project supervisor and two internal senior experts shall monitor the progress of the project work. A Project Review Committee (PRC) shall be constituted with Principal as a Chair person, Heads of the Departments of the program and two other senior faculty members, as members of PRC. PRC will come into action when DC is not able to resolve the issues.
- Registration of project work: A student is permitted to register for the project work after satisfying the attendance requirements of all the courses (theory, practical and seminars)
- After satisfying above point, a student has to submit in consultation with his supervisor, the title, objective plan of action of his project work to the DC for approval. Only after obtaining the approval of DC, the student can initiate the project work
- The work on the project shall be initiated in the penultimate semester and continued in the final semester. The student can submit project thesis with the approval of DC after 16 weeks from the date of registration at the earliest but not later than 6 Months from the date of registration for the project work. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institute
- The internal evaluation shall be made by the DC to grade, on the basis of two seminars presented by the student on the topic of his project.

- The student must submit the status of thesis/dissertation only after passing all the prescribed subjects such as theory, practical's, seminar and project internal evaluation
- A Student has to prepare four copies of the thesis/dissertation certified in the prescribed format by the supervisor and HOD. Out of which three copies shall be submitted in the examination section.
- Viva Voce examination shall be conducted by a board consisting of the supervisor, Head of the department and the External examiner. The Board shall jointly report student work as:

  A- Excellent
  B- Very Good
  C- Good
  D- Satisfactory
  E- Not Satisfactory

  Head of the Department shall coordinate and make arrangements for the conduct of viva-voce.
- If the report of the viva-voce is failure, the student will retake the viva-voce examination after three months. If he/she fails to get a satisfactory report at the second viva-voce examination, he/she will not be eligible for the award of the degree.

9.1 Pre-Submission Seminar

- A student shall present a seminar before submitting the final project in II Year II Semester of the M.C.A Programme.
- A student under the supervision of a faculty member, shall collect literature on his/her project, critically review the literature, carry out the work and submit it to the department in a form of report as prescribed by the Academic section and shall make an oral presentation before the Departmental Committee.
- Student has to clear Pre-Submission Seminar, prior to the submission of project report to the DC for approval.

9.2 Comprehensive Viva-Voce Evaluation

- Comprehensive Viva-Voce is to assess the student's technical and analytical skills in the domain of Computer Applications.
- There shall be a Comprehensive Viva-Voce in II Year II Semester.
- The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two senior faculty mambers of the department.
- The Comprehensive Viva-Voce is intended to assess the student's understanding of the subjects he/she studied during the MCA course of study.
- This is also to see the articulation of what is being learnt by them.

- The idea is to see that stidents are able to digest what is being taught in two tears and see their relevance not only in the practical field but also their inter relationship.
- The Comprehensive Viva-Voce is evaluated for 100 marks by the committee.
- Comprehensive Viva-Voce conducted twice in II Year II Semester.
- One in the middle of the semester and the other towards the end of the semester, and the best one is considered.
- There are no internal marks for the Comprehensive Viva-Voce.

10. ATTENDANCE REQUIREMENTS AND DETENTION POLICY

- A student shall maintain a minimum required attendance of 75% in AGGREGATE.
- Shortage of attendance up to 10% i.e., attendance between 65% to 75% in aggregate, may be condoned by the Institute Academic Committee based on the rules prescribed by the Academic Council of the Institute from time to time.
- A stipulated fee shall be payable towards condonation of shortage of attendance.
- Shortage of attendance below 65 % shall in no case be condoned. A stipulated fee shall be payable towards condonation of shortage of attendance to the Institute as per following slab system.

  1st Slab: Less than 75% attendance but equal to or greater than 70% a normal condonation fee can be collected from the student.

  2nd Slab: Less than 70% but equal to or greater than 65%, double the condonation fee can be collected from the student.

- Students whose shortage of attendance is not condoned OR who have not paid the stipulated fee OR who have not cleared any other due to the Institute in any semester are not eligible to write the Semester End Examination (SEE).
- Students, who do not meet the minimum required attendance of 65% in a semester, shall be detained in that semester and their registration for that semester shall stand cancelled. They shall not be promoted to the next semester.
- Students detained in a semester shall seek re-admission into that semester as and when offered.
- Academic regulations applicable to the semester in which re-admission is sought shall be applicable to the re-admitted student.
- In case, there are any professional electives and / or the same may also be re- registered, if offered. However, if those electives are not offered in the later semesters, then alternate electives may be chosen from the same set of elective courses offered under that category.

  Any student against whom any disciplinary action is pending shall not be permitted to attend semester end examination (SEE) in that semester.

11. Minimum Academic Requirements and Award of the Degree

The following Academic Requirements have to be satisfied in addition to the attendance requirements mentioned in section 10.

11.1 A student shall be deemed to have satisfied the minimum academic requirements and earn the credits for each theory , practical and seminar, if he secures

- A minimum of 40 % marks for each theory course in the Semester End Examination (SEE), and
- A minimum of 50 % marks for each theory course considering both CIE and SEE taken together.

11.2 A student shall be deemed to have satisfied the minimum academic requirements and earn the credits allotted to seminar courses, if he secures

- A minimum of 50 % marks for a seminar in the Continuous Internal Evaluation (CIE)

11.3 A student shall be treated as failed, if he

- Does not submit a report of a seminar or
- Does not make a presentation of the same before the evaluation committee as per the schedule, or
- Secures less than 50 % marks in evaluation.

11.4 If a student fails to secure a pass grade in a particular course, it is mandatory that he shall register and re-appear for the examination in that course during the next semester when SEE is conducted in that course. It is mandatory that he should continue to register and re-appear for the examination till he secures a pass grade.

11.5 A student detained in a SEMESTER due to shortage of attendance, may be re-admitted when the same semester in the next academic year for fulfillment of academic requirements.

11.6 Academic regulations applicable to the semester in which re-admission is sought shall be applicable to the re-admitted student.

11.7 A student shall be given one chance to re-register, after completion of the course work, for each course, provided the internal marks (CIE) secured by a student are less than 50% and he has failed in the SEE. In such a case, a student may re-register for the course(s) with prior permission and secure the minimum required attendance. Attendance in the re-registered course(s) shall be calculated separately to become eligible to write the semester end examination (SEE) in the re-registered course(s).

11.8 Re-registration is allowed only in those cases where the student doesn't have any course(s) yet to pass other than the re-registration course(s) where the CIE marks are less than 50%. However, in the case of re-registration of course(s) by a student, academic regulations applicable at the time of student admission in the programme shall be applicable.

11.9 In the event of re-registration, the internal evaluation marks as well as the End Semester Examinations marks secured in the previous attempt (s) for those subjects stand cancelled.

11.10 For each subject re-registered, the student has to pay a fee equivalent to one third of the semester tuition fee

11.11 A student shall register and put up minimum academic requirement of all 90 credits and earn all 90 credits for the award of M.C.A Degree

11.12 Students who fail to earn 90 credits as indicated in the course structure within four academic years from the year of their admission shall forfeit their seat in M.C.A course and their admission shall stand cancelled.

12. SEMESTER GRADE POINT AVERAGE (SGPA) AND CUMULATIVE GRADE POINT AVERAGE (CGPA)

The performances of students in each of the courses in the Programme are expressed in terms of letter grades based on an absolute grading system. We use 10-point grading system with letter grades. They are given in the following table.

Marks Obtained	Letter Grade	Description	Grade Points (GP)
≥90	S	Superior	10
≥80 and ≤89.99	E	Excellent	9
≥70 and ≤79.99	A	Very Good	8
≥60 and ≤69.99	B	Good	7
≥50 and ≤59.99	C	Pass	6
< 50	F	Fail	--
Absent in the exam(s)	AB	Absent	--

A student is eligible for the award of the M.C.A. Degree with the class as mentioned in the following table

CGPA	Class
≥7.5	First class with Distinction
≥6.5 and <7.5	First Class
≥5.5 and <6.5	Second Class
≥5.0 and <5.5	Pass

12.1 Computation of SGPA

The performance of each student at the end of each semester shall be indicated in terms of SGPA. The SGPA shall be calculated as follows:

$$SGPA = \frac{Total\ earned\ weighted\ grade\ points\ in\ a\ semester}{Total\ credits\ in\ a\ semester}$$

$$SGPA = \frac{\sum_{i=1}^{p} C_{i.}\, G_i}{\sum_{i=1}^{p} C_i}$$

Where

$C_{i.}$ = Number of credits allotted to a particular course 'i'

G_i= Grade point corresponding to the letter grade awarded to the course i

$i = 1,2,\ldots.$p represent the number of courses in a particular semester.

Note: SGPA is calculated and awarded to those students who pass all the courses in a semester.

12.2 Computation of CGPA

The performance of a student shall be obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained on all courses during the course of study

$$CGPA = \frac{Total\ earned\ weighted\ grade\ points\ for\ the\ entire\ programme}{Total\ credits\ for\ the\ entire\ program}$$

$$CGPA = \frac{\sum_{j=1}^{m} C_{j.}\, G_j}{\sum_{j=1}^{m} C_j}$$

Where

$C_{j.}$ = Number of credits allotted to a particular semester 'j'

G_j = Grade point corresponding to the letter grade awarded to the semester j

$j = 1,2,\ldots.$m represent the number of semester of the entire programme.

12.3 Grade Card

The grade card issued shall contain the following

- The credits for each course offered in that semester
- The letter grade and grade point awarded in each course
- The SGPA and CGPA
- Total number of credits earned by the student up to the end of that semester

Example: - Computation /calculation of SGPA

Course name	Credits (C)	Letter grade	Grade point (GP)	Credit point (CP=C*GP)
Course 1	4	A	9	4x9=36
Course 2	3	A+	10	3*10=30
Course 3	2.5	A+	10	2.5*10=25
Course 4	1.5	D	6	1.5*6=9
Course 5	1	E	5	1*5=5
Total	12			105

Therefore, SGPA= $\frac{105}{12}$ 8.75

Example Illustration of CGPA

Semester 1	Semester 2	Semester 3
Credit: 20 SGPA : 8.75	Credit : 20 SGPA : 8.25	Credit : 22 SGPA : 7.89

Thus, CGPA = $\frac{20*8.75+20*8.25+22*7.89}{62} = 8.28$

Similarly, compute CGPA obtained at the end of 4th semester shall be the final CGPA secured by the student for the entire programme.

12.4 Conversion of SGPA into percentage

In case of a specific query by students/employers regarding Semester Grade Point Average (SGPA)/ Cumulative Grade Point Average (CGPA) into percentage, the following formulae will be adopted for notional conversion of CGPA into percentage.

Percentage = (CGPA-0.50)*10

13. TRANSCRIPTS

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

14. 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 11 and they will follow the academic regulations into which they are readmitted. Students who are permitted to avail gap year shall be eligible for re-joining into the succeeding year of their M.C.A from the date of commencement of class work, subject to Section 11 and they will follow the academic regulations into which they are readmitted.

15. MINIMUM INSTRUCTION DAYS FOR A SEMESTER

The minimum instruction days for each semester shall be 16 weeks.

16. STUDENT TRANSFERS

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the affiliating University from time to time.

17. ANNOUNCEMENT OF RESULTS

- Results review committee comprising of University nominee, Principal, Dean Academics, Chairman of various boards of studies, Controller of Examinations and Deputy Controller of Examinations will monitor the results and gives the permission for announcement of results.
- After review meeting results are loaded in to Institution website from which students can access their results by entering Hall Ticket number. And also results in form of hard copy are available with respective Heads of the departments.

18. GENERAL INSTRUCTIONS:

- The academic regulations should be read as a whole for purpose of any interpretation.
- Malpractices rules-nature and punishments are appended.
- Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal / Governing body is final.
- Any legal issues are to be resolved in Rajampet Jurisdiction.
- The Institute 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 Institute.

APPENDIX I: Rules for Disciplinary Action for Malpractices / Improper Conduct in Examinations

Malpractices identified by squad or special invigilators or invigilators

Punishments shall be given to the students as per the above guidelines. The case is to be referred to the malpractice committee.

Malpractice committee

1. The Principal, Chairman
2. Dean, Academics, Member
3. Invigilator, Member
4. Subject expert, Member
5. Concerned Head of the Department, Member
6. Controller of Examinations, Member Secretary

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 fill all the norms required for the award of Degree.

	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 performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four 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. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's 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 University examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all University examinations.

		The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject 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 officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of student 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/officer-in-charge of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits

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

DEPARTMENT OF COMPUTER APPLICATIONS

VISION AND MISSION OF THE DEPARTMENT

Vision

To become globally prominent and significant in the areas of academics and research keeping the aim of developing competitive professionals to serve the society and to light on the needs of ever changing software industry.

Mission

- To enable the students to be knowledgeable and creative by developing state-of-the-art curriculum through innovative teaching methodologies.
- Providing training programs that bridges the gap between academia and industry to produce competitive software professionals.
- To inculcate values and ethics in the students enabling them to become socially committed professionals.
- To enhance the research quality and productivity, by providing required facilities and industry collaboration.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Practice software engineering principles and standards to develop software to meet customer requirements across verticals.

PEO2: Contribute to build sustainable and inclusive applications using mathematical, simulation and meta-heuristic models.

PEO3: Demonstrate entrepreneurial qualities through individual competence and team work.

PEO4: Achieve successful professional career with integrity and societal commitments leading to lifelong learning.

PROGRAMME OUTCOMES (POs)

1. **Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
2. **Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
3. **Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Computing Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage**: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
6. **Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
7. **Life-long Learning:** Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
8. **Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
9. **Communication Efficacy**: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
10. **Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
11. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
12. **Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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Regulations: R20 Program Code: 1F

MASTER OF COMPUTER APPLICATIONS

I Year Semester - I (Theory - 6, Lab - 3)						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20DF11T	Mathematical Foundations of Computer Science	3	0	0	3
2.	20DF12T	Data Structures and Algorithms	3	0	0	3
3.	20DF13T	Relational Database Management Systems	3	0	0	3
4.	20DF14T	Computer Organization	3	0	0	3
5.	20DC11T	Probability and Statistics	3	0	0	3
6.	20DC12T	Technical Communication	3	0	0	3
7.	20DF12L	Data Structures through C Lab	0	0	4	2
8.	20DF13L	RDBMS Lab	0	0	4	2
9.	20DC12L	English Language Communication Skills lab	0	0	4	2
					Total	24

I Year Semester - II (Theory - 6, Lab – 3, M-1)						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20DF21T	Operating Systems	3	0	0	3
2.	20DF22T	Python Programming	3	0	0	3
3	20DF23T	Software Engineering	3	0	0	3
4.	20DF24T	Computer Networks	3	0	0	3
5.	Elective – I		3	0	0	3
	20DF2AT	Data Warehousing and Data Mining				
	20DF2BT	Operations Research				
	20DF2CT	Computer Graphics				
	20DF2DT	Distributed Databases				
	20DF2ET	Management Information Systems				
6.	Elective-II		3	0	0	3
	20DF2FT	Cloud Computing				
	20DF2GT	Design and Analysis of Algorithms				
	20DF2HT	Artificial Intelligence				
	20DF2IT	Compiler Design				
	20DF2JT	Information Security				
7.	20DF21L	Operating Systems and Computer Networks lab	0	0	4	2
8.	20DF22L	Python Programming Lab	0	0	4	2
9.	20DF23L	Software Engineering Lab	0	0	4	2
10.	20DF21A	*Mandatory Audit Course-1 (Constitution of India)	2	0	0	NA
					Total	24

II year Semester - I (Theory - 6, Lab – 3, M-1)						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	20DF31T	Web Technologies	3	0	0	3
2.	20DF32T	Object Oriented Modeling and Design with UML	3	0	0	3
3.	20DF33T	Dev. Ops	3	0	0	3
4.	20DF34T	Big Data Analytics	3	0	0	3
5	Elective – III (MOOCs)		3	0	0	3
	20DF3AT	Internet of Things				
	20DF3BT	E-Commerce				
	20DF3CT	Digital marketing				
	20DF3DT	Software Testing Methodologies				
	20DF3ET	Deep learning				
6	Elective – IV		3	0	0	3
	20DF3FT	Data Science				
	20DF3GT	IT Service Management				
	20DF3HT	Machine Learning				
	20DF3IT	Block Chain Technologies				
	20DF3JT	Mobile Application Development				
7	20DF31L	Web Technologies Lab	0	0	4	2
8.	20DF32L	UML Lab	0	0	4	2
9.	20DF33L	Dev. Ops Lab	0	0	4	2
10	20DF31M	*Mandatory Audit Course-2 (Universal Human Values)				NA
					Total	24

II year Semester - II (Project & Comprehensive Viva))			
S. No	**Course Code**	**Course Name**	**Credits**
1	20DF41P	Project work	16
2	20DF42C	Comprehensive Viva-Voce	2
		Total	**18**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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First Semester MCA

20DF11T-MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

COURSE OBJECTIVES

- To Formulate, analyze and understand mathematical logic, predicates and quantifiers.
- To Identify and analyze binary relations and their properties.
- To Enumerate arrangements and selections in various scenarios.
- To Recognize the role of initial conditions and characteristic equations in solving recurrence relations.
- To Understand the basics of graph theory and its applications.

UNIT-I **12 Hrs**

MATHEMATICAL LOGIC: Statements and Notations, Connectives: AND, OR, Conditional, Bi-conditional, Negation, Truth Tables, Tautology, Contradiction, Well-formed Formulas, Logical Equivalence, Equivalence Implication, Normal Forms

PREDICATES: Predicative Logic, Quantifiers, Universal Quantifiers, Free & Bound Variables, Rules of Inference, Consistency, Proof of Contradiction.

UNIT-II **10 Hrs**

RELATIONS: Operations on Relations, Properties of Binary Relations, Equivalence, Compatibility and Partial Ordering Relations, Lattices and its Properties, Hasse Diagram, Transitive Closure, Representing Relations, Diagraph of POSET.

UNIT-III **10 Hrs**

ELEMENTARY COMBINATORICS: Basics of Counting, Enumerating Combinations & Permutations with Repetitions, Constrained Repetitions, Binomial Coefficients, Binomial-Multinomial Theorems, The Principle of Inclusion – Exclusion, Pigeon-Hole Principles and its Applications.

UNIT-IV **12 Hrs**

RECURRENCE RELATIONS: Generating Functions & Sequences, Calculating Co-efficient of Generating Function, Homogeneous Recurrence Relations: First Order, Second Order, Third and Higher Order Recurrence Relations, In-homogeneous Recurrence Relations: First Order, Second and Higher Order.

UNIT-V **14 Hrs**

GRAPH THEORY APPLICATIONS: Representation of Graphs with Examples, Vertex, Degree, Sub Graph, Multi Graph, Simple Graph, Complete Graph, Bipartite Graph, Regular Graph, Digraph, Operations on Graphs, Euler Circuits, Hamiltonian Graphs, Chromatic Number, Planar Graphs, Trees, Spanning Trees: DFS, BFS, Minimal Spanning Trees: Prim's and Kruskal's Algorithms.

TEXT BOOKS:

1. Discrete Mathematical Structures with Application to Computer Science, Tremblay, Manohar. McGraw Hill Publication.
2. Mathematical Foundations of Computer Science, D. Chandra Sekharaiah, Prism Books.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, J.L.Mott, A.Kandel, T.P. Baker, PHI.
2. Elements of Discrete Mathematics – A computer oriented approach, C.L.Liu, D.P. Mahopatra, Third Edition, TMH.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Analyze the outcome of mathematical logic.	**L4**
2. Apply the concepts of binary relations in various applications.	**L3**
3. Apply permutations and combinations using binomial and multinomial theorems.	**L3**
4. Solve different types of functions using recurrence relations.	**L3**
5. Apply Prim's and Kruskal's algorithms for graph theory concepts.	**L3**

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF11T-1	3	3	2	2	-	-	1	-	-	-	-	1
20DF11T-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF11T-3	3	2	1	2	-	-	1	-	-	-	-	-
20DF11T-4	3	2	1	2	-	-	-	-	-	-	-	-
20DF11T-5	3	2	1	2	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY &SCIENCES : RAJAMPET

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First Semester MCA

20DF12T - DATA STRUCTURES AND ALGORITHMS

Course Objectives:

- To understand algorithms and its analysis procedure.
- To design and implement various data structure algorithms.
- To introduce various techniques for representation of different types of data in the real world.
- Compute the complexities of various algorithms.
- To understand sorting and searching techniques.

UNIT I **10 Hrs**

INTRODUCTION TO DATA STRUCTURES: Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Data types – primitive and non-primitive, Algorithm: Basic Notation, Types of Algorithms, Algorithm Analysis: Analysis. –Efficiency classes- Mathematical analysis of Non recursive algorithm - Mathematical analysis of Performance Analysis and Measurement (Time and space analysis of algorithms-Average-, best- and worst-case analysis), Asymptotic recursive algorithm.

UNIT II **10 Hrs**

LINEAR DATA STRUCTURE: ARRAYS, LISTS, STACKS AND QUEUES: Arrays: Implementation – Operations-Applications, Linked List: Implementation – Operations- Applications, Stack: Implementation – Operations - Applications, Queues: Implementation – Operations – Applications.

UNIT III **14 Hrs**

NON-LINEAR DATA STRUCTURE AND HASH TABLES: Introduction- Definition and Basic terminologies of trees and binary trees- Representation of trees, Threaded binary trees - Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods.

UNIT IV **14 Hrs**

TREES AND GRAPHS: **INTRODUCTION:** Binary Trees, terminology, representation and Binary Tree traversals-Binary Search Trees: Definition- Operations and applications. Height Balanced Trees or AVL. **Graphs**- terminology, representation and traversals (BFS & DFS), Spanning trees, shortest path algorithms, Minimum spanning trees- Prim's, Kruskal's, Dijkstra's and Warshall's algorithms.

UNIT V **12 Hrs**

SORTING, SEARCHING: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Radix Sort and Quick Sort, Heap Sort. **Searching:** Linear Search, Binary Search, and Fibonacci Search.

TEXT BOOKS:

1) Data Structures Using C. 2nd Edition.ReemaThareja, Oxford.
2) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

REFERENCE BOOKS:

1. Data Structures using C, A.M.Tanenbaum, Y. Langsam, M.J.Augenstein, Pearson
2. Data structures: A Pseudo code Approach with C, 2nd edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning.
3. Pai G.A.V., "Data Structures and Algorithms", TMH.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Summarize the basic concepts of data structures and algorithms efficiency.	L2
2. Comprehend the linear data structures.	L2
3. Explain non-linear data structures..	L2
4. Apply concepts of non-linear data structure of trees as well as graphs.	L3
5. Apply appropriate sorting or searching technique for a given problem.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF12T - 1	2	2	1	1	-	-	-	-	-	-	-	-
20DF12T - 2	2	2	1	1	-	-	-	-	-	-	-	-
20DF12T - 3	2	2	1	1	-	-	-	-	-	-	-	-
20DF12T - 4	3	2	1	2	-	1	1	-	-	-	-	-
20DF12T - 5	3	2	1	2	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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First Semester MCA

20DF13T- RELATIONAL DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES

- Explain database concepts and structures and terms related to database design, transactions and management.
- Demonstrate data modeling, normalization and development of the database.
- Formulate SQL statements for data definition, modification and retrieval of data.
- Analyze how databases are affected by real-world transactions.
- Design and build a simple database system.

UNIT I **8 Hrs**

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS: Data Vs Information, Purpose of databases, Views of data, Database languages, Data models, Database architecture -users and administrators. E-R Model, Entity-Relationship diagrams, E-R diagrams design issues, Extended E-R features, Specialization, Generalization, Aggregation.

UNIT II **8 Hrs**

RELATIONAL MODEL: Structure of Relational database, Relational algebra, Tuple relational calculus, Domain relational calculus, QBE (Query-by-Example).

UNIT III **12 Hrs**

STRUCTURED QUERY LANGUAGE (SQL):. Introduction to SQL, SQL Operators, SQL Functions, Join queries, Sub queries, Nested queries, Views, Integrity constraints, Functional Dependencies, Database design

Normalization: Normal Forms-1st, 2nd, 3rd and BCNF, Multi - Valued Dependency-4th Normal Form, 5th NF/Projection-Join Normal form and De- Normalization.

UNIT IV **8 Hrs**

TRANSACTION MANAGEMENT: Transaction concept, ACID properties, Transaction state, concurrent execution. **Recovery System:** Storage structure, Recovery and atomicity, Log-Based Recovery, ARIES Recovery Technique and Remote Back systems.

UNIT V **8 Hrs**

FILE STRUCTURE: File Organization, Organization of Records in Files and Data-Dictionary Storage.

Indexing and Hashing: Ordered Indices, B+-Tree Index Files, B-Tree Index files, Multiple-key access, Static and Dynamic Hashing.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan. Database system Concepts. McGraw Hill International Edition, 7thEd.
2. Elmasri, Navate, Fundamentals of Database Systems, Person Education, 7thEd.

REFERENCE BOOKS:

1. PS Deshpande, SQL/PLSQL for Oracle 9i, dreamtec Press.
2. Raghurama Krishna, Johannes Gehrke, Database management systems,TMH.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Explain database concepts and ER Models.	L2
2: Apply the relational algebra of queries with the TRC & DRC.	L3
3: Apply the database queries and also normalization phases.	L3
4: Comprehend transaction management and rollback.	L2
5: Comprehend the file management and ordering concepts.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF13T-1	2	2	1	1	-	-	-	1	-	-	-	-
20DF13T-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF13T-3	3	2	1	2	-	1	-	1	-	-	-	-
20DF13T-4	2	2	1	1	-	-	1	-	-	-	1	-
20DF13T-5	2	2	1	1	-	-	1	1	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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First Semester MCA

20DF14T - COMPUTER ORGANIZATION

COURSE OBJECTIVES

- Describe various number systems and explain how arithmetic and logic operations are performed by computers.
- Learn the fundamentals of memory organization.
- Understand the structure of CPU organization and different instruction formats.
- Understand 8086 assembly language instructions.
- Learn the techniques of Micro programmed control and input-output organization.

UNIT I **12 Hrs**

NUMBER SYSTEMS AND COMPUTER ARITHMETIC: Signed and unsigned numbers, complements, Addition and subtraction, Multiplication, Division, Floating point representation, Gray code, BCD codes, Boolean algebra, Simplification of Boolean expressions, K-Maps. **Combinational and Sequential Circuits**: Decoders, Encoders, Multiplexers, Half and Full adders, Sequential circuits, Flip-flops.

UNIT II **10 Hrs**

MEMORY ORGANIZATION: Memory hierarchy, Main memory-RAM, ROM chips, Memory address map, Memory connection to CPU, Associative Memory-Hardware logic, Match, Read and Write logic, Cache Memory-Associative mapping, direct mapping, Set- associative mapping.

UNIT III **10 Hrs**

BASIC CPU ORGANIZATION: General Register Organization, Stack Organization, Instruction Formats- Zero, one, two, and three address instructions, Instruction formats- INTEL-8086 CPU Architecture, Addressing modes.

UNIT IV **10 Hrs**

INTEL 8086 ASSEMBLY LANGUAGE INSTRUCTIONS: Data transfer instructions, Input-Output instructions, Flag transfer, arithmetic, logical, shift and rotate instructions, Conditional and unconditional transfer, Iteration control, Interrupts, Assembler directives, Programming with assembly language instructions.

UNIT V **12 Hrs**

MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro program example, Design of Control Unit. **INPUT-OUTPUT ORGANIZATION:** Peripheral devices, Modes of transfer, Priority interrupts - Daisy chaining, parallel priority, DMA- DMA control, DMA transfer, Input output processor-CPU-IOP communication.

TEXT BOOKS:

1. Computer System Architecture, M.Morris Mano, Pearson Education, 3rd Edition.
2. Fundamentals of Computer Organization and Design, SivaramaP.Dandamudi, Springer Int.Edition.
3. Assembly Language programming, Peter Abel, Fifth Edition IBM PC.

REFERENCE BOOKS:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill.
2. Computer Organization and Architecture, William Stallings, 7thEdition, Pearson/PHI.
3. Intel 8086 programming, V. Douglas Hall, Tata McGraw-Hill.

COURSE OUTCOMES

Students will be able to:	**Blooms Level of Learning**
1: Desribe various number systems and digital circuits.	L2
2: Apply memory organization and mapping techniques for effective processing.	L3
3: Analyze different instruction formats and addressing modes.	L4
4: Analyze various assembly language instructions.	L4
5: Explain micro programmed control and input-output organization.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF14T -1	2	2	1	1	-	-	1	-	-	-	-	-
20DF14T -2	3	2	1	2	-	-	-	-	-	-	-	-
20DF14T -3	3	3	2	2	-	-	-	-	-	-	-	-
20DF14T -4	3	3	2	2	-	-	-	-	-	-	-	-
20DF14T -5	2	2	1	1	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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First Semester MCA

20DC11T - PROBABILITY AND STATISTICS

COURSE OBJECTIVES

- To introduce the basic concepts of probability theory.
- To elucidate probability distribution for solving problems in engineering.
- To introduce confidence interval for a population parameter of large samples.
- To explain the steps of testing of hypothesis for large and small samples.
- To introduce the concept of queueing theory.

Unit I **14 Hrs**

PROBABILITY :Sample space and events – Probability – The axioms of probability – Some elementary theorems - Conditional probability – Baye's theorem. Random variables –Discrete and continuous – Distribution functions - mean and variance.

Unit II **10 Hrs**

PROBABILITY DISTRIBUTIONS: Binomial distribution –Poisson distribution- Uniform distribution - Normal distribution

Unit III **14 Hrs**

SAMPLING DISTRIBUTION AND ESTIMATION: Sampling distribution: Population and sample - Sampling distributions of means (σ known and unknown).

ESTIMATION: Point estimation – interval estimation - one mean –two means (large sample) and one proportion – two proportions (large sample).

Unit IV **14 Hrs**

TEST OF HYPOTHESIS: Test of Hypothesis concerning one and two means, one and two proportions, two variances and goodness of fit.

Unit V **8 Hrs**

QUEUEING THEORY: Pure birth and death process,(M/M/1) model and simple problems.

Prescribed Text Books

1. Fundamentals of Mathematical Statistics, S C Gupta and V K Kapoor, Sultan schand& sons.
2. Queueing Theory (a linear algebraic approach), second edition, Lester Lipsky, Spinger.

Reference Books

1. Probability, Statistics and Queueing Theory with Computer Science applications,2nd edition, Ornald O. Allen, Academic press.
3. Probability & Statistics for Engineers (Miller and John E. Freund‟s), Richard A Jhonson, seventh Edition,PHI.

COURSE OUTCOMES:

The student will be able to	**Blooms Level of Learning**
1. Apply the concepts of probability theorems in stochastic process.	L3
2. Apply the probability distribution in real life problems.	L3
3. Apply various sampling distributions in research and agricultural data.	L3
4. Evaluate the hypothesis for large samples and small samples.	L5
5. Apply queueing theory in real life problems.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DC11T-1	3	2	1	2	-	-	1	-	-	-	-	-
20DC11T-2	3	2	1	2	-	-	1	-	-	-	-	-
20DC11T-3	3	2	1	2	-	-	1	-	-	-	-	-
20DC11T-4	3	3	2	3	-	-	1	-	-	-	-	-
20DC11T-5	3	2	1	2	-	-	1	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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First Semester MCA

20DC12T - TECHNICAL COMMUNICATION

Course Objectives:

- To develop and create awareness regarding communication in organization.
- To know various key issues and strategies in developing soft ware
- To learn team working and attempt interviews successfully.
- To impart writing skills viz email writing, business letters.
- To develop the skill of report writing to yield pragmatic results in the organization.

Unit I **12 Hrs**

BASICS OF TECHNICAL COMMUNICATION – Introduction, Process of Communication, Language as a Tool, Levels of Communication, Communication Networks,

ACTIVE LISTENING : Introduction , Types of Listening , Traits of good Listener , Active versus Passive Listening , implications of effective listening ; Barriers to Communication : Definition of Noise , Classification of Barriers

Unit II **12 Hrs**

TECHNOLOGY IN COMMUNICATION: Impact of Technology, Transmitting Documents, Effective use of email. The Importance of Non-Verbal Communication: Kinesics, Proxemics, Paralinguistics and Chronemics.

EFFECTIVE PRESENTATION STRATEGIES: Introduction, defining purpose ,Analyzing Audience and Locale , Organizing Contents , Preparing outline , Usage of Visual Aids , Understanding Nuances of Delivery.

Unit III **12 Hrs**

BUSINESS LETTERS: Significance, Purpose, Structure, Layout and principles.

TYPES – Claim Letters, Adjustment Letters, Sales Letters and Job Application Letters.

MEMOS – Structure and Layout, Style and Samples,

E-MAIL – Style, Structure and Content, E-mail Etiquettes, Sample E-mail Messages, Effectiveness and Security.

Unit IV **12 Hrs**

REPORTS – Introduction, Objectives, Characteristics of a Report, Types of Reports, The importance of Reports, Formats, Structure of Reports, Writing the Report and Samples

Unit V **10 Hrs**

GROUP COMMUNICATION: Introduction, Group Discussion, Organizational Group Discussion, Group discussion as part of selection process Meetings, conferences.

INTERVIEWS: Introduction, Objectives, Types of Interviews, Job Interviews, Resume Writing: Format and style, Sample Resume.

TEXT BOOKS:

1. Technical Communication, Principles and Practices, Meenakshi Raman and Sangeetha Sharma, Oxford University Press.
2. Communication skills, Sanjay kumar, P ushapaLatha, oxford University Press.

Course Outcomes:

Students will be able to	**Blooms Level of Learning**
1. Use different communication skills to overcome barriers at organization level.	L3
2. Apply the knowledge of electronic forms for effective communication.	L3
3. Ensure constructive official communication through letters, memos and emails.	L4
4. Prepare reports to make important decisions in the organization.	L3
5. Take part in interviews with sheer confidence.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DC12T -1	-	-	-	-	-	1	1	-	3	-	-	-
20DC12T -2	-	-	-	-	-	1	1	-	3	-	-	-
20DC12T-3	-	-	-	-	-	1	1	-	3	-	-	-
20DC12T-4	-	-	-	-	-	1	1	-	3	-	-	-
20DC12T-5	-	-	-	-	-	1	1	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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First Semester MCA

20DF12L - DATA STRUCTURES THROUGH C LAB

COURSE OBJECTIVES

- To develop skills to design and analyze simple linear and nonlinear data structures.
- It strengthens the ability to the students to identify and apply the suitable data structure for the given real world problem.
- It enables them to gain knowledge in practical applications of data structures .
- Design and Develop programs on derived data types and data structures such as stack, queue, linked list, sorting and searching.
- Design correct programs to solve problems.

List of Sample Problems/Experiments

1. Write a C program to perform the operations on Arrays.
2. Write a C program to perform the operations on single linked list
3. Write a C program to perform the operations of Double linked list
4. Write a C program that demonstrates the polynomial manipulation using linked list.
5. Write a C program to implement stack data structure using array representation.
6. Write a C program to perform the operations of simple Queue. Use linked list representation.
7. Write a C program to convert given infix expression to post fix expression.
8. Write a C program to demonstrate the following Sorting techniques.
    a) Bubble Sort
    b) Quick Sort
9. Write a C program to demonstrate the following Searching techniques using integer or float or string or structure data.
    a) Binary search
    b) Fibonacci search
10. Write a C program to evaluate the given post fix expression.
11. Write a C program to perform the operations insert a node, delete a node, search and traverse using Binary Search Tree.
12. Write a C program
    (a) To implement Prims' algorithm.
    (b) To implement Kruskal's algorithm.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Apply linear and non-linear data structures for writing C programs.	L3
2. Apply stacks,queues and linked lists concepts using C programs.	L3
3. Apply trees, graphs, searching and sorting techniques concepts using C programming.	L3
4. Apply shortest path algorithms, prim's, kruskal's, dijkstra's Algorithms to implement C programming.	L3
5. Apply binary search trees and AVL trees for writing C programs.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF12L -1	3	2	1	1	1	1	1	-	-	-	1	1
20DF12L -2	3	2	1	1	1	1	1	-	-	-	1	1
20DF12L-3	3	2	1	1	1	1	1	-	-	-	1	1
20DF12L-4	3	2	1	1	1	1	1	-	-	-	1	1
20DF12L-5	3	2	1	1	1	1	1	-	-	-	1	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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First Semester MCA

20DF13L - RDBMS LAB

COURSE OBJECTIVES

- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To present the concepts and techniques relating to query processing by SQL engines.
- To present the concepts and techniques relating to ODBC and its implementations.
- To present the concepts Function, Procedure, Trigger and Package.

List of Sample Problems/Experiments

1. Creation, altering and drop of tables and inserting, deleting and update the rows into a table using SELECT Command.
2. Queries using integrity constraints.
3. Queries using SQL operators like, relational, logical and set operators.
4. Queries using Aggregate and SQL functions.
5. Queries using join conditions.
6. Create Views, Sequences.
7. Write a Simple PL/SQL Program to display student's details.
8. Create PL/SQL block using IF/ELSE, IF/NESTED -IF statement.
9. Create PL/SQL block using WHILE/FOR Loops.
10. Create PL/SQL block using CURSORS.
11. Create PL/SQL block using EXCEPTION handling.
12. Create PL/SQL block using FUNCTION, PROCEDURE, TRIGGER and PACKAGE

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Apply the queries in the database languages like DDL, DML, TCL, DCL.	L3
2: Analyze SQL queries in relational algebra.	L4
3: Analyze SQL queries to perfoem actions like operations, functions, joins, views.	L4
4: Apply the database transactions.	L3
5: Analyze the orderings and indexing.	L4

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF13L-1	3	2	1	2	1	1	1	-	-	-	1	1
20DF13L-2	3	3	2	2	1	1	1	-	-	-	1	1
20DF13L-3	3	3	2	2	1	1	1	-	-	-	1	1
20DF13L-4	3	2	1	2	1	1	1	-	-	-	1	1
20DF13L-5	3	3	2	2	1	1	1	-	-	-	1	1

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First Semester MCA

20DC12L - ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Course Objectives:

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning and to sensitize the students to the nuances of English speech sounds.
- To provide opportunities for practice in using English in day to day situations.
- To improve the fluency in spoken English and neutralize mother tongue influence
- To help the students to prepare resume effectively.
- To train students to use language appropriately for Group Discussion and to help students face interviews confidently and presents his ideas efficiently.

Unit-I **9 Hrs**

PHONETICS – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription and word stress –Rules of word stress

Unit –II **9 Hrs**

SITUATIONAL DIALOGUES : Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Giving directions -Social and Professional etiquettes

Unit –III **9 Hrs**

WRITING SKILLS : Structures, formats and styles –planning-defining career objective-projecting one's strength and skills –creative self-marketing – sample resumes-cover letter.
Report writing – Writing a research paper - abstract Writing – Technical report writing

9 Hrs

Unit –IV

ORAL PRESENTATIONS : Collection of data from various sources –planning, preparation and practice – attention gathering strategies --transition –handling questions from audience.

Unit-V **9 Hrs**

INTERVIEW SKILLS – GROUP DISCUSSION: Concept and process –pre-interview planning- preparation-body language –answering strategies-frequently asked questions and communicating views and opinions-discussing- intervening-agreeing and disagreeing asking for and giving clarification –substanding-providing solution on any given topic.

TEXT BOOK: Lab Manual developed by Faculty Members of English

COURSE OUTCOMES:

Student will be able to	**Blooms Level of Learning**
1. Describe the significance of pronounciation accent and will attempt to neutralize the accent.	L2
2. Use their public speaking skills, interpersonal and intrapersonal skills effectively in different contexts	L3
3. Organize Resume effectively and properly and writing cover letter relevantly.	L4
4. Apply his communication skills to make presentation effectively	L3
5. Plan how to participate in group discussion to face interviews confidently	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DC12L-1	-	-	-	-	-	1	3	-	3	-	1	-
20DC12L-2	-	-	-	-	-	1	3	-	3	-	1	-
20DC12L-3	-	-	-	-	-	1	3	-	3	-	1	-
20DC12L-4	-	-	-	-	-	1	3	-	3	-	1	-
20DC12L-5	-	-	-	-	-	1	3	-	3	-	1	-

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Second Semester MCA

20DF21T-OPERATING SYSTEMS

COURSE OBJECTIVES

- Identify the concepts, principles and services of operating system.
- Understand the operating system functionalities managing with hardware.
- Analyze the structure and design decisions involved in the implementation of an operating system.
- Evaluate different algorithms related to different operating system components.
- Explore various operating system utility commands to manage operating system.

UNIT I **10 Hrs**

OPERATING SYSTEM INTRODUCTION: Operating System Definition, Evolution of Operating Systems- Simple, Batch, Multi Programmed, Time-Shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System Calls, Types of System Calls.

UNIT II **12 Hrs**

PROCESS AND CPU SCHEDULING: Process Concepts- The Process, Process State, Process Control Block, **Process Scheduling**- Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms,

PROCESS COORDINATION: Process Synchronization, the Critical-Section Problem, Semaphores, Classic Problems of Synchronization.

UNIT III **11 Hrs**

DEADLOCKS: System model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

UNIT IV **12 Hrs**

MEMORYMANAGEMENT: Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms.

FILE SYSTEM INTERFACE: The Concept of a File, Access methods, Directory Structure, Allocation methods, Disk Scheduling algorithms.

UNIT V **10 Hrs**

PROTECTION: System Protection- Goals of Protection, Principles of Protection, Access Matrix

SECURITY: - The Security Problem, Program Threats, System and Network Threats,

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin. Operating System Principles. Wiley Student Edition, 8th Ed.
2. Andrew S Tanenbaum. Modern Operating Systems. Pearson/ PHI, 3rd Ed.

REFERENCE BOOKS:

1. R. Elmasri, A.G.Carrick and D.Levine. Operating Systems. MGH.
2. A.S. Godbole. Operating Systems. TMH, 2ndEd.
3. W. Stallings. Operating Systems-Internal and Design Principles, Pearson Education, 6th Ed.

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1:	Summarize the fundamentals and its components of operating system.	L2
2:	Apply scheduling algorithms and techniques.	L3
3:	Apply the algorithms to handle the dead lock operations.	L3
4:	Describe memory management and file management techniques.	L2
5:	Comprehend various protection and security issues..	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF21T-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF21T-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF21T-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF21T-4	2	2	1	1	-	-	-	-	-	-	-	-
20DF21T-5	2	2	1	1	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF22T- PYTHON PROGRAMMING

COURSE OBJECTIVES

- To introduce Python programming language through its core language basics and program design techniques suitable for modern applications.
- To understand the wide range of programming facilities available in Python covering graphics, GUI, data visualization and Databases.
- To utilize high-performance programming constructs available in Python, to develop solutions in real life scenarios.
- Learn to use Turtle to develop GUI applications and to import the text files and process them accordingly.
- Understand the object-oriented features of Python.

UNIT-I **12 Hrs**

INTRODUCTION TO PYTHON: The process of computational Problem solving, The Python Programming Language, A First Program.

DATA AND EXPRESSIONS: Literals, Variables and Identifiers, Operators, Expressions and Data types with examples.

UNIT-II **10 Hrs**

CONTROL STRUCTURES: Boolean Expressions (Conditions), Selection Control, Iterative Control and Examples.

LISTS: List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python with Examples.

UNIT-III **12 Hrs**

FUNCTIONS: Program Routines, More on Functions-Calling Value-Returning Functions, Calling Non-Value-Returning Functions, Parameter Passing, Keyword Arguments in Python, Default Arguments in Python, Variable Scope.

OBJECTS: Software Objects, Turtle Graphics, Turtle programs**.**

UNIT-IV **13 Hrs**

MODULAR DESIGN: Modules, Top-Down Design, Python Modules.

TEXT FILES: Using Text Files, String Processing, Exception Handling.

DICTIONARIES AND SETS: Dictionary Type in Python, Set Data Type.

UNIT-V **12 Hrs**

RECURSION: Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion.

OBJECT-ORIENTED PROGRAMMING: What is Object-Oriented Programming?,Encapsulation, Inheritance, Polymorphism.

TEXT BOOKS:

1. Charles Dierbach, Introduction to Computer Science using Python, Wiley.
2. Wesley J Chun, “Core Python Applications Programming”, Prentice Hall.

REFERENCE BOOKS:

1. James Payne, Beginning Python: Using Python 2.6 and Python 3, Wiley India.
2. Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E.

COURSE OUTCOMES

Student's will be able to	Blooms Level of Learning
1. Summarize python fundamental concepts.	L2
2. Apply python syntax and semantics use of flow control statements.	L3
3. Analyze functions, turtle graphics using python.	L4
4. Apply the python text-files, exception handling and manipulate dictionary data type.	L3
5. Apply object oriented programming concepts using recursion.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF22T-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF22T-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF22T-3	3	3	2	2	-	-	-	-	-	-	-	-
20DF22T-4	3	2	1	2	-	-	-	-	-	-	-	-
20DF22T-5	3	2	1	2	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF23T-SOFTWARE ENGINEERING

COURSE OBJECTIVES

- To Apply software engineering principles to real world scenarios and projects.
- To Enable students to understand and document both functional and non-functional requirements various system modeling techniques effectively.
- To Develop skills in making critical architectural decisions that influence the overall system structure.
- To Apply verification, validation, and testing concepts to real-world software projects through hands-on exercises and projects.
- To Apply project management, planning, scheduling, risk management, and cost estimation concepts to real-world software projects.

UNIT – I **10 Hrs**

SOFTWARE, SOFTWARE ENGINEERING, AND PROCESS: The nature of Software, The unique nature of WebApps, Software engineering- A layered technology, General principles of software engineering practice, Software myths, Agile development: What is an Agile Process?, Capability Maturity Model Integration (CMMI).

UNIT – II **12 Hrs**

PROCESS MODELS: A Generic process model (framework), Process assessment and improvement, Prescriptive process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, **SOFTWARE REQUIREMENTS**: Functional and Non-functional requirements; User requirements, The software requirements document, **Requirements Engineering Processes**: Requirements elicitation and analysis, Requirements validation Requirements management, **System Modeling**: Context models, Behavioral models, Data models, Object models, Structured Methods.

UNIT – III **8 Hrs**

DESIGN CONCEPTS: Design Concepts, **ARCHITECTURAL DESIGN**: Architectural design decisions, System organization, Modular decomposition styles.
OBJECT-ORIENTED DESIGN: Objects and Object Classes, An Object-Oriented design process, Design Evolution.

UNIT – IV **10 Hrs**

VERIFICATION AND VALIDATION: Planning verification and validation, Software inspections, Automated static analysis, Verification and formal methods.
SOFTWARE TESTING: System testing, Component testing, Test case design, Test automation, **Quality management:** Software Quality Assurance.

UNIT- V **8 Hrs**

PROJECT MANAGEMENT: Management activities, Project planning, Project scheduling, Risk management. **SOFTWARE COST ESTIMATION:** Software Productivity, Estimation techniques- The COCOMO II Model, Project duration and staffing.

TEXT BOOKS:

1. Roger S. Pressman. Software Engineering - A Practitioners approach. McGraw-Hill.
2. Ian Sommerville. Software Engineering. Pearson Education Publications.

REFERENCE BOOKS:

1. Shari Lawrence Pfleeger, Joanne M. Atlee. Software Engineering Theory and Practice. Pearson Education.

2. Waman S Jawadekar. Software Engineering Principles and Practice, Tata McGraw Hill.

COURSE OUTCOMES

Students will be able to	**Blooms Level of Learning**
1: Comprehend the basic terminologies associated with software engineering.	L2
2: Apply various process models for developing software.	L3
3: Apply different modular decomposition styles for developing software architecture.	L3
4: Apply various testing strategies for software quality assurance.	L3
5: Estimate effective software development cost.	L5

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO-11	PO12
20DF23T-1	2	2	1	1	-	1	-	-	-	-	-	-
20DF23T-2	3	2	2	2	1	1	1	1	-	-	1	1
20DF23T-3	3	2	1	2	1	1	-	-	-	-	1	1
20DF23T-4	3	2	1	2	1	1	1	1	-	-	1	1
20DF23T-5	3	3	2	3	1	1	1	1	-	-	1	1

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Second Semester MCA

20DF24T - COMPUTER NETWORKS

COURSE OBJECTIVES

- To know the concepts of the Reference Models and understand the fundamentals of Computer Networks.
- To understand various techniques of data link layer.
- To know various issues of routing, quality of service and congestion control.
- To understand various transport protocols.
- To know various security issues of computer networks.

UNIT I **12 Hrs**

INTRODUCTION: Uses of Computer Networks, Network Topologies, Network Hardware, Network Software, **Reference Models**- The OSI Reference model, The TCP/IP Reference Model.

THE PHYSICAL LAYER: Multiplexing- Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Code Division Multiplexing, **Switching-**Packet Switching, Circuit Switching.

UNIT II **11 Hrs**

THE DATA LINK LAYER: Data Link layer design issues-Framing, Error Control, Flow Control, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols.

THE MEDIUM ACCESS CONTROLSUB-LAYER: The Channel Allocation Problem,

Multiple Access Protocols-ALOHA, Carrier Sense Multiple Access Protocols (CSMA), Collision-Free Protocols, Limited-Contention Protocols, Wireless LAN Protocols.

UNIT III **10 Hrs**

THE NETWORK LAYER :Network layer design issues; **Routing Algorithms**-The Optimality Principle, Shortest path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting routing.

Internetworking-How Networks Differ, Tunneling, Internetwork Routing, Packet Fragmentation.

UNIT IV **10 Hrs**

THE TRANSPORT LAYER :The Transport Service, The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP.

THE APPLICATION LAYER: The Domain Name System(DNS), Electronic Mail.

UNIT V **10 Hrs**

NETWORK SECURITY: Cryptography, Symmetric-Key Cryptography algorithms- Data Encryption Standard (DES), Advanced Encryption Standard (AES); Asymmetric-Key Cryptography algorithms- Rivest, Shamir, and Adleman (RSA); Digital Signature, Entity Authentication.

TEXT BOOKS:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Pearson education, 5th Ed.
2. Behrouz A. Forouzan, Data Communications and Networking, 4thEd.,McGraw-Hill.

REFERENCE BOOKS:

1. James F. Kurose, Keith W. Rose. Computer Networks- A Top-Down Approach Featuring the internet, Pearson education.
2. S. Keshav. An engineering Approach to Computer Networking, ATM Networks, the Internet and the Telephone Network. Pearson education.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Summarize the concepts of computer networks.	L2
2: Apply the different data link layer techniques.	L3
3: Apply various routing algorithms.	L3
4: Analyze various transport protocols.	L4
5**:** Comprehend the cryptography and network security techniques.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF24T-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF24T-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF24T-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF24T-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF24T -5	2	2	1	1	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF2AT -DATAWARE HOUSING & DATA MINING
(Elective I)

COURSE OBJECTIVES

- To introduce students the basic concepts and techniques of Data Warehousing.
- To understand OLAP functions and tools, including OLAP server types.
- To explore the multi-dimensional data model, data cubes and concept hierarchy.
- To gain insights into mining association rules using the Apriori algorithm.
- To explore classification and prediction methods .

UNIT – I **12 Hrs**

DATA WAREHOUSING: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

UNIT -II **12 Hrs**

DATAWAREHOUSE AND OLAP TECHNOLOGY: Aggregation, Historical information, Query Facility, OLAP function and Tools.OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

UNIT – III **12 Hrs**

DATA MINING: Overview, Motivation, Data Mining-Definition & Functionalities, Data Processing, Form of Data Pre-processing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

UNIT– IV **14 Hrs**

CONCEPT DESCRIPTION:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, **Association Analysis**- Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.

UNIT – V **14 Hrs**

CLASSIFICATION AND PREDICTIONS: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K- nearest neighbor classifiers, Genetic Algorithm. **CLUSTER ANALYSIS:** Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods-STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis.

TEXT BOOKS:

1. M.H.Dunham,"DataMining: Introductory and Advanced Topics" Pearson Education
2. Jiawei Han, MichelineKamber, "Data Mining Concepts & Techniques" Elsevier.

REFERENCE BOOKS:

1. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems, 1/e", Pearson Education..
2. Mallach,"Data Warehousing System", McGraw –Hill

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Explain data concepts in data ware housing.	**L2**
2. Analyze the query facilities, OLAP functionalities and types.	**L4**
3. Explain the data classification in data mining.	**L2**
4. Apply the data mining techniques like classification and regression.	**L3**
5. Apply the data mining predictions and clustering's to the data processing.	**L3**

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2AT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2AT-2	3	3	2	2	1	-	-	-	-	-	-	-
20DF2AT-3	2	2	1	1	-	-	-	-	-	-	1	-
20DF2AT-4	3	2	1	2	1	-	1	-	-	-	1	-
20DF2AT-5	3	2	1	2	1	-	1	-	-	-	1	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPE
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Second Semester MCA

20DF2BT-OPERATIONS RESEARCH

(Elective I)

COURSE OBJECTIVES

- Formulate a real-world problem as a mathematical programming model.
- Understand different methods for finding feasible solutions for transportation problems.
- Know the solutions for job sequencing.
- Understand different replacement models and game theory.
- Finding solutions for inventory maintenance problems.

UNIT I **14 Hrs**

INTRODUCTION TO OPERATIONS RESEARCH: Basic definition, Scope, Objectives, Phases, Models and Limitations of Operations Research, Linear Programming Problem – Formulation of LPP, Simplex Method, Big-M method, Two-phase Method, Degeneracy and Unbound solutions, Revised simplex method, Duality, Dual Simplex Method.

UNIT II **12 Hrs**

TRANSPORTATION PROBLEM: Formulation, Unbalanced Transportation problem, Finding basic feasible solutions - Northwest corner rule, least cost method and Vogel's approximation method, Optimality test –MODI method, Assignment model – Formulation, Hungarian method for optimal solution, Solving unbalanced problem.

UNIT III **11 Hrs**

SEQUENCING MODELS : Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines, Processing n Jobs through m Machines.

UNIT IV **12 Hrs**

REPLACEMENT MODELS: Group replacement policy, Game Theory: Competitive games, Rectangular game, Saddle point, Minimax (Maximin) method of optimal strategies, Value of the game, Solution of games with saddle points, Dominance principle, Rectangular games without saddle point – mixed strategy for 2 X 2 games.

UNIT V **12 Hrs**

INVENTORY MODELS: Inventory costs, Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non – uniform and production rate infinite,model (c) demand rate uniform and production rate finite.

TEXT BOOK:

1. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education.

REFERENCE BOOKS:

1. Operations Research, R. Panneerselvam 2/e, PHI.
2. Operations Research, P.K. Gupta and D.S. Hira, S.Chand& CO.

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1:	Summarize real-world problems as mathematical programming models.	L2
2:	Analyze different methods for finding feasible solutions.	L4
3:	Analyze different sequencing models.	L4
4:	Apply replacement models for finding optimal strategies.	L3
5:	Describe various inventory models.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2BT-1	2	2	1	1	-	-	1	-	-	-	-	-
20DF2BT-2	3	3	2	2	-	-	-	-	-	-	-	-
20DF2BT- 3	3	3	2	2	-	-	-	-	-	-	-	-
20DF2BT -4	3	2	1	2	-	-	-	-	-	-	-	-
20DF2BT-5	2	2	1	1	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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Second Semester MCA

20DF2CT-COMPUTER GRAPHICS
(Elective I)

Course Objectives

- To study the graphics techniques, packages and algorithms.
- To study the clipping and drawing algorithms.
- To enable the students to understand the transformations and projections.
- To enable the students to learn graphics packages and to use that to develop an application.
- To enable the students to understand curves, surfaces and solid modeling mechanisms.

UNIT I: 12 Hrs

INTRODUCTION : Image Processing as Picture Analysis, the Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Applications, Development of Hardware and Software for Computer Graphics, Conceptual Framework for Interactive Graphics, Drawing with SRGP, Basic Interaction Handling, Raster Graphics Features, Limitations of SRGP.

UNIT II: 12 Hrs

BASIC RASTER GRAPHICS ALGORITHMS FOR DRWING 2D PRIMITIVES & CLIPPING: Basic Raster Graphics Algorithms For Drawing 2D Primitives: Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses, Filling Rectangles, Filling Polygons, Filling Ellipse Arcs, Pattern Filling, Thick Primitives, Line Style and Pen Style Clipping: Clipping in a Raster World, Clipping Lines, Clipping Circles and Ellipses, Clipping Polygons, Generating Characters, SRGP Copy Pixel, Anti-aliasing.

UNIT III: 13 Hrs

2D& 3D GEOMETRICAL TRANSFORMATIONS : 2D Geometrical Transformations: 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, he Window-to-Viewport Transformation, Efficiency. 3D Geometrical Transformations: Matrix Representation of 3D Transformations, Composition of 3D Transformations, Transformation as a change in Coordinate System. Viewing in 3D: Projections, Specifying an Arbitrary 3D View, Examples of 3D Viewing.

UNIT IV 14 Hrs

REPRESENTING CURVES, SURFACES & SOLID MODELING: Representing Curves and Surfaces: Polygon Meshes, Parametric Cubic Curves, Parametric Bi-cubic Surfaces, Quadratic Surfaces. Solid Modeling: Representing Solids, Regularized Boolean Set Operations, Primitive Instancing, Sweep Representations, Boundary Representations, Spatial-Partitioning Representations, Constructive Solid Geometry, Comparison of Representations, User Interfaces for Solid Modeling. Simulation, code profiling.

UNIT V 12 Hrs

ACHROMATIC LIGHT & COLORED LIGHT : Achromatic Light, Chromatic Color, Color Models for Raster Graphics, Reproducing Color, Using Color in Computer Graphics. Case Studies: Case studies using GKS, CORE.

TEXT BOOK:

1. Computer Graphics Principles and Practice, Second Edition in C, James D.Foley, Andries Van Dam, Steven K.Feiner, JhonF.Hughes.
2. Computer Graphics C version, Donald Hearn and M. Pauline Baker, Pearson education.

REFERENCE BOOKS:

1. Computer Graphics Second Edition, Zhigandxiang, Roy Plastock, Schaum's outlines, Tata McGraw Hill.
2. Computer Graphics: A Practical Approach, Er. Rajiv Chopra, S.Chand.

COURSE OUTCOMES

Student's will be able to	**Bloom's Level of Learning**
1. Comprehend graphics packages and displaying techniques.	**L2**
2. Apply raster graphics techniques for drawing 2D primitives and clipping.	**L3**
3. Apply 2D and 3D geometric transformations for image processing.	**L3**
4. Analyze the different representations of curves, surfaces and solid models.	**L4**
5. Apply interactive graphics applications to develop chromatic light and colored light.	**L3**

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2CT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2CT -2	3	2	1	1	-	-	-	-	-	-	-	-
20DF2CT-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF2CT -4	3	3	2	2	-	-	-	-	-	-	-	-
20DF2CT -5	3	2	1	1	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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Second Semester MCA

20DF2DT-DISTRIBUTED DATABASES
(Elective I)

COURSE OBJECTIVES

- To learn the principal and foundation of distributed databases.
- To learn the architecture, design issue and integrity control of distributed databases.
- To learn the details of query processing and query optimization technique.
- To learn the concept of transaction management in distributed databases.
- To learn the concepts of authorization and protection.

UNIT I **12 Hrs**

DISTRIBUTED DATABASES: Features of Distributed versus Centralized Databases, Why Distributed Databases? Distributed Database Management Systems (DDBMSs), Architecture for Distributed Databases, Types of Data Fragmentation.

UNIT II **13 Hrs**

LEVELS OF DISTRIBUTION TRANSPARENCY: Distribution Transparency for Read- Only Applications, Distribution Transparency for Update Applications, Distributed Database Access Primitives, Integrity Constraints in Distributed Databases.

UNIT III **12 Hrs**

TRANSLATION OF GLOBAL QUERIES INTO FRAGMENT QUERIES: Equivalence Transformations for Queries, Transforming global queries into fragment Queries, Distributed grouping and aggregate function Evaluation, parametric Queries. A Framework for Query Optimization.

UNIT IV **13 Hrs**

THE MANAGEMENT OF DISTRIBUTED TRANSACTION: A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions.

CONCURRENCY CONTROL: Foundations of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control Based on Timestamps.

UNIT V **11 Hrs**

RELIABILITY: Basic Concepts, Non-blocking Commit Protocols.

DISTRIBUTED DATABASE ADMINISTRATION: Catalog Management in Distributed Databases, Authorization and Protection.

TEXT BOOK:

1. Stefano ceri, Giuseppe Pelagatti. Distributed Databases Principles and System.MGH.

REFERENCE BOOK:

1. M.Tamerozsu, Patrick Valduriez. Principles of Distributed database systems, 3rd Edition.

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1:	Explain data distribution and fragmentation.	L2
2:	Explain levels of distribution transparencies like read only and update applications.	L2
3:	Apply the distributed global queries and fragments.	L3
4:	Analyze the transaction management and concurrency control of distributed databases.	L4
5:	Apply the non-blocking protocols and authorizations of distributed databases.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2DT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2DT-2	2	2	1	1	-	-	-	-	-	-	-	-
20DF2DT-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF2DT-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF2DT-5	3	2	1	2	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF2ET-MANAGEMENT INFORMATION SYSTEMS
(Elective I)

Course Objectives

- Know the basic concepts of Management and Information Systems.
- Understand the concepts of Global business systems.
- Gain the knowledge of Decision Making.
- Detailed System Design.
- Implementation , Evaluation and Maintenance of Information Systems.

UNIT I **12 Hrs**

THE MEANING AND ROLE OF MIS: What is a Management Information System?, Note on Decision support systems, The systems view of business, MIS Organization within the company.

MANAGEMENT ANDORGANIZATIONAL THEORY:Development of organizational theory, Management and organizational behavior.

UNIT II **13 Hrs**

INFORMATION SYSTEMS IN GLOBAL BUSINESS TODAY: Strategic business objectives of Information systems, What is an information system?, Dimensions of information systems, Contemporary Approaches to Information Systems.

INFORMATION SYSTEMS, ORGANIZATIONS, AND STRATEGY: Organizations and Information Systems, How information systems impact organizations and business firms, Using Information Systems to achieve competitive advantage.

UNIT III **12 Hrs**

INFORMATION SYSTEMS FOR DECISION MAKING: Evolution of an information system, Decision making and MIS, MIS as a technique for making programmed decisions.

CONCEPTUAL SYSTEM DESIGN: Define the problems, set system objectives, Establish system constraints, Determine information needs, Determine information sources, develop alternative conceptual designs and select one, document the system concept.

UNIT IV **12 Hrs**

DETAIL SYSTEM DESIGN: Inform and involve the organization, Aim of detailed design, Project management of MIS detailed design, Identify dominant and trade-off criteria, Define the subsystems, Determine the degree of automation of each operation, Inputs, outputs and processing,Early system testing, Software, hardware and tools, Propose an organization to operate the system, Document the detailed design.

UNIT V **11 Hrs**

IMPLEMENTATION, EVALUATION AND MAINTENANCE OF THE MIS: Plan the implementation, Acquire floor space and plan space layouts, Organize for implementation, Develop procedures for implementation, Train the operating personnel, Computer related acquisitions, Develop forms for data collection and information dissemination, Develop the files, Test the system, Cut over, Document the system, Evaluate the MIS.

TEXT BOOKS:

1. R.G. Murdick, J.E. Ross and J.R Claggett. Information Systems for Modern Management. PHI, 3rd Ed,.
2. Kenneth C. Laudon, Jane P. Laudon. Management Information Systems, Managing the Digital Firm, Pearson Education, 12th Ed.

REFERENCE BOOKS:

1. Waman S Jawadekar. Management Information Systems Text and Cases, MGH.
2. Robert schultberis, Mary sumner. Management information systems. PHI.
3. C.S.V Murthy. Management information systems text and applications,HPH, 3rd Ed reprint.

COURSE OUTCOMES

Student's will be able to	**Bloom's Level of Learning**
1. Explain the role of management information systems.	**L2**
2. Describe strategies of information systems.	**L2**
3. Apply the knowledge of information systems for decision making.	**L3**
4. Apply various aspects of detail system design.	**L3**
5. Comprehend implementation, evaluation and maintenance of management information systems.	**L2**

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2ET-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2ET -2	2	2	1	1	-	-	-	-	-	-	-	-
20DF2ET-3	3	2	1	2	-	-	-	1	-	-	-	-
20DF2ET -4	3	2	1	2	-	-	-	-	-	-	-	-
20DF2ET -5	2	2	1	1	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF2FT - CLOUD COMPUTING
(Elective II)

COURSE OBJECTIVES

- The objective of this course is to establish the definition of cloud computing.
- Describing the various service delivery models of a cloud computing architecture, and the ways in which clouds can be deployed as public, private, hybrid, and community clouds.
- Able to understand the advantages and Risks exists in Cloud Computing
- Understand the concept of Virtual Storage paradigms exits in Cloud computing.
- Understand the Azure concepts.

UNIT I **8 Hrs**

CLOUD COMPUTING: Introduction, History of Cloud Computing, uses, services, types of cloud computing. Applications of Cloud Computing, feature perspective and developments of cloud computing.

UNIT II **10 Hrs**

CLOUD COMPUTING FOR EVERY ONE: Working of cloud computing and Collaboration of Cloud computing, Centralizing email communication, cloud computing for community, collaboration on schedules, collaborating on group projects and events, cloud computing for corporation and mapping scheduling & managing projects.

UNIT III **10 Hrs**

USING CLOUD SERVICES-I: Collaborating on calendars, schedulers and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets and databases ,Evaluating web mail services, evaluating instant messaging, evaluating web conference tools, Creating groups on social networks, evaluating on line groupware, collaborating via blogs and wikis.

UNIT IV **10 Hrs**

USING CLOUD SERVICES-II: Understanding Cloud Storage, evaluating on-line file storage, exploring on-line book marking services, exploring on-line photo editing applications, exploring photo sharing communities, controlling it with web bases desktops.

UNIT V **12 Hrs**

INDUSTRIAL PLATFORMS AND NEW DEVELOPMENTS: Cloud Platforms in Industry,Amazon web services,Compute services Storage services, Communication services, Additional services,GoogleAppEngine ,Architecture and core concepts, Application life cycle,Cost model, Observations ,Microsoft Azure, Azure core concepts 9.3.2 SQL AzureWindows,Azure platform appliance , observations.

TEXT BOOKS:

1. Michael Miller. Cloud computing. Pearson Education,New Delhi.
2. Mastering Cloud Computing Foundations and Applications Programming- RajkumarBuyya Christian Vecchiola S. ThamaraiSelvi , Morgan Kaufmann is an imprint of Elsevier(ISBN: 978-0-12-411454-8)

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Summarize cloud computing services, uses and applications.	L2
2: Analyze various cloud collaboration services.	L4
3: Apply cloud services for various types of applications.	L3
4: Analyze exploring cloud services based on category.	L4
5: Comprehend different industrial cloud platforms.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2FT -1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2FT -2	3	3	2	2	-	-	1	-	-	-	-	-
20DF2FT -3	3	2	1	2	-	-	-	1	-	-	-	-
20DF2FT -4	3	3	2	2	-	-	-	1	-	-	-	-
20DF2FT -5	2	2	1	1	1	-	-	-	-	-	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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Second Semester MCA

20DF2GT -DESIGN & ANALYSIS OF ALGORITHMS
(Elective II)

COURSE OBJECTIVES

- To teach paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
- To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
- To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.
- Discuss various searching, sorting and graph traversal algorithms.
- Understand NP completeness and identify different NP complete problems.

UNIT I **10 Hrs**

INTRODUCTION: Notion of Algorithm - Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm efficiency – analysis frame work – Asymptotic Notations - Recurrence equations – Solving recurrence equations –Analysis of linear search- Recursive solution to the Tower of Hanoi Puzzle

UNIT II **10 Hrs**

DIVIDE AND CONQUER: General Method, Merge sort, Quick sort, Binary search, Binary tree traversals and related properties.

UNIT III **12 Hrs**

DYNAMIC PROGRAMMING: General Method – Multistage Graphs – All-Pair shortest paths –Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem,

GREEDY TECHNIQUE: General Method, Prim's algorithm, Kruskal's algorithm, Single Source Shortest Paths-Dijkstra's algorithm.

UNIT IV **10 Hrs**

BACK TRACKING: General Method, 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles, Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem.

UNIT V **10 Hrs**

NP- COMPLETENESS– NP-Hard and NP-Complete Problems: NP-Hard, NP-Complete Classes, COOKS Theorem.

TEXT BOOKS:

1. T. H. Corman, C Leiserson, Rivest, Ronald and stein Clifford. Introduction to algorithms. MGH, New York, 2nd Ed.
2. AnanyLevitin. Introduction to the design and analysis of algorithms. Pearson education, 2nd Ed.
3. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press.

REFERENCE BOOKS:

1. E Horowitz, S Sahni, S Rajasekaran, Fundamentals of computer algorithms. Universities press, 2nd Ed.
2. Richard Neopolitan, KumarssNaimipour, Foundations of algorithms using C++ pseudo code, Jones and Bartlett Learning, 2nd Ed.
3. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd.

COURSE OUTCOMES

	Student's will be able to	Blooms Level of Learning
1 :	Comprehend algorithms efficiency in asymptotic notations.	L2
2 :	Apply divide and conquer strategy to develop algorithms.	L3
3 :	Apply dynamic programming and greedy strategy for minimum shortest path and maximum profits.	L3
4 :	Solve problems using back tracking strategy.	L3
5 :	Summarize NP-Hard problems and NP-Complete problems.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2GT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2GT-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF2GT-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF2GT-4	3	2	1	2	-	-	-	-	-	-	-	-
20DF2GT-5	2	2	1	1	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF2HT -ARTIFICIAL INTELLIGENCE
(ELECTIVE – II)

COURSE OBJECTIVES

- To know the essential concepts of Artificial intelligence.
- To understand various searching techniques and algorithms for problem solving.
- To know various constraint satisfaction problems.
- To understand the required knowledge and reasoning aspects of Artificial Intelligence.
- To know how to handle the problems with uncertain knowledge.

UNIT-I **12 Hrs**

INTRODUCTION: What is AI? Foundations of AI, History of AI, Agents and environments, The nature of the Environment, Problem solving Agents, Problem Formulation, Search Strategies

UNIT-II **12 Hrs**

KNOWLEDGE AND REASONING: Knowledge-based Agents, Representation, Reasoning and Logic, Prepositional logic, First-order logic, Using First-order logic, Inference in First-order logic, forward and Backward Chaining.

UNIT-III **14 Hrs**

CONSTRAINT SATISFACTION PROBLEMS: Backtracking Search for constraint satisfaction problems, variable and value ordering, Propagating information through constraints, Intelligent backtracking, local search for constraint satisfaction problems

ADVERSARIAL SEARCH: Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance

UNIT-IV **14 Hrs**

KNOWLEDGE AND REASONING: Knowledge-Based Agents, Logic, Propositional Logic, Inference, Equivalence, validity and satisfiability, Resolution, Forward and backward Chaining, Local-search algorithms

FIRST-ORDER LOGIC: Syntax and Semantics of First-Order Logic.

INFERENCE IN FOL: Unification and Lifting, Forward Chaining, Backward Chaining.

UNIT-V **14 Hrs**

PLANNING: Language of planning problems, Planning with state-space search, Partial-order planning, Planning graphs, Planning with propositional logic.

UNCERTAIN KNOWLEDGE AND REASONING: Uncertainty, Handling uncertain knowledge, Uncertain and rational decisions, Basic probability notation, The axioms of probability, Inference using full joint distributions.

TEXT BOOK:

1. Stuart Russell, Peter Norvig: "Artificial Intelligence: A Modern Approach",2nd Edition, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence:Winston P.H., Addison Wesley
2. Artificial Intelligence:E.Rich and Knight, Tata McGraw Hill.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Summarize the basic concepts of AI.	**L2**
2. Analyze appropriate problem-solving method and knowledge representation technique.	**L4**
3. Analyze constraint oriented problems based on appropriate searching method.	**L4**
4. Analyze logical based problems for different chaining inferences.	**L4**
5. Summarize planning and uncertainity in real world scenario.	**L2**

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2HT -1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2HT -2	3	3	2	2	-	-	-	-	-	-	-	-
20DF2HT-3	3	3	2	2	-	-	1	-	-	-	-	-
20DF2HT-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF2HT-5	2	2	1	1	1	-	-	-	-	-	-	1

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Second Semester MCA

20DF2IT-COMPILER DESIGN
(ELECTIVE – II)

COURSE OBJECTIVES

- To describe the design of a compiler including its phases andcomponents.
- To demonstrate top downparser.
- To organize bottom parser and syntax directed translation.
- To evaluate conversion of popular programing language constructs into intermediate code forms and symbol table format.
- To distinguish different optimization techniques and design object code generation algorithms in the design of compiler.

UNIT– I **13 Hrs**

OVERVIEW OF COMPILATION: Phases of Compilation – Lexical Analysis, Regular Grammar and Regular Expression for common programming language features, pass and Phases of translation, Interpretation, Bootstrapping, data structures in compilation – LEX lexical analyzer generator.

UNIT–II **11 Hrs**

TOP DOWN PARSING: Context free grammars, Top down parsing – Backtracking, LL(1), Recursive Descent Parsing, Predictive parsing, Preprocessing steps required for predictive parsing.

UNIT– III **12 Hrs**

BOTTOM UP PARSING: Operator precedence, Shift Reduce parsing, SLR, CLR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC– automatic parser generator.

SEMANTIC ANALYSIS: Attributed grammars, Syntax directed translation, L-attributed definition, Top Down & Bottom Up evaluation of expressions, Type checking.

UNIT–IV **13 Hrs**

INTERMEDIATE CODE: Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Conversion of popular Programming language constructs into Intermediate code forms.

SYMBOL TABLES: Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non-block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

UNIT–V **13 Hrs**

CODE OPTIMIZATION: Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation. Data flow analysis **:** Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation, Machine dependent code optimization.

OBJECT CODE GENERATION: Object code forms; register allocation and assignment generic code generation algorithms, DAG for register allocation

TEXT BOOKS:

1. Principles of compiler design -A.V. Aho. J.D.Ullman; PearsonEducation.
2. ModernCompilerImplementationinC-AndrewN.Appel,CambridgeUniversityPress.

REFERENCE BOOKS:

1. Lex&yacc – John R. Levine, Tony Mason, Doug Brown,O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda,Elsevier.
4. Compiler Construction, Louden,Thomson.

"Principles of Compiler Design", Aho. A.V & Ullman J.D, Narosa publications..

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Explain the compilers lexical analysis, phases and components.	L2
2. Analyze the syntax of the top-down parsing.	L4
3. Analyze the syntax trees of bottom-up parsing and semantic analyses.	L4
4. Explain the polish notation syntaxes and symbol table syntax formations.	L2
5. Analyze the code optimization of DAG and object code generations.	L4

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2IT-1	2	2	1	1	-	-	1	-	-	-	-	-
20DF2IT-2	3	3	2	2	1	-	1	1	-	-	-	-
20DF2IT-3	3	3	2	2	1	-	1	1	-	-	-	-
20DF2IT-4	2	2	1	1	-	-	1	-	-	-	-	-
20DF2IT-5	3	3	2	2	1	-	1	1	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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Second Semester MCA

20DF2JT-INFORMATION SECURITY
(Elective II)

COURSE OBJECTIVES

- To provide knowledge about Security Attacks and Services.
- To make the students to learn about traditional encryption principles.
- The objective of the course is to explore a comprehensive study of the principles and practices of computer system security.
- To study the firewalls, intrusion detection techniques.
- Providing Security at operating system Level, network security, software security and web security.

UNIT I **10 Hrs**

INTRODUCTION: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

UNIT II **9 Hrs**

SYMMETRIC CIPHERS: symmetric Encryption Principles, symmetric block encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution

UNIT III **12 Hrs**

PUBLIC – KEY CRYPTOGRAPHY AND MESSAGE AUTHENTICATION: approaches of Message Authentication, Secure Hash Functions. Public key cryptography principles, public key cryptography algorithms, digital signatures,

NETWORK SECURITY APPLICATIONS: AUTHENTICATION APPLICATIONS: Kerberos, X.509 Authentication Service,

EMAIL SECURITY: Pretty Good Privacy (PGP) and S/MIME.

UNIT IV **11 Hrs**

IP SECURITY: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT V **11 Hrs**

NETWORK MANAGEMENT SECURITY: Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3

SYSTEM SECURITY: Intruders

MALICIOUS SOFTWARE: Viruses and related threats

FIREWALLS: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. William Stallings. Network Security Essentials (Applications and Standards). Pearson Education.
2. Bruce Schneider. Applied Cryptography. Toha Wiley and Sons.

REFERENCE BOOKS:

1. Eric Maiwald. Fundamentals of Network Security. Dreamtech press.
2. Charlie Kaufman, Radia Perlman and Mike Speciner. Network Security - Private Communication in a Public World. Pearson/PHI.
3. Stallings. Cryptography and Network Security - Principles and Practice. Prentice Hall.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Summarize various security attacks, services and mechanisms.	L2
2: Analyze symmetric encryption algorithms.	L4
3: Apply different authentication principles network security.	L3
4: Describe various IP security aspects.	L2
5: Comprehend basic concepts of security issues.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF2JT -1	2	2	1	1	-	-	-	-	-	-	-	-
20DF2JT -2	3	3	2	2	-	-	-	-	-	-	-	-
20DF2JT -3	3	2	1	2	-	-	-	-	-	-	-	-
20DF2JT -4	2	2	1	1	-	-	-	-	-	-	-	-
20DF2JT -5	2	2	1	1	-	1	1	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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Second Semester MCA

20DF21L- OPERATING SYSTEMS AND COMPUTER NETWORKS LAB

COURSE OBJECTIVES

- To learn the mechanisms of implementing scheduling algorithms.
- To learn the mechanisms involved in memory management.
- To learn programmatically to implement simple OS mechanisms.
- To learn computer networking concepts.
- To learn encryption techniques.

List of Sample Problems/Experiments

1. Simulate the following CPU scheduling algorithms
   a) FCFS b) SJF c) priority
2. Simulate the following file allocation strategies
   a) SEQUENTIAL b) INDEXED
3. Simulate MVT and MFT
4. Simulate Bankers algorithm for Deadlock Avoidance
5. Simulate FIFO and optimal page replacement algorithms
6. Simulate Paging Technique of Memory Management.
7. Implement the data link layer framing methods such as bit stuffing and character stuffing.
8. Implement data link layer framing method character count.
9. Implement CRC polynomials
10. Implement a C program to take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.
11. Implement a C program that take a 64 bit plain text and encrypt the same using DES algorithm.
12. Implement RSA algorithm that encrypts a text data and Decrypt the same.

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1:	Analyze the various process scheduling algorithms.	L4
2:	Analyze Bankers algorithm for deadlock avoidance and prevention.	L4
3:	Apply FIFO and Optimal page replacement algorithms.	L3
4:	Analyze paging techniques for memory management algorithms.	L4
5	Apply computer networking concepts using C programs.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF21L-1	3	3	2	2	-	-	-	-	-	-	-	-
20DF21L-2	3	3	2	2	-	-	1	-	-	-	-	-
20DF21L-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF21L-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF21L-5	3	2	1	2	-	-	1	-	-	-	-	-

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Second Semester MCA

20DF22L-PYTHON PROGRAMMING LAB

COURSE OBJECTIVES

- To understand the concepts of Python.
- To develop the programming skills in Python for control structures.
- To develop the programming skills in Python for functions and graphic design.
- To understand the text files, dictionaries and exception handling concepts of Python.
- To understand the principles of object oriented programming concepts of Python.

Implement the following in Python

1. Programs using basic concepts.
2. Programs using various control structures.
3. Programs using lists.
4. Programs using functions.
5. Programs using objects.
6. Programs using turtle.
7. Programs using modules.
8. Programs using text files.
9. Programs using Exception Handling.
10. Programs using Dictionaries.
11. Programs using Recursion.
12. Programs using object oriented concepts.

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1 :	Apply python fundamental programs using operators.	L3
2 :	Apply control statements using python	L3
3 :	Analyze functions, turtle graphics using python.	L4
4 :	Analyze text files, manipulate dictionary data types and exception handling programs using python.	L4
5 :	Apply object oriented programs using class, constructors, polymorphism and inheritance.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF22L -1	3	2	1	2	-	-	-	-	-	-	-	-
20DF22L -2	3	2	1	2	-	-	-	-	-	-	-	-
20DF22L -3	3	3	2	2	-	-	-	-	-	-	-	-
20DF22L -4	3	3	2	2	-	-	1	-	-	-	-	-
20DF22L -5	3	2	1	2	-	-	-	-	-	-	-	-

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Second Semester MCA

20DF23L-SOFTWARE ENGINEERING LAB

COURSE OBJECTIVES

- To Apply software engineering principles to real world scenarios and projects.
- To Enable students to understand and document both functional and non-functional requirements various system modeling techniques effectively.
- To Develop skills in making critical architectural decisions that influence the overall system structure.
- To Apply verification, validation, and testing concepts to real-world software projects through hands-on exercises and projects.
- To Apply project management, planning, scheduling, risk management, and cost estimation concepts to real-world software projects.

Design and Develop following applications:

1. Online Railway Reservation System
2. Payroll processing application
3. Inventory system
4. Automating the banking process
5. Software for game
6. Library management system
7. Create a dictionary
8. Text editor
9. Telephone directory
10. Create an E-Book of your choice

COURSE OUTCOMES

Students will be able to	**Blooms Level of Learning**
1: Comprehend various requirements needed to develop software.	L2
2: Apply various process models for developing software.	L3
3: Apply different modular decomposition styles for developing software architecture.	L3
4: Apply various testing strategies for quality assurance.	L3
5: Estimate effective software development cost.	L5

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF23L-1	2	2	1	1	-	-	-	1	-	-	-	-
20DF23L-2	3	2	1	2	-	1	1	1	-	-	1	-
20DF23L-3	3	2	1	2	1	-	1	1	-	-	1	-
20DF23L-4	3	2	1	2	-	-	1	1	-	-	1	-
20DF23L-5	3	3	2	3	1	1	1	1	-	-	1	-

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Second Semester MCA

20DF21A - CONSTITUTION OF INDIA

COURSE OBJECTIVES

- To understand the key elements and importance of indian constitution.
- To understand the importance of fundamental rights as well as fundamental duties.
- To understand the functioning of state government and its administration.
- To understand local governance and its administration.
- To understand the role and nature of election commission of india and functions of welfare commissions.

UNIT 1 **6 Hrs**

CONSTITUTION: Meaning Of The Term, Importance and Functions, Types, Qualities, Features Of Indian Constitution, Directive Principles Of State Policy.

UNIT II **7 Hrs**

FUNDAMENTAL RIGHTS AND DUTIES: Features of Fundamental Rights, Right to Freedom, Protection Of Life And Personal Liberty, Criticism Of Fundamental Rights, Significance Of Fundamental Rights, Fundamental Duties, Features Of The Fundamental Duties.

UNIT III **6 Hrs**

STATE GOVERNMENT AND ITS ADMINISTRATION: Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT IV **7 Hrs**

DISTRICT'S ADMINISTRATION HEAD - Role and Importance, Recruitment of District Collector, Role of District Collector in Revenue Administration, Role of District Collector in the Maintenance of Law and Order, Municipalities, Types of Urban Governments, Panchayat Raj: Functions of Panchayat Raj Institution (PRI).

UNIT V **6 Hrs**

ELECTION COMMISSION: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. TheConstitutionofIndia, 1950 (BareAct), Government Publication.
2. Dr.S.N.Busi, Dr.B.R.Ambedkar framing of IndianConstitution, 1st Edition.

REFERENCE BOOKS:

1. M.P.Jain, Indian Constitution Law, 7th Edn., LexisNexis.
2. D.D.Basu, Introduction to the Constitution of India, LexisNexis.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Comprehend meaning of the constitution, importance,functions, types, qualities and featires of indian constitution.	L2
2. Comprehend the fundamental rights and duties of constitution.	L2
3. Describe the roles and responsibilities of a governor, CM, and state secretariat.	L2
4. Summarize the roles of various districts administration.	L2
5. Comprehend the role of chief election commissioner and functions of commissions.	L2

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. **CO-PO MAPPING**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF21A-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF21A-2	2	2	1	1	-	-	-	-	-	-	-	-
20DF21A-3	2	2	1	1	-	-	-	-	-	-	-	-
20DF21A-4	2	2	1	1	-	-	-	-	-	-	-	-
20DF21A-5	2	2	1	1	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF31T- WEB TECHNOLOGIES

COURSE OBJECTIVES

- Develop strong foundation in object oriented programming principles.
- Understand how packages improve code organization and modularity, and exception hierarchy in java.
- Provide strong foundation in web development including HTML,CSS, Java script and XML. Technologies.
- Understand the lifecycle of servlets and how to manage their execution, how to design scalable and maintainable web applications using JSP.
- Build on foundational knowledge of JSP to create dynamic and database -driven web applications.

UNIT I **12 Hrs**

CLASSES AND OBJECTS: Concepts of classes, objects, methods, access control, this keyword, garbage collection, simple java program, constructors, parameter passing, recursion, Enumeration.

STRING HANDLING: String Handling Methods and Constructors.

INHERITANCE: Hierarchical abstractions, Base class, object, subclass, Forms of inheritance, Member access rules, super keyword and its uses, using final with inheritance.

POLYMORPHISM- Method Overriding, Abstract classes, Method Overloading, examples.

UNIT II **10 Hrs**

PACKAGES AND INTERFACES: Defining Package & Interface, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, Interfaces vs Abstract classes, differences between classes and interfaces, implementing interface, applying interfaces, extending interfaces.

EXCEPTION HANDLING AND MULTITHREADING: Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions.

UNIT III **12 Hrs**

HTML COMMON TAGS: Introduction, HTML Basics- Text, Colors, Links, Images, Lists, Forms, Frames, Tables, Web Page Design, HTML5, Cascading Style Sheets, Introduction to CSS, Types of CSS.

JAVA SCRIPT: Introduction to JavaScript, Basics of JavaScript, Control Structures, Pop Up Boxes, Functions, Arrays, Events, Objects.

XML: Introduction, Document Type Definition, XML Schema, Document Object Model, Presenting XML(XSL), XML Parsers: DOM and SAX.

UNIT-IV **11 Hrs**

INTRODUCTION TO SERVLETS: Web Servers, Deployment of Servlets- How to write servlet, how to execute Servlet, Lifecycle of a Servlet, JSDK, The Servlet API, The javax, servlet package, Reading Servlet parameters, Reading Initialization parameters, The javax, servlet HTTP package, Handling HTTP Request and Responses, Cookies, Session Tracking.

INTRODUCTION TO JSP: The Problem with servlet, The anatomy of JSP page, JSP Processing, JSP application design with MVC, Setting up and JSP environment, Installing the Java Software Development Kit, Tomcat Server and Testing Tomcat, JSP Standard Tag Library(JSTL).

UNIT V **10 Hrs**

JSP APPLICATION DEVELOPMENT: Directive Elements, Template Text, Beans and JSP, Action Elements, Using scripting elements, Implicit JSP Objects, Conditional Processing- Declaring Variables and methods, Error handling and debugging.

DATABASE ACCESS: Introduction, Database Programming with JDBC- How JDBC works, JDBC Architecture, JDBC Driver Types. Studying javax.sql.* package, Accessing Database from JSP page- Use of Prepared Statement, Deploying Java Beans in a JSP Page.

TEXT BOOKS:

1. Herbert Schildt, Java. The Complete Reference.
2. Hans Bergstan. Java Server Pages. SPD publications.
3. T. Budd. Understanding OOP with Java. Pearson education, Updated Ed.

REFERENCE BOOKS:

1. Y. Daniel Liang. Introduction to Java programming. Pearson education.
2. Knuckles. Web Applications Technologies Concepts. John Wiley.
3. Wang. An Introduction to Web Design and Programming. Thomson.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Apply object oriented concepts for developing java applications.	L3
2. Apply exception handling mechanisms using java for developing applications.	L3
3. Apply HTML, CSS, javascript and XML features for developing web pages.	L3
4. Apply servlets concepts to develop java applications.	L3
5. Apply database connections to develop jsp applications.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF31T -1	3	2	1	2	-	-	-	-	-	-	-	-
20DF31T -2	3	2	1	2	-	-	-	-	-	-	-	-
20DF31T -3	3	2	1	2	-	-	-	-	-	-	-	-
20DF31T -4	3	2	1	2	-	-	-	-	-	-	-	-
20DF31T -5	3	2	1	2	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF32T- OBJECT ORIENTED MODELING AND DESIGN WITH UML

COURSE OBJECTIVES

- To know the importance of modeling in the software development life cycle.
- Explain OOAD concepts and various UML diagrams.
- Specify, analyze and design the use case driven requirements for a particular system.
- Model the event driven state of object and transform them into implementation specific layouts.
- Identify, Analyze the subsystems, various components and collaborate them interchangeably.

UNIT I **10 Hrs**

INTRODUCTION:Why We Model : Importance of modeling, principles of modeling, Object-Oriented Modeling, **Introducing the UML**: An Overview of the UML, Conceptual model of UML, UML architecture and Software Development Life Cycle

UNIT II **10 Hrs**

STRUCTURAL MODELING: Classes, Relationships, Common Mechanisms, Advanced classes, Interfaces, Packages, modeling Class and Object Diagrams.

UNIT III **10 Hrs**

BEHAVIORAL MODELING: Interaction diagrams, Use cases, Use case Diagrams and Activity Diagrams.

UNIT IV **10 Hrs**

ADVANCED BEHAVIORAL MODELING: Events and signals, state machines, processes and Threads, time and space, state chart diagrams

UNIT V **10 Hrs**

ARCHITECTURAL MODELING: Component, Deployment, Component diagrams and Deployment diagrams

TEXT BOOKS:

1.GradyBooch, James Rumbaugh, Ivar Jacobson. The Unified ModelingLanguage User Guide.PearsonEducation.
2.MichaelBlaha and James Rumbaugh. Object Oriented Modeling and Design with UML.

REFERENCE BOOKS:

1.CraigLarman. Appling UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process. Pearson Education.
2.BerndOestereich. Developing software with UML- Addision-Wesley, June.
3.Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado. UML 2 Toolkit, WILEY- Dreamtech India Pvt.Ltd.

Outcomes

	Student's will be able to	**Blooms Level of Learning**
1:	Comprehend conceptual model of UML.	L2
2:	Apply structural modeling of the system.	L3
3:	Analyze behavioral modeling of the system.	L4
4:	Apply advanced behavioral modeling of the system.	L3
5:	Apply architectural modeling of the system.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF32T -1	2	2	1	1	-	-	-	-	-	-	-	-
20DF32T -2	3	2	1	2	-	-	1	1	-	-	-	-
20DF32T -3	3	3	2	2	-	-	1	1	-	-	-	-
20DF32T -4	3	2	1	2	-	-	1	1	-	-	-	-
20DF32T -5	3	2	1	2	-	-	1	1	-	-	-	-

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Third Semester MCA

20DF33T- Dev. Ops

Course Objectives:

- To give basic knowledge of AWS practices.
- To give strong knowledge of AWS practices.
- To give strong foundation of applications of Dev. Ops.
- To give strong foundation of development and its operations.
- To give foundation of the Docker.

UNIT I **12 Hrs**

AWS INTRODUCTION: Introduction to cloud computing, Service Models in cloud computing, Deployment models in Cloud Computing, Introduction to Aws, Aws account creation and free tier limitations overview.

UNIT II **11 Hrs**

AWS SERVICES: IAM service, Ec2 Service, S3 Bucket, ECS, RDS, VPN, Route53, Monitoring tools

UNIT III **10 Hrs**

Git&GitHub: Version control system, basic commands, git branches, create a remote repository

UNIT IV **12 Hrs**

JENKINS: Why continuous integration, Introduction to Continuous Integration, Release and relation with Devops, Jenkins Introduction and setup, Jenkins projects/jobs, Jenkins plugins, Jenkins administration

UNIT V **11 Hrs**

DOCKER: Introduction to docker, Virtualization an Docker cli and Containerization differences, Docker Installation, Docker cli, Docker-compose, Docker File

TEXT BOOKS:

1. The DevOps Handbook - by Gene Kim, Jez Humble, Patrick Debois, and WillisWillis
2. What is DevOps? - by MikeLoukides

REFERENCES:

1. The DevOps Handbook - by John Willis, Patrick Debois, Jez Humble, GeneKim.
2. DevOps: A Software Architect's Perspective - by Len Bass, Ingo Weber, LimingZhu.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Summarize cloud computing components and AWS cloud.	L2
2. Apply AWS services.	L3
3. Analyze version control system.	L4
4. Analyze continuous integration frame wrok.	L4
5. Apply docker containerization.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF33T-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF33T-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF33T-3	3	3	2	2	-	-	1	-	-	-	1	-
20DF33T-4	3	3	2	2	-	-	1	-	-	-	-	-
20DF33T-5	3	2	1	2	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF34T- BIG DATA ANALYTICS

COURSE OBJECTIVES

- To know the fundamentals and need of Big Data.
- To learn various big data technologies.
- To know holistic view of big data analytics and gain the knowledge for decision making.
- To learn advanced analytics platform of big data.
- To gain knowledge about Hadoop Map Reduce and parallel processing patterns.

UNIT I **11 Hrs**

INTRODUCTION TO BIG DATA : What is Big Data and why is it important?, Four V"s of Big Data, Drivers for Big Data, Building the big data team, Big data sources, Big Data Analytics applications.

UNIT II **12 Hrs**

BIG DATA TECHNOLOGIES: Hadoop's Parallel World, Data discovery, Open-source technology for Big Data Analytics, The cloud and Big Data, Predictive Analytics, Mobile Business Intelligence, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics, Information Management.

UNIT III **10 Hrs**

THE PEOPLE PART OF THE EQUATION: Rise of the data scientist, Using deep math, science, and computer science, Holistic view of analytics, Creating talent for decision sciences, Setting up the right organizational structure for institutionalizing analytics, Best practices for big data analytics.

UNIT IV **11 Hrs**

ADVANCED ANALYTICS PLATFORM: Real-Time Architecture for conversations, Orchestration and Synthesis Using Analytics Engines, Discovery using Data at Rest, Implementation of Big Data Analytics: Big Data Governance, Analytics Business Maturity Model

UNIT V **11 Hrs**

PROCESSING BIG DATA USING HADOOP: What is Hadoop Map Reduce?, Hadoop Map Reduce components, Advantages of Hadoop Map Reduce, Hadoop Map Reduce Example, Building blocks of Hadoop Map Reduce, Design of HDFS, HDFS Concepts, Data flow. Anatomy of a Map Reduce job run.

TEXT BOOKS:

1. Michael Minelli, Michehe Chambers, AmbigaDhiraj "Big Data, Big Analytics: EmergingBusiness Intelligence and Analytic Trends for Today"s Businesses", 1st Edition, Wiely CIO Series.
2. ArvindSathi, "Big Data Analytics: Disruptive Technologies for Changing theGame", 1st Edition, IBM Corporation.

REFERENCE BOOKS:

1. Frank J. Ohlhorst, "Big data analytics: Turning big data into big money", 1st Edition, Wiley.
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS BusinessSeries.
3. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O"reilly.

EXPECTED COURSE OUTCOMES

Student's will be able to	Blooms Level of Learning
1: Comprehend the fundamental concepts of big data.	L2
2: Describe various big data technologies.	L2
3: Apply decision making concepts in big data analytics.	L3
4: Describe advanced analytic platforms of big data.	L2
5: Comprehend processing of big data using Hadoop Map Reduce.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF34T-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF34T-2	2	2	1	1	-	-	-	-	-	-	-	-
20DF34T-3	3	2	1	2	-	-	-	-	-	-	-	-
20DF34T-4	2	2	1	1	-	-	-	-	-	-	-	-
20DF34T-5	2	2	1	1	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF3AT-INTERNET OF THINGS
(Elective III)

COURSE OBJECTIVES

- To understand overview of internet of things, exploring various applications of IOT in different domains.
- To understand logical design, physical design and enabling technologies of IOT.
- To gain knowledge of integration and operability, emerging trends, agriculture and precision forming, automation of industrial things.
- The objective of the course is to explore usage and performance of Internet of Things in real-world applications.
- Understand constraints and opportunities of wireless and mobile networks for Internet of Things.

UNIT I **10 Hrs**

IOT DEFINITIONS: overview, applications, potential & challenges, and architecture.
IOT EXAMPLES: Case studies, e.g. sensor body-area-network and control of a smart home.

UNIT II **13 Hrs**

INTRODUCTION TO INTERNET OF THINGS: Physical Design of IoT, Logical Design of IoT,IoT Enabling Technologies .

UNIT III **12 Hrs**

DOMAIN SPECIFIC IOTS: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry.

UNIT IV **10 Hrs**

IOT PLATFORM DESIGN METHODOLOGY: Purpose & requirements Specification , Process specification, Domain model specification, Information model specification, IoT level specification , Operation view specification , Application Development.

UNIT V **7 Hrs**

RASPBERRY PI INTERFACE: Serial, Serial Peripheral Interface (SPI) and I2C protocol address and Interface.
APACHE HADOOP: MapReduce Programming Model and HandoopMapReduce Job Execution.

TEXT BOOK :

1. ArshdeepBahga and Vijay Madisetti. " Internet of Things: a hands-on Approach" ,

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Comprehend the impact and challenges of internet of things and architectural models.	L2
2: Summarize the different types of internet of things.	L2
3: Apply different types of domain specific internet of things in real time environment.	L3
4: Analyze different types of internet of things platform design methodologies.	L4
5: Analyze trade-offs in interconnected wireless embedded sensor networks.	L4

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3AT -1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3AT -2	2	2	1	1	-	-	-	-	-	-	-	-
20DF3AT -3	3	2	1	2	-	-	1	-	-	-	-	-
20DF3AT -4	3	3	2	2	-	-	-	-	-	-	-	-
20DF3AT -5	3	3	2	2	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF3BT-E – COMMERCE
(Elective-III)

Course Objectives:

- Have a general understanding of the Internet and related technologies.
- Understanding of policy issues related to privacy, content selection, intellectual property rights, and establishing identity that are germane to electronic commerce.
- Capability to analyze the impact that electronic commerce is having and will likely have on key sectors of the economy and assess the strategic implications this analysis holds for an organization.
- Be able to analyze the organizational fit between strategy and technology.
- Recognize and understand ways of using electronic commerce technologies to improve intra and inter-organizational processes.

UNIT – I **10 Hrs**

ELECTRONIC COMMERCE: Frame work, Anatomy of E-Commerce applications, E-Commerce Consumer Applications, E-Commerce Organization Applications, Consumer Oriented Electronic Commerce: - Consumer Oriented Applications, Mercantile Process models.

UNIT – II **8 Hrs**

ELECTRONIC PAYMENT SYSTEMS: Types of Electronic Payment System, Digital Token-Based, Smart Cards, Credit Cards, Risks and Electronic Payment Systems.

UNIT – III **10 Hrs**

INTER ORGANIZATIONAL COMMERCE AND EDI: Electronic Data Interchange, EDI in Application Business, EDI: Legal, Security and Privacy Issues, EDI and Electronic Commerce. EDI Implementation, MIME and Value Added Networks:- Standardization and EDI, EDI Software Implementation, EDI Envelope for Message Transport, Value added networks, Internet Based EDI.

UNIT – IV **10 Hrs**

CORPORATE DIGITAL LIBRARY: Dimensions of Internal EC Systems, Making a Business Case for a Document Library, Types of Digital Document, Issues behind Document Infrastructure, Corporate Data Warehouses. Advertising and Marketing - Information Based Marketing, Advertising on Internet, On-line Marketing Process, Market Research.

UNIT – V **8 Hrs**

CONSUMER SEARCH AND RESOURCE DISCOVERY : Information search and Retrieval, Commerce Catalogues, Information Filtering.

MULTIMEDIA - Key Multimedia Concepts, Digital Video and Electronic Commerce, Desktop Video Processing's, Desktop Video Conferencing.

Text Book:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.

References:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, JohnWiley.
2. E-Commerce, S.Jaiswal –Galgotia.

COURSE OUTCOMES:

Students will be able to :		Bloom's Level of Learning
1.	Summarize basic concepts of e-commerce.	L2
2.	Summarize electronic payment systems.	L2
3.	Explain inter organizational commerce and EDI.	L2
4.	Describe digital library and marketing process.	L2
5.	Summarize consumer search and information filtering.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3BT -1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3BT -2	2	2	1	1	-	-	-	-	-	-	-	-
20DF3BT -3	2	2	1	1	-	-	-	-	-	-	-	-
20DF3BT-4	2	2	1	1	-	-	-	-	-	-	-	-
20DF3BT -5	2	2	1	1	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF3CT-DIGITAL MARKETING
(Elective – III)

Course Objectives:

- To provide students with a comprehensive understanding of digital marketing strategies and components.
- To teach students about SEO and its role in digital marketing success, covering keyword strategy, on-page and off-page techniques, and search engine marketing.
- To explore email marketing, its various types, automation lead generation, and integration with social media and mobile.
- To delve into social media marketing, including leveraging social media for brand engagement, creating successful campaigns, and utilizing influencer marketing.
- To emphasize the importance of analytics in digital marketing, covering various platforms and methods, and how to adapt strategies based on data and recent trends.

UNIT I **8 Hrs**

ONLINE MARKET SPACE: Digital Marketing Strategy- Components -Opportunities for building Brand-Website - Planning and Creation- Content Marketing.

UNIT II **12 Hrs**

SEARCH ENGINE OPTIMIZATION: Keyword Strategy- SEO Strategy - SEO success factors - On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works.

UNIT III **12 Hrs**

E- MAIL MARKETING : Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximizing email campaign effectiveness. Mobile Marketing-Mobile Inventory/channels- Location based; Context based; Coupons and offers, Mobile Apps, Mobile Commerce.

UNIT IV **12 Hrs**

SOCIAL MEDIA MARKETING: Social Media Channels- Leveraging Social media for brand conversations and buzz. Successful /benchmark Social media campaigns. Engagement Marketing-Building Customer relationships - Creating Loyalty drivers - Influencer Marketing.

UNIT V **8 Hrs**

DIGITAL TRANSFORMATION & CHANNEL ATTRIBUTION: Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.

Text Books:

1. Fundamentals of Digital Marketing by Puneet Singh Bhatia;Publisher: Pearson Education; First edition (July 2017);ISBN-10: 933258737X;ISBN-13:978-9332587373.
2. Digital Marketing by VandanaAhuja ;Publisher: Oxford University Press ISBN-10: 0199455449;ISBN-13:978-0199455447

References

1. Marketing 4.0: Moving from Traditional to Digital by Philip Kotler;Publisher: Wiley; 1st edition; ISBN10: 9788126566938;ISBN13: 9788126566938;ASIN:8126566930
2. Ryan, D. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, KoganPageLimited.
3. Pulizzi,J Beginner's Guide to Digital Marketing , McgrawHillEducation.

4. Barker, Barker, Bormann and Neher, Social Media Marketing: A Strategic Approach, 2E South-Western ,CengageLearning.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Comprehend the digital marketing strategy and components.	L2
2. Explain strategies of search engine marketing. .	L2
3. Apply Email automation and mobile Apps in marketing.	L3
4. Analyze successful and benchmark social media campaigns.	L4
5. Analyze understanding of channel attribution in digital marketing.	L4

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3CT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3CT-2	2	2	1	1	-	-	-	-	-	-	-	-
20DF3CT-3	3	2	1	2	-	-	1	-	-	-	-	-
20DF3CT-4	3	3	2	2	-	-	1	-	-	-	-	-
20DF3CT-5	3	3	2	2	-	-	1	-	-	-	-	-

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Third Semester MCA

20DF3DT - SOFTWARE TESTING METHODOLOGIES
(ELECTIVE-III)

COURSE OBJECTIVES

- To understand the fundamental concepts of software testing, testing objectives and taxonomy of bugs.
- To know various path testing and transaction flow testing techniques.
- To gain knowledge of data flow and domain testing.
- To understand path products, regular expressions and logic based testing techniques.
- To understand state graphs and graph matrices.

UNIT I **11 Hrs**

INTRODUCTION: The Purpose of testing, Some Dichotomies, Model for testing, Consequences of bugs, Taxonomy of bugs.

UNIT II **12 Hrs**

FLOW GRAPHS AND PATH TESTING: Basic Concepts of path-testing, Predicates, path predicates and achievable paths, Path sensitizing, Path instrumentation, Application of path testing,

TRANSACTION-FLOW TESTING: Transaction flows, transaction-flow testing techniques.

UNIT III **12 Hrs**

DATA FLOW TESTING: Basics of Dataflow testing, Strategies in dataflow testing, Application of dataflow testing.

DOMAIN TESTING: Domains and paths, Nice and Ugly domains, Domain testing, Domains and interface testing, Domains and testability.

UNIT IV **11 Hrs**

PATH, PATH PRODUCTS AND REGULAR EXPRESSIONS: Path products and path expressions, A Reduction procedure, Applications.

LOGIC BASED TESTING: Motivational Overview, Decision tables, Path expressions.

UNIT V **11 Hrs**

STATE, STATE GRAPHS AND TRANSITION TESTING: State graphs, Good and bad state graphs, State testing.

GRAPH MATRICES AND APPLICATIONS: The Matrix of a graph, Relations,The powers of a matrix, Node-reduction algorithm, Building tools.

TEXT BOOK:

1. Boris Beizer. Software testing techniques. Dreamtech, 2nd Ed.

REFERENCE BOOKS:

1. Edward kit. Software testing in the real world.Addison-Wesley professional.
2. Dr.K.V.K.K.Prasad. Software Testing Tools. Dreamtech press, New Delhi, Reviewed.

EXPECTED COURSE OUTCOMES:

Student's will be able to	**Blooms Level of learning**
1: Describe the concepts of software testing.	L2
2: Apply path testing and transaction flow testing techniques.	L3
3: Apply different data flow testing and domain testing strategies.	L3
4: Analyze path products and path expressions.	L4
5: Analyze state graphs and graph matrices.	L4

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3DT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3DT-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF3DT-3	3	2	1	2	-	-	-	1	-	-	-	-
20DF3DT-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF3DT-5	3	3	2	2	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF3ET-DEEP LEARNING
(ELECTIVE-III)

COURSE OBJECTIVES

- To acquire knowledge on the basics of neural networks.
- To implement neural networks using computational tools for variety of problems.
- To explore various deep learning algorithms.
- To present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.
- To explore advanced topics such as deep generative models, Boltzmann machines and its applications.

UNIT – I **12 Hrs**

INTRODUCTON TO DEEP LEARNING: History of Deep Learning: Basics: Biological Neuron, Idea of computational units, McCulloch– Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.

UNIT – II **11 Hrs**

FEEDFORWARD NETWORKS: Feedforward Networks: Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.

UNIT-III **13 Hrs**

CONVOLUTIONAL NETWORKS: Convolutional Networks: The Convolution Operation - Variants of the Basic Convolution Function - Structured Outputs - Data Types - Efficient Convolution Algorithms - Random or Unsupervised Features- LeNet, AlexNet

UNIT- IV **11 Hrs**

RECURRENT NEURAL NETWORKS: Recurrent Neural Networks: Bidirectional RNNs - Deep Recurrent Networks Recursive Neural Networks - The Long Short-Term Memory and Other Gated RNNs

UNIT-V **13 Hrs**

DEEP GENERATIVE MODELS: Deep Generative Models: Boltzmann Machines - Restricted Boltzmann Machines - Introduction to MCMC and Gibbs Sampling- gradient computations in RBMs - Deep Belief Networks- Deep Boltzmann Machines.

APPLICATIONS: Large-Scale Deep Learning - Computer - Speech Recognition - Natural Language Processing.

TEXT BOOKS:

1. Deep Learning from Scratch: Building with Python from First Principles, Seth Weidman, O'REILLY
2. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press.
3. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1: 1127.

REFERENCE BOOKS:

1. Fundamentals of Deep Learning, Nikhil Buduma, O'REILLY.
2. Nikhil Buduma, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly publications.

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1 :	Comprehend introduction to deep learning.	L2
2 :	Analyze the feed forward networks.	L4
3 :	Analyze convolutional networks using efficient algorithms..	L4
4 :	Analyze the recurrent neural networks.	L4
5 :	Apply deep generative models in natural language processing..	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3ET-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3ET-2	3	3	2	2	-	-	-	-	-	-	-	-
20DF3ET-3	3	3	2	2	-	-	-	-	-	-	-	-
20DF3ET-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF3ET-5	3	2	1	2	-	-	1	-	-	-	-	-

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Third Semester MCA

20DF3FT -DATA SCIENCE
(Elective IV)

COURSE OBJECTIVES

- To Understand the fundamentals and concepts of data science.
- The course gives you a set of practical skills for handling data that comes in a variety of formats and sizes, such as texts, spatial and time series data.
- These skills cover the data analysis lifecycle from initial access and acquisition, modeling, transformation, integration, querying, application of statistical learning and data mining methods, and presentation of results.
- This includes data wrangling, the process of converting raw data into a more useful form that can be subsequently analysed.
- To implement applications with Bokeh(Python), recent trends and techniques in data science.

UNIT – I **13 Hrs**

FUNDAMENTALS OF DATA SCIENCE: Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.
Supervised Versus Unsupervised Learning, Regression Versus Classification Problems, Assessing Model Accuracy, Measuring the Quality of Fit, The Bias-Variance Trade-of, The Classification Setting.

UNIT – II **12 Hrs**

MAINTENANCE OF DATA, DATA COLLECTION AND MANAGEMENT: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, using multiple data sources.

UNIT-III **12 Hrs**

DATA ANALYSIS: Classification, Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods, Logistic Regression, LDA, QDA, and KNN, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

UNIT- IV **13 Hrs**

DATA VISUALIZATION: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, mapping variables to encodings, Visual encodings. Data Wrangling: Data Acquisition, Data Formats, Imputation, The split-apply-combine paradigm.

UNIT-V **12 Hrs**

DATA SCIENCE-APPLICATIONS: Applications of Data Science, Technologies for visualization, Bokeh (Python), Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

TEXT BOOKS:

1. Alberto Boschetti, Luca Massaron, “Python Data Science Essentials”, Packt Publications, 2nd Edition.
2. Davy Cielen, Arno Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and more, using Python tools”, Manning Publications; First Edition.
3. Mark Gardener, Beginning R The statistical Programming Language, Wiley.

4. Han ,Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman.

REFERENCE BOOKS:

1. SinanOzdemir, Principles of Data Science, Packt Publishing Ltd Dec.
2. Joel Grus, Data Science from Scratch, Oreilly media.

COURSE OUTCOMES

	Student's will be able to	Blooms Level of Learning
1 :	Summarize the fundamentals of data science.	L2
2 :	Explain how data is collected, managed and stored for data science.	L2
3 :	Analyze the data by applying various techniques.	L4
4 :	Explain data visualization techniques.	L2
5 :	Describe several applications in data science.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3FT-1	2	2	1	1	-	-	-	-	-	-	-	-
20-DF3FT-2	2	2	1	1	-	-	-	-	-	-	-	-
20DF3FT-3	3	3	2	2	-	-	1	-	-	-	-	-
20DF3FT-4	2	2	1	1	-	-	1	-	-	-	-	-
20DF3FT-5	2	2	1	1	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF3GT - IT SERVICE MANAGEMENT

(Elective IV)

COURSE OBJECTIVES

- To know the essential concepts of Service Management.
- To understand Service Life Cycle.
- To know basic ITIL Processes and Functions.
- To understand advanced ITIL Processes with their functionalities.
- Guides on measurement and metrics.

UNIT-I **12 Hrs**

INTRODUCTION: What is Service Management?, Best practice versus Good practice, Why ITIL is required?, The ITIL framework, The ITIL Core, The ITIL Service Management Model, Benefits of ITIL.

UNIT-II **10 Hrs**

THE SERVICE LIFECYCLE: ITIL Publications, Service Basics, Service Strategy, Service Design, Service Transition, Service Operation, Continual Service improvement.

UNIT-III **12 Hrs**

THE PROCESSES AND FUNCTIONS – I: IT Financial Management, Demand Management, Service Portfolio Management, Service Level Management, Supplier Management, Capacity Management, Availability Management, Information Security Management and Access Management, Knowledge Management.

UNIT-IV **10 Hrs**

THE PROCESSES AND FUNCTIONS – II: Change Management, Release and Deployment Management, Request Fulfillment, Incident Management, Problem Management, IT Operations Management, Event Management.

UNIT-V **10 Hrs**

MEASUREMENT AND METRICS: Service Oriented Architecture, Application Management, Technical Management, The Seven-step improvement process, Measurement and Metrics, The Deming Cycle.

TEXT BOOK:

1. IT Service Management: A Guide for ITIL V3 Foundation Exam Candidates, Ernest Brewster, Richard Griffiths, Aidan Lawes, John Sansbury, bcs The chartered institute for IT, Viva Books Private Limited.

REFERENCE BOOK:

1. ITIL for Beginners: The Complete Begineer guide to itil; 2nd Edition, Clydebank Technology, Clydebank.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Comprehend the fundamentals of IT service management and the importance of best practices.	L2
2: Analyze ITIL service life cycle and its various stages.	L4
3: Apply knowledge of processes and functions in IT service management.	L3
4: Apply IT processes with their functionalities.	L3
5: Apply measurement and metrics for continual service improvement.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3GT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3GT-2	3	3	2	2	-	-	-	-	-	-	-	-
20DF3GT-3	3	2	1	2	-	-	1	-	-	-	-	-
20DF3GT-4	3	2	1	2	-	-	1	-	-	-	-	-
20DF3GT-5	3	2	1	2	-	-	1	-	-	-	-	-

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Third Semester MCA

20DF3HT-MACHINE LEARNING
(Elective-IV)

COURSE OBJECTIVES

- To formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weakness.
- To understand the basic theory underlying machine learning.
- To apply machine learning algorithms, to solve problems of moderate complexity.
- To understand different types of learning approaches.

UNIT– I **12 Hrs**

INTRODUCTION: Machine learning, Terminologies in machine learning, Types of machine learning supervised, unsupervised, semi-supervised learning, parametric and nonparametric models, curse of dimensionality, bias and variance, overfitting.

UNIT– II **12 Hrs**

CLASSIFICATION: Decision Trees, CART, Decision Rules, Instance based learners, Support Vector Machines- Large margin classifiers, Nonlinear SVM, kernel functions, SMO algorithm. Evaluating classifiers, Ensemble Methods: Bagging - Simple methods, Boosting - Adaboost, Gradient Boosting, Random Forest. Directed Graphical Models: Bayes nets, Learning Bayes nets, Markov and hidden Markov models.

UNIT– III **12 Hrs**

DIMENSIONALITY REDUCTION - Factor analysis, Principal components analysis, Independent Component Analysis. Clustering: EM algorithm, partitioned, hierarchical and density based clustering. Evaluating cluster quality.

UNIT– IV **14 Hrs**

ANALYTICAL LEARNING - Introduction, Learning with Perfect Domain Theories: Prolog-EBG, Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control
Knowledge.

COMBINING INDUCTIVE AND ANALYTICAL LEARNING – Motivation, Inductive-AnalyticalApproaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using PriorKnowledge to Alter the Search Objective.

UNIT– V **14 Hrs**

GENETIC ALGORITHMS – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis, Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

REINFORCEMENT LEARNING – Introduction, the Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples.

TEXT BOOKS:

1. John D. Killeher, Brian Mac, Namee, AoiFE D'Arcy, Fundamental of Machine Learning for Predictive Data Analytics, MIT press.
2. Tom Mitchell, “Machine Learning”, McGraw Hill
3. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard O. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995 CRC
4. Python Machine Learning by Example, Yuxi (Hayden) Liu, First Edition.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Comprehend the fundamental concepts of machine learning.	L2
2. Describe various algorithms for machine learning.	L2
3. Analyze independent component in dimensionality reduction.	L4
4. Describe analytical learning using prior knowledge.	L2
5. Summarize different genetic algorithms and reinforcement learning.	L2

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3HT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3HT-2	2	2	1	1	-	-	-	-	-	-	-	-
20DF3HT-3	3	3	2	2	-	-	-	-	-	-	-	-
20DF3HT-4	2	2	1	1	-	-	-	-	-	-	-	-
20DF3HT-5	2	2	1	1	-	-	-	-	-	-	-	-

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Third Semester MCA

20DF3IT-BLOCK CHAIN TECHNOLOGIES

(Elective – IV)

Course Objectives:

- Understand how blockchain systems (mainly Bitcoin and Ethereum) work.
- Introduce key vocabulary and concepts related to block chain and Bitcoin in business situations.
- Discuss the current state of the Block chain landscape.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from blockchain technology into their own projects.

UNIT-I **13 Hrs**

BLOCK CHAIN: Distributed systems, the history of block chain, introduction to block chain, CAP theorem and block chain, Benefits and limitations of block chain.

DECENTRALIZATION: Decentralization using block chain, Methods of decentralization, Routes to decentralization, Block chain and full ecosystem decentralization, Smart contract, Decentralized organizations, Decentralized autonomous organizations, Decentralized autonomous corporations, Decentralized autonomous societies, Decentralized applications, Platforms for decentralization.

UNIT-II **12 Hrs**

CRYPTOGRAPHY AND TECHNICAL FOUNDATIONS: Introduction, Cryptography, Confidentiality, Integrity, Authentication, Cryptographic primitives, Cryptographic primitives, Public and private keys, Financial markets and trading.

UNIT-III **12 Hrs**

BITCOIN: Bitcoin, Transactions, Blockchain, Bitcoin payments, Bitcoin programming and the command-line interface, Bitcoin improvement proposals (BIPs). **Alternative Coins:** Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin

UNIT-IV **12 Hrs**

SMART CONTRACTS: History, Definition, Ricardian contracts

ETHEREUM : Introduction, Ethereumblockchain, Elements of the Ethereumblockchain, Precompiled contracts, Accounts, code Block.

UNIT-V **11 Hrs**

HYPERLEDGER: Projects, Hyperledger as a protocol, Fabric, Hyperledger Fabric, Sawtoothlake, Corda

TEXT BOOK:

1. Imran Bashir, “Mastering Blockchain” Packt Publishing Ltd, March 2017.

REFERENCE BOOKS

1. Josh Thompson, ‘Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming’, Create Space Independent PublishingPlatform.
2. Melanie swan, “Blokchain blueprint for a new economy”, O’REILLY.
3. Andreas Antonopoulos, The internet of money.
4. Paul Vigna& Michael J. Casey, The age of cryptocurrency.

COURSE OUTCOMES

	Student's will be able to	Blooms Level of Learning
1.	Explain advantages, limitations and decentralize currency using block chain technology.	L2
2.	Apply Cryptography for Block chain technology.	L3
3.	Analyze Bitcoin crypto currency and alternate to bitcoin technology.	L4
4.	Desribe the smart contracts to add and investigate the challenges and securiry issues of ethereum.	L2
5.	Analyze the Hyperledger project and open source ledger framework.	L4

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3IT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3IT-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF3IT-3	3	3	2	2	-	-	1	-	-	-	-	-
20DF3IT-4	2	2	1	1	-	-	-	-	-	-	-	-
20DF3IT-5	3	3	2	2	-	-	1	-	-	-	-	-

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Third Semester MCA

20DF3JT - MOBILE APPLICATION DEVELOPMENT (ELECTIVE – IV)

COURSE OBJECTIVES

- Learning about mobile devices types.
- Learning about modern mobile operating systems.
- Learning about data transmission standards.
- Learning about systems for mobile application distribution.
- Preparing for mobile application development.

UNITI **12 Hrs**

Hello, Android: A Little Background, Native Android Applications, Android SDK Features, Introducing the Open Handset Alliance, Why Develop for Android?, Introducing the Development Framework, **Getting Started:** Developing for Android, Developing for Mobile and Embedded Devices, Android Development Tools.

UNIT II **12 Hrs**

Creating Applications and Activities: What Makes an Android Application? Using the Manifest Editor, the Android Application Lifecycle.**Building User Interfaces:** Fundamental Android UI Design, Introducing Layouts, Introducing Fragments.

UNIT III **10 Hrs**

Databases and Content Providers: Introducing Android Databases, Introducing SQLite, Content Values and Cursors, working with SQLite Databases, Creating Content Providers.

UNIT IV **10 Hrs**

Advanced User Experience: Designing for Every Screen Size and Density, Introducing Android Text-to-Speech, Using Speech Recognition, Working with Animations, Advanced Drawable Resources.

UNITV **12 Hrs**

Maps, Geo-coding, and Location-Based Services: Using Location-Based Services, Using the Emulator with Location-Based Services, selecting a Location Provider, Finding Your Current Location.

Creating Map-Based Activities, Audio, Video, and Using the Camera: Playing Audio and Video, creating a Sound Pool, Using Audio Effects, Using the Camera for Taking Pictures, Recording Video, Using Media Effects, Adding Media to the Media Store.

TEXT BOOK:

1. Reto Meier: Professional Android 4 Application Development. Wiley India Edition.

REFERENCE BOOKS:

1. Jerome(J.F.)DiMarzio:AndroidAProgrammer's Guide, Tata McGraw-Hill
2. B.M. Harwani: Android Programming, Pearson Jason Ostrander: Android UI Fundamentals Develop and Design, Pearson

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1: Summarize types of mobile devices and mobile platforms.	L2
2: Apply manifest editor and lifecycle to build android applications.	L3
3: Describe various databases for mobile applications.	L2
4: Apply screen size, speech recognition and animations for advanced drawable resources.	L3
5: Apply map based activities to find current locations using camera.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF3JT-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF3JT-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF3JT-3	2	2	1	1	-	-	-	-	-	-	-	-
20DF3JT-4	3	2	1	2	-	-	1	-	-	-	-	-
20DF3JT-5	3	2	1	2	-	-	1	-	-	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

Third Semester MCA

20DF31L-WEB TECHNOLOGIES LAB

COURSE OBJECTIVES

- Develop strong foundation in object oriented programming principles.
- Understand how packages improve code organization and modularity, and exception hierarchy in java.
- Provide strong foundation in web development including HTML,CSS, Java script and XML. technologies
- Understand the lifecycle of servlets and how to manage their execution, how to design scalable and maintainable web applications using JSP.
- Build on foundational knowledge of JSP to create dynamic and database -driven web applications.

List of programs

1. Write a Java Program for creation of classes and use of different types of functions.
2. Write a Java Program using constructor.
3. Write a Java Program on a) interfaces and b) packages
4. Write a Java Program using a) function overloading and overriding b) inheritance.
5. Write a Java Program using exception handling mechanism.
6. Develop static pages of an online Bookstore. The pages should resemble www.amazon.com. The website should consist the following pages
   - Home Page
   - Registration Page
   - Login Page
   - Books Catalogue
   - Shopping Cart
   - Payment By Credit Card
   - Order Confirmation
7. Design a web page using Cascading Style Sheet.
8. Validate the Registration Page using Java Script.
9. Write an XML file which will display the Faculty information and also XSLT Program to display XML Data in HTML document which includes:
   1) Name of the Faculty 2) First Semester Subject 3) Second Semester Subject 4) Third Semester Subject
10. Create an HTML file and retrieve the data from servlet using Tomcat Server.
11. Develop a JSP Page for entering Student details, and must be saved in database using JDBC Connections and will be displayed the data from the database in the webpage.
12. Create a JDBC Program in which data will be retrieved from the database using MS-Access and output will be displayed in DOS Prompt.

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Apply object oriented programs using class, constructors, polymorphism and inheritance.	L3
2. Apply exception handling mechanisms using java.	L3
3. Apply HTML, CSS, javascript and XML features for developing web pages.	L3
4. Apply servlets concepts to develop java applications.	L3
5. Apply database connections to develop jsp applications.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF31L-1	3	2	1	2	-	-	-	-	-	-	-	-
20DF31L-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF31L-3	3	2	1	2	1	-	1	-	-	-	-	-
20DF31L-4	3	2	1	2	-	-	-	-	-	-	-	-
20DF31L-5	3	2	1	2	1	-	-	-	-	-	-	-

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Third Semester MCA

20DF32L-UML LAB

COURSE OBJECTIVES

- Describe the three pillars of object-orientation and explain the benefits of each.
- Create use case documents that capture requirements for a software system.
- Create class diagrams that model both the domain model and design model of a software system.
- Create interaction diagrams that model the dynamic aspects of a software system.
- To make the students to know about all the nine diagrams.

Select 4 Projects from the following and design UML Diagrams

1. Online Library Management System
2. Airline Reservation System
3. ATM Model
4. Hospital Management System
5. Point of Sale
6. College Management System

COURSE OUTCOMES

	Student's will be able to	**Blooms Level of Learning**
1:	Explain the basic elements of modeling such as Things, Relationships and Diagrams.	L2
2:	Apply basic and Advanced Structural Modeling Concepts for designing real time applications.	L3
3:	Apply interaction, usecase and activity diagrams that represent static aspects of a software system.	L3
4:	Analyze state chart diagrams and dynamic aspects of a software system.	L4
5:	Apply component and deployment diagrams of runtime environment of software system.	L3

CO- PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF32L-1	2	2	1	1	-	-	-	-	-	-	-	-
20DF32L-2	3	2	1	2	-	1	1	1	-	-	1	-
20DF32L-3	3	2	1	2	-	1	1	1	-	-	1	-
20DF32L-4	3	3	2	2	-	1	1	1	-	-	1	-
20DF32L-5	3	2	1	2	-	1	1	1	-	-	1	-

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Third Semester MCA

20DF33L -DEV. OPS LAB

COURSE OBJECTIVES

- To understand the concept of DevOps with associated technologies and methodologies.
- To be familiarized with Jenkins freestyle project.
- To understand Load balancer.
- To understand ci/cd through Jenkins.
- To understand Docker to build, ship and run containerized images.

List of programs

1. Make html project live in Aws cloud using s3
2. Hello World Jenkins freestyle project
3. Creating Classic Load balancer and attach to two ec2 machines
4. Simple Devops project for ci/cd through jenkins
5. Building our own image in docker through docker file

COURSE OUTCOMES

Student's will be able to	**Blooms Level of Learning**
1. Analyze amazon web service account.	L4
2. Apply html project live on AWS cloud using S3.	L3
3. Analyze hello world Jenkins freestyle project.	L4
4. Analyze simple dev.ops project for CI/CD through Jenkins.	L4
5. Apply docker file to build our own docker image.	L3

CO- PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF33L-1	3	3	2	2	-	-	-	-	-	-	-	-
20DF33L-2	3	2	1	2	-	-	-	-	-	-	-	-
20DF33L-3	3	3	2	2	-	-	1	-	-	-	1	-
20DF33L-4	3	3	2	2	-	-	-	-	-	-	-	-
20DF33L-5	3	2	1	2	-	-	1	-	-	-	-	-

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Third Semester MCA

20DF31M -UNIVERSAL HUMAN VALUES
(Mandatory Audit Course – 2)

Course Objectives:

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

Unit 1: 6 Hrs

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 Validation- as 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

Unit 2: 6 Hrs

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'

Unit 3: 6 Hrs

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- 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 4: 6 Hrs

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature.
- Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space.

Unit 5: 7 Hrs

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 eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

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. ISBN978-93-87034-47-1
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. ISBN 978-93-87034-53-2

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, Jeevan VidyaPrakashan, Amar kantak.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi.

COURSE OUTCOMES:

Student's will be able to	Blooms Level of Learning
• Analyze more aware of themselves and their surroundings (family,society,nature) for value education	L4
• Comprehend more responsible in life and handling problems with sustainable solutions in life.	L2
• Describe harmony in the family and society, trust and respect of the human relationship.	L2
• Analyze human values, human relationship and self regulations in nature.	L4
• Apply what they have learny to day to day activities in real life and we have learnt to their own self harmony on professional ethics.	L3

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20DF31M-1	3	3	2	2	-	1	-	-	-	-	-	-
20DF31M-2	2	2	1	1	-	1	-	-	-	-	-	-
20DF31M-3	2	2	1	1	-	1	-	-	-	-	-	-
20DF31M-4	3	3	2	2	-	1	-	-	-	-	-	-
20DF31M-5	3	2	1	2	-	1	-	-	-	-	-	-