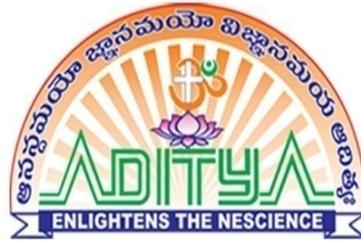


ACADEMIC REGULATIONS, PROGRAMME STRUCTURE AND SYLLABUS

MASTER OF COMPUTER
APPLICATIONS

For

MCA THREE YEAR DEGREE PROGRAMME
(Applicable for the batches admitted from 2017-18)



ADITYA ENGINEERING COLLEGE

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUK & Accredited by NBA, NAAC with 'A' Grade
Recognized by UGC under the sections 2(f) and 12(B) of UGC act 1956
Aditya Nagar, ADB Road, SURAMPALEM - 533 437

ABOUT ADITYA ENGINEERING COLLEGE

ADITYA ENGINEERING COLLEGE (AEC) was established in 2001 at Surampalem, Kakinada, Andhra Pradesh in 125 Acres of pollution free and lush green landscaped surroundings by the visionaries of Aditya Academy who are in the glorious service field of education since last 33 years.

AEC believe in the holistic development of society at large and are researching its efforts in multi-disciplinary activities. We shoulder the responsibility of shaping the Intellect, Character and Physique of every student, because we believe that these students would be the architects to develop a humanized and harmonious society, and the nation as a whole.

Our vision is to impart education, in a conducive ambience, as comprehensive as possible, with the support of all the modern technologies and produce graduates and post graduates in engineering with the ability and passion to work wisely, creatively, and effectively for the betterment of our society. It is our endeavor to develop a system of Education which can harness students' capabilities and the muscles of the mind thoroughly trained to enable it to manifest the great feats of intellectualism which it is capable of.

SALIENT FEATURES:

- An Autonomous Institution.
- Accredited by NAAC with “A” Grade in 2015 and NBA in 2008.
- Recognized by UGC under sections 2(f) & 12(B).
- Affiliated to JNTUK, Kakinada.
- Recognized by Scientific and Industrial Research Organizations (SIROs) of Department of Scientific and Industrial Research, Ministry of Science and Technology, Govt. of India.
- Rated as “GOLD” Category institute by AICTE-CII Survey of Industry – Linked Technical Institutes 2016.
- Bagged Grade “A” (top grade) by the Govt. of A.P.
- Dept. of Science and Technology under Technology Development Board has sanctioned Incubation Centre and only one College in the state received this financial Assistance.
- Best Rankings & Ratings given to Aditya by reputed Magazines & journals in their surveys :

- Grade AAA by careers 360.
 - One of the best 20 Engineering colleges in India by The Sunday Indian.
 - South India IV rank by Digital Mailers.
 - South India VI rank by Silicon India.
 - India 13th Rank out of top 25th Engineering Colleges by 4Ps.
 - Asia's Top 100 colleges by WCRC Leaders.
 - Higher Education Review 35th Rank in India.
 - South India's 68th Rank, India's 99th Rank by the Week magazine.
 - 8th Rank in providing high quality infrastructure out of 10 engineering Colleges in India by The Week magazine and more
- The college has students from 17 states across India & 13 foreign countries.
 - 150+ foreign students.
 - Honored with Best Placement Award by Chief Minister of Andhra Pradesh.
 - Only one college in AP received Best Performance Award from Tech Mahindra for its outstanding achievement in campus placements.
 - Remarkable achievement of campus placements in CMM Level 5 Companies
 - Students received Gold Medals at University level.
 - Offering most job potential engineering courses of Petroleum Engineering, Mining Engineering, and Agricultural Engineering in addition to the regular courses of Mechanical, Civil, and EEE, ECE, CSE and IT at UG, PG and Diploma Levels.
 - Skill Development Centre with the collaboration of Govt. of A.P. (APSSDC)
 - Siemens Centre of Excellence Campus.
 - PMKVY Skill Development Centre Campus.
 - South India's first Microsoft Ed-vantage Platinum Campus.
 - Campus of Microsoft innovation centre.
 - Adobe's Centre of Excellence Campus.
 - Campus of CISCO Networking Academy.
 - MOU with 4 Foreign Universities.
 - MOU with Educational Consultants India Ltd., (EdCil).
 - On campus Nationalized Bank with 8 ATMs facility.
 - On campus hostels with world class infrastructure facilities & 50+ resident staff.
 - Own transportation facility to pickup and drop the students and staff covering all the villages in the District with more than 60 buses.

ACADEMIC REGULATIONS (AR17)

Applicable for the students admitted from the academic year 2017-18 onwards

1. AWARD OF MCA DEGREE

A student will be declared eligible for the award of MCA Degree,

1.1 If he pursued a course of study in not less than three and not more than six academic years.

1.2 The student shall register for all 126 credits and secure all the 126 credits.

2. DISTRIBUTION AND WEIGHTAGE OF MARKS

2.1 The performance of the student in each semester shall be evaluated course - wise, with a maximum of 100 marks for both theory and practical on the basis of Sessional evaluation and End examinations, Project work evaluation for 200 marks on the basis of Sessional evaluation and End examinations (Viva-Voce) and Seminar presentation for 50 marks of Sessional evaluation.

2.2 For the theory courses, the distribution shall be 40 marks for Sessional examinations and 60 marks for End examinations. The Sessional marks shall be made based on the average of the marks secured in two Sessional examinations. The first Sessional examination is conducted for first 2 ½ units and second Sessional examination for remaining 2 ½ units for each course in a semester. Each Sessional examination shall be conducted for duration of 120 minutes with 4 questions (no choice), each question is for 10 marks. End examination is conducted for duration of 180 minutes with 8 questions out of which 5 questions to be answered and each question carries 12 marks.

2.3 For practical courses, there shall be continuous evaluation during the semester for 40 Sessional marks and 60 End examination marks. The Sessional 40 marks shall be awarded as, day-to-day work-15 marks, Record-10 marks and laboratory Exam -15 marks. The End examination shall be conducted by the concerned teacher and external examiner appointed by the Principal from a panel of three examiners submitted by HOD.

2.4 For Seminar, there shall be a seminar presentation during VI semester for 50 Sessional marks. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically

review the literature and submit it to the department in a report form and shall make an oral presentation before the Seminar Review Committee consisting of Head of the Department, Supervisor and two other senior faculty members of the department. A student has to secure a minimum of 50% of marks to be declared successful. There shall be no End examination for seminar.

2.5 For Project evaluation, out of 200 marks, 80 marks shall be for Sessional Evaluation and 120 marks for the End examination (Viva-Voce). Every student shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee (PRC).

1. A PRC shall be constituted with the Head of the Department, supervisor and two other senior faculty members.
2. A student is permitted to register for the project work after satisfying the attendance requirements of all the courses up to V semester.
3. A student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, at the beginning of the VI semester by obtaining the approval from the PRC. The project duration is for one semester.
4. If a student wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC shall examine whether or not the change of topic / supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.
5. A student shall submit his status report at least with 2 reviews conducted by the PRC.
6. The Sessional Evaluation shall be on the basis of reviews and on the progress of the work evaluated by PRC.
7. Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.
8. The external examiner shall be appointed by the Principal from the panel of three examiners, who are eminent in that particular field

given by the Head of the Department. The project thesis is sent to the same examiner for the adjudication.

9. If the report of the examiner is favourable, Viva-Voce examination shall be conducted by PRC and the examiner who adjudicated the Thesis.

(a) Student has to secure 40% of marks in the Viva-Voce examination and a minimum aggregate of 50% of total marks in Viva-Voce examination and Sessional evaluation taken together.

(b) If the report of the Viva-Voce is fail, the student shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the student has to re-register for the project and complete the project within the stipulated time after taking the approval from the Principal.

10. If the report of the examiner is unfavorable, the student shall revise and resubmit the Thesis, in the time frame as decided by the PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The student has to re-register for the project and complete the project within the stipulated time after taking the approval from the Principal.

2.6 A student shall be deemed to have secured the minimum academic requirement in a course, if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Examination and Sessional examinations taken together.

3. RE-REGISTRATION FOR IMPROVEMENT OF SESSIONAL MARKS:

Following are the conditions to avail the benefit of improvement of Sessional marks.

- 3.1 A student shall be given one chance to re-register for each course provided the Sessional marks secured by a student are less than 50% and has failed in the End examination.
- 3.2 In such a case, the student can re-register for the course(s) and the attendance shall be calculated separately.
- 3.3 If the student gets required minimum attendance then he shall be eligible for writing the End examination in that course(s).
- 3.4 In case that student secures less than the required attendance in any re-registered course(s), he shall not be permitted to write the End examination in the course. He shall again re-register the course when next offered.
- 3.5 In the event of the student taking re-registration, his Sessional marks and End examination marks obtained in the previous attempt stand cancelled in that course(s).
- 3.6 For re-registration, the student has to get approval from the Principal and has to pay the requisite fee which is of one third of the semester tuition fee before the start of the semester in which re-registration is required.
- 3.7 At a given time a student is permitted to re – register for maximum of two courses in addition to the regular semester.

4. ATTENDANCE

- 4.1 A student shall be eligible to write End examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses.
- 4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) on a medical grounds in a semester may be granted by the College Academic Committee and a student can be condoned for a maximum of three times only.
- 4.3 Shortage of Attendance below 65% in aggregate shall not be condoned.
- 4.4 Students, whose shortage of attendance is not condoned in any semester, are not eligible to write their End examination of that semester.

- 4.5 A fee of 500/- shall be payable towards condonation of shortage of attendance.
- 4.6 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when next offered.
- 4.7 If any student fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same semester.

5. AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and are eligible for the award of MCA. degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	From the CGPA Secured from 126 Credits
First Class with Distinction	≥ 7.75 (with no course failures)	
First Class	≥ 6.75 with course failures	
Second Class	≥ 5.75 to < 6.75	

6.1 Cumulative Grade Point Average (CGPA)

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

Range of Marks (%)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥ 80 to < 90	A+	Excellent	9
≥ 70 to < 80	A	Very Good	8
≥ 60 to < 70	B+	Good	7
≥ 50 to < 60	B	Fair	6
< 50	F	Fail	0
		Absent	0

1. Computation of SGPA

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

$$SGPA(S_i) = \frac{\sum(C_i \cdot G_i)}{\sum(C_i)}$$

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

2. Computation of CGPA

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

$$CGPA = \frac{\sum(C_i \cdot S_i)}{\sum(C_i)}$$

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

(ii) The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

(iii) Equivalent Percentage = $(CGPA - 0.75) \times 10$

6. MINIMUM INSTRUCTION DAYS

The minimum instruction days for each semester shall be 90 working days.

7. WITHHOLDING OF RESULTS

If the student not paid any dues to the college or involved in indiscipline activities, his result will be withheld.

8. TRANSITORY REGULATIONS

8.1 Discontinued or detained students are eligible for readmission as and when next offered.

8.2 The readmitted students will be governed by the regulations under which the student has been admitted.

9. GENERAL

- 9.1 Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- 9.2 The academic regulation should be read as a whole for the purpose of any interpretation.
- 9.3 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic council is final.
- 9.4 The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

MALPRACTICES RULES
Disciplinary Action for /Improper Conduct in Examinations

The Chief controller of examinations shall refer the cases of malpractices in Sessional and End Examination to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice allegedly committed by the student to the Chief Controller of Examinations. The Chief Controller of Examinations along with the members of the Committee is authorized to impose a suitable punishment, if the student is found guilty as per the following guidelines.

	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 course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	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 examination hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester.
3	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the

		candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester
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 the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is course to the academic regulations in connection with forfeiture of seat.
5	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 the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester. The candidate is also debarred and forfeits of seat.

7	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practical and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8	Refuses to obey the orders of the Chief controller of examinations / Observer / 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 or 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	misconduct or has the tendency to disrupt the orderly conduct of the examination.	
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.
10	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that End examination.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Chief controller of examinations for further action to award suitable punishment.	

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

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

Teasing, Embarrassing and Humiliation	 6 months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Years	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE ADITYA A RAGGING FREE CAMPUS

Ragging

**ABSOLUTELY
NO TO RAGGING**

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE ADITYA A RAGGING FREE CAMPUS

VISION & MISSION OF THE COLLEGE

VISION

To induce higher planes of learning by imparting technical education with International standards, Applied research, Creative ability and Value based instruction to emerge as a premier institute.

MISSION

Achieving academic excellence by providing globally acceptable technical education by forecasting technology through

- Innovative research & development
- Industry institute interaction
- Empowered manpower

PROGRAMME STRUCTURE

I SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC1T01	C Programming & Data Structures	3	1	---	3
173MC1T02	Computer Organization	3	1	---	3
173MC1T03	Discrete Mathematical Structures & Graph Theory	3	1	---	3
173MC1T04	Statistics With R Programming	3	1	---	3
173MC1T05	Accounting & Financial Management	3	1	---	3
173MC1L01	English Language Communication Skills Lab	---	---	3	2
173MC1L02	C Programming Lab	---	---	3	2
173MC1L03	Statistics With R Programming Lab	---	---	3	2
TOTAL		15	5	9	21

II SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC2T06	OOPS Through Java	3	1	---	3
173MC2T07	Operating Systems	3	1	---	3
173MC2T08	Software Engineering	3	1	---	3
173MC2T09	Optimization Techniques	3	1	---	3
173MC2T10	Computer Graphics	3	1	---	3
173MC2L04	OOPS Through Java Lab	---	---	3	2
173MC2L05	Data Structures Lab	---	---	3	2
173MC2L06	Operating System & Computer Graphics Lab	---	---	3	2
TOTAL		15	5	9	21

III SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC3T11	Database Management Systems	3	1	---	3
173MC3T12	Computer Networks	3	1	---	3
173MC3T13	Unix Programming	3	1	---	3
173MC3T14	Management Information System	3	1	---	3
173MC3T15	Design & Analysis of Algorithms	3	1	---	3
173MC3L07	Database Management Systems Lab	---	---	3	2
173MC3L08	Unix Programming Lab	---	---	3	2
173MC3L09	Computer Networks Lab	---	---	3	2
TOTAL		15	5	9	21

IV SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC4T16	Object Oriented Analysis & Design	3	1	---	3
173MC4T17	Advanced Java & Web Technologies	3	1	---	3
173MC4T18	Data Warehousing & Mining	3	1	---	3
Elective – I					
173MC4E01	Mobile Computing	3	1	---	3
173MC4E02	Human Computer Interaction				
173MC4E03	Cloud Computing				
Elective – II					
173MC4E04	Software Project Management	3	1	---	3
173MC4E05	Artificial Intelligence				
173MC4E06	Embedded Systems				
173MC4L10	Advanced Java & Web Technologies Lab	---	---	3	2
173MC4L11	Data Warehousing & Mining Lab	---	---	3	2
173MC4L12	Object Oriented Analysis & Design Lab	---	---	3	2
TOTAL		15	5	9	21

V SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC5T19	Big Data Analytics	3	1	---	3
173MC5T20	Network Programming	3	1	---	3
173MC5T21	Python Programming	3	1	---	3
Elective – III					
173MC5E07	Cyber Security	3	1	---	3
173MC5E08	Computer Forensics				
173MC5E09	E – Commerce				
Elective – IV					
173MC5E10	Internet of Things	3	1	---	3
173MC5E11	Multimedia Application Development				
173MC5E12	Software Testing Methodologies				
173MC5L13	Big Data Analytics Lab	---	---	3	2
173MC5L14	Network Programming Lab	---	---	3	2
173MC5L15	Python Programming Lab	---	---	3	2
TOTAL		15	5	9	21

VI SEMESTER

Course Code	Name of the Course	Lecture (L)	Tutorial (T)	Practice (P)	Credits (C)
173MC6R01	Seminar	---	---	---	2
173MC6P01	Major Project	---	---	---	19
TOTAL		---	---	---	21

I Semester	T	P
	4	0

C PROGRAMMING & DATA STRUCTURES

UNIT-I:

Introduction to Computers, HW and SW concepts, Algorithm, pseudo code, flowchart, program development steps, Introduction to various IDE's and their use in C program development, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Control structures such as if, go to, labels, and switch statements.

UNIT-II:

Loops- while, do-while and for statements, break, continue, Arrays -concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays other than strings, 2-Dcharacter arrays – 2-D arrays other than character arrays – Multidimensional arrays.

UNIT-III:

Functions: basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor. Passing 1-D arrays, 2-D arrays, and functions. Pointers: concepts, initialization of pointer variables, pointers and Function arguments, passing by address –dangling memory, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments.

UNIT-IV:

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typed of, bit-fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations
Data Structures: Introduction to Data Structures – Time Complexity –Space Complexity – Pattern matching – naive method – Robin Karp Algorithm - Searching – Linear and binary search methods, sorting –Bubble sort, selection sort, Insertion sort, Quick sort, merge sort.

UNIT-V:

Single linked lists, doubly linked lists, circular list, representing stacks and queues in C using arrays and linked lists, infix to post fix conversion, postfix expression evaluation. Trees- Binary trees, terminology, representation, traversals, Graphs - terminology, representation, graph versals (dfs & bfs) –Warshalls – Dijkstra – Kruskal – Prims Algorithms

TEXT BOOKS:

1. C and Data Structures: A snapshot oriented treatise using live engineering examples, N B Venkateswarlu, E. V Prasad, S Chand & Co.
2. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C , Horowitz, Sahni, Anderson- Freed, 2nd ed, universities Press, 2008.
2. Classic Data Structures, Samanta, 2nd ed, PHI, 2009.
3. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson.
4. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
5. DataStructures Using C , A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/ Pearson.
6. Programming in C , Stephen G. Kochan, III Edition, Pearson.
7. Data Structures and Program Design in C, R.Kruse,, Tondo, Leung, Shashi M, 2nd Edition, Pearson.
8. Data Structures and Algorithms, Aho, Hopcroft, Ullman, Pearson, 2006
9. C and Data Structures, Ashok N.Kamthane, Pearson.
10. C Programming and Data Structures, E Balaguruswamy, TMH, 2008.

I Semester	T	P
	4	0

COMPUTER ORGANIZATION

UNIT-I:

Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

UNIT-II:

Machine Instruction and Programs: Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT-III:

Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT-IV:

INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT-V:

The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING Secondary Storage: Magnetic Hard Disks, Optical Disks, Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

TEXT BOOKS:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
2. Computer Architecture and Organization , John P. Hayes ,3rd Edition, McGraw Hill.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int.Edition.

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DISCRETE MATHEMATICAL STRUCTURES & GRAPH THEORY

UNIT-I:

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT-II:

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram. Functions: composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application. Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and monoids, groups, sub groups, Definitions, Examples, homomorphism, Isomorphism and related problems.

UNIT-III:

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations, Enumerating of Combinations & Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion – Exclusion.

UNIT-IV:

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V:

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees, Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

TEXT BOOKS

1. Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R.Manohar, TMH
2. Discrete Mathematical for computer Scientists & Mathematicians “ J.L. Molt, A.Kandel, T.P.Baker, PHI

REFERENCE BOOKS:

1. Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH
2. Discrete Mathematics, Schaum’s Outlines, Lipschutz, Lipson, TMH.
3. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 2009
4. Discrete Mathematics, Johnsonbaugh, 6th ed., Pearson, 2005
5. Discrete Mathematics, Malik, Sen, 6th ed., Cengage Learning, 2004
6. Discrete Mathematics for computer science, Bogart, Stein and Drysdale, Springer, 2005

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STATISTICS WITH R PROGRAMMING

UNIT-I:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT-II:

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets, - If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quick sort Implementation- Extended Example: A Binary Search Tree.

UNIT-III:

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV:

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot () Function – Customizing Graphs, Saving Graphs to Files.

UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA. Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Spines- Decision- Random Forests

TEXT BOOKS:

1. The Art of R Programming, Norman Matloff, Cengage Learning
2. R for Everyone, Lander, Pearson

REFERENCE BOOKS:

1. R Cookbook, Paul Teetor, Oreilly.
2. R in Action, Rob Kabacoff, Manning

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ACCOUNTING & FINANCIAL MANAGEMENT

UNIT-I:

Accounting Generally Accepted Accounting Principles (GAAP) & Accounting standards, Characteristics and limitations of single entry system, double entry system of accounting, introduction of basis books of accounts, ledgers. Preparation of trail balance – Final accounts – company final accounts – Users of Accounting Information, Role of Accountant in modern Organizations.

UNIT-II:

Financial Management – meaning and scope, role, objectives of time value of money – over vitalization – under capitalization – profit maximization – wealth maximization – EPS maximization. Ration Analysis - advantages - limitations - Fund flow analysis – meaning, importance, preparation and interpretation of Funds flow and cash flow statements – statements of changes in working capital.

UNIT-III:

Costing – nature and importance and basic principles. Elements of cost – Absorption costing Vs. Marginal costing – Financial accounting Vs. cost Accounting Vs. management accounting. Marginal costing and Break – even Analysis: nature, scope and importance– practical applications of marginal costing, limitation and importance of cost – volume, profit analysis, short run decisions.

UNIT-IV:

Standard costing and budgeting : nature, scope and computation and analysis – materials variance, labor variance and sales variene – cash budget, sales - budget – flexible Budgets, master budgets.

UNIT-V:

Introduction to computerized accounting system: coding logic and codes, master files, transaction files, introduction documents used for data collection, processing of different files and Outputs obtained.

TEXT BOOKS:

1. Accounting for Managers, P. Vijaya Kumar, and Himalaya Publications.
2. Accounting for Management. Vijaya Kumar.TMH.
3. Financial Accounting, S.N Maheswari and S.K. Maheswari, Vikas.
4. Financial Accounting, A. Mukherjee and M. Heneef, TMH.

REFERENCE BOOKS:

1. Basic Financial Accounting for Management, Ambaresh Gupta, Pearson.
2. Accounts And Finance for Non accounts, Chatterjee, D.K.Himalaya.
3. Financial Analysis and Accounting, P. Premchand Babu and M. Madam Mohan, Himalaya.
4. Essential of Financial Accounting, Ashish, K and Ballacharya, PHI.
5. Guide to Financial Management, John Tannent, Viva.

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ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Objectives: The language lab focuses computer-aided multi-media instruction and language acquisition to achieve the following targets:

To expose the students to a variety of self-instructional, learner-friendly modes of language learning.

To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm

To train them to use language effectively to face interviews, group discussions, public speaking.

To initiate them into greater use of the computer in resume preparation, report writing, format- making etc.

However, depending upon the availability of infrastructure and budget, the above targets can also be achieved by procuring the minimum required equipment suggested for the establishment of conventional lab the details of which are given below. The lab should cater to the needs of the students to build up their confidence to help them develop leadership qualities through their communicative competence.

ENGLISH LANGUAGE LABORATORY PRACTICE

Module	TOPICS/SUB-TOPICS	LAB SESSION
1.	INTRODUCTION TO PHONETICS -vowels, -Consonants, -Diphthongs INTRODUCTION TO STRESS & INTONATION -Articulation, -Respiration, -phonation	3
2.	Group Discussions Facing Interviews	4
3.	Situational / Dialogue / Role Play Resume Preparation	2
4.	Public Speaking, Debate	2
5.	GRE, TOEFL, GMAT, MODELS, e-CORRESPONDENCE	3

Introduction to phonetics. 2. Introduction to Vowels and Consonants and associated phonetic symbols. 3. Introduction to Accent, Intonation and Rhythm. 4. Situational

Dialogues/Role Play. 5. Debate 6. Public Speaking. 7. Group Discussions 8. Facing Interviews 9. Resume preparation 10. e – correspondence

Suggested Software for Lab classes:

Cambridge Advanced Learner's Dictionary with exercise

The Rosetta Stone English Library

Clarity Pronunciation Power

Mastering English in Vocabulary, Grammar, Spellings, Composition

Dorling Kindersley series of grammar, Punctuation, Composition etc.

Oxford Advanced Learner's Compass, 7th Edition

Language in Use, Foundation Books Pvt Ltd

Learning to Speak English – 4 CDs Microsoft Encarta

Murphy's English Grammar, Cambridge

Time series of IQ Test, Brain-teasers, Aptitude Test etc.

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy,
Cambridge

REFERENCE BOOKS:

1. The Human Touch: personal Skills for Professional Success – by Debra Paul.
2. The Definitive Book of body Language – by Allan Pease, Barbara Pease.
3. How to Face Interviews – by Clive Fletcher.
4. The 7 Habits of Highly Effective People – by Stephen Covey.
5. The Google Resume: How to Prepare of a Career and Land a Job at Apple, Microsoft.
6. Good English –by G.H Vallins
7. Better English – G.H Vallins
8. Best English – G.H. Vallins
9. How to Talk to Anyone: 92 little tricks for big success in Relationships by Leli Lowndes.
10. The leader in you - by Dale Carnegie
11. 250 Job Interview Questions You'll most likely Be Asked – by Peter Verki, Peter Verki.
12. Contemporary English Grammar, structures and Composition - by David Green.

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C PROGRAMMING LAB

OBJECTIVES:

1. To learn/strengthen a programming language like C, To learn problem solving techniques
2. To introduce the student to simple linear and non linear data structures such as lists, stacks, queues, etc.,

Recommended Systems/Software Requirements:

1. Intel based desktop PC, ANSI C Compiler with Supporting Editors, IDE's such as Turbo C, Bloodshed C

EXERCISE I:

- a. Write a C program to find the sum of individual digits of a positive integer.
- b. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and Subsequent terms are found by adding the preceding two terms in the sequence. Write a C Program to generate the first n terms of the sequence.
- c. Write a C program to generate all the prime numbers between 1 and n, where n is a value Supplied by the user.
- d. Write a program which checks a given integer is Fibonacci number or not.

EXERCISE II:

- a. Write a C program to calculate the following Sum: $Sum = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
- b. Write a C program to find the roots of a quadratic equation.
- c. Write a C program to implement Newton Raphson method for a quadratic equation
- d. Write a C program to implement Newton Raphson method for a general purpose algebraic equation

EXERCISE III:

- a. Write C programs that use both recursive and non-recursive functions i) To find the factorial of a given integer.
- b. To find the GCD (greatest common divisor) of two given integers.
- c. To solve Towers of Hanoi problem.
- d. Write program to calculate probability of head/tail by generating random numbers using random () function.

EXERCISE IV:

- a. The total distance travelled by vehicle in 't' seconds is given by distance = $ut + \frac{1}{2}at^2$ where 'u' and 'a' are the initial velocity (m/ sec.) and acceleration (m/sec²). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

EXERCISE V:

- a. Write a C program to find both the largest and smallest number in a list of integers.
- b. Write a C program that uses functions to perform the following:
 - (i). Addition of Two Matrices
 - (ii). Multiplication of Two Matrices
 - (iii). Checking symmetry of a square matrix.
 - (iv). Calculating transpose of a matrix in- place manner.

EXERCISE VI:

- a. Write a C program that uses functions to perform the following operations: i) To insert a sub-string in to given main string from a given position. ii) To delete n Characters from a given position in a given string.
- b. Write a C program to determine if the given string is a palindrome or not

EXERCISE VII:

- a. Write a C program that displays the position/ index in the string S where the string T begins, or -1 if S doesn't contain T.
- b. Write a C program to count the lines, words and characters in a given text.

EXERCISE VIII:

- a. Write a C program to generate Pascal's triangle.
- b. Write a C program to construct a pyramid of numbers.

EXERCISE IX:

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$ For example: if n is 3 and x is 5, then the program computes $1 + 5 + 25 + 125$. Print x, n, the sum Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if $n < 0$, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

EXERCISE X:

- a. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b. Write a C program to convert a Roman numeral to its decimal equivalent.

EXERCISE XI:

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

- (i). Reading a complex number ii) Writing a complex number iii) Addition of two complex numbers
- (ii). Multiplication of two complex numbers

EXERCISE XII:

- a. Write a C program which copies one file to another.
- b. Write a C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

I Semester

STATISTICS WITH R PROGRAMMING LAB

1. Write a program to illustrate basic Arithmetic in R
2. Write a program to illustrate variable assignment in R
3. Write a program to illustrate data types in R
4. Write a program to illustrate creating and naming a vector in R
5. Write a program to illustrate create a matrix and naming matrix in R
6. Write a program to illustrate Add column and Add a Row in Matrix in R
7. Write a program to illustrate Selection of elements in Matrix in R
8. Write a program to illustrate Performing Arithmetic of Matrices
9. Write a program to illustrate Factors in R
10. Case study of why you need use a Factor in R
11. Write a program to illustrate Ordered Factors in R
12. Write a program to illustrate Data frame selection of elements in a data frame
13. Write a program to illustrate Sorting a data frame
14. Write a program to illustrate List? Why would you need a List?
15. Write a program to illustrate Adding more elements into a List
16. Write a program to illustrate if-else-else if in R
17. Write a program to illustrate While and For loops in R
18. Write a program to illustrate Compare and Matrices and Compare mVectors
19. Write a program to illustrate Logical & and Logical | operators in R
20. Write a program to illustrate Functions in Quick sort implementation in R
21. Write a program to illustrate Function inside function in R
22. Write a program to illustrate to create graphs and usage of plot() function in R
23. Write a program to illustrate Customising and Saving to Graphs in R
24. Write a program to illustrate some built in Mathematical Functions

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OOPS THROUGH JAVA

UNIT-I:

Basics of Object Oriented Programming(OOP): Need for OO paradigm , A way of viewing world- Agents, responsibility, messages, methods, classes and instances, class hierarchies(Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms

Java Basics: Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects- concepts of classes, objects, constructors methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT-II:

Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, sombination, benefits of inheritance costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes.

Packages and Interfaces: Defining, Creating and Accessing a package, Understanding CLASSPATH, Importing packages, differences between classes and interfaces, defining an interface, Implementing interface, applying interfaces variables in interface and extending interfaces.

UNIT-III:

Exception handling and Multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT-IV:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy , user-interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, list panes- scroll pane, dialogs, menu bar, graphics, layout manager- layout manager types- boarder, grid, flow, card and grid bag.

UNIT-V:

Applets: Concepts of Applets, differences between applets and applications, lifecycle of an applet, types of applets, creating applets, passing parameters to applets.

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons-The JButton class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables.

TEXT BOOKS:

1. Java-The complete reference,7/e, Herbert schildt, TMH.
2. JAVA: How to program, 8/e, Dietal , Dietal,PHI.
3. Introduction of programming with JAVA,S.Dean,TMH.
4. Introduction to Java programming, 6/e, Y.Daniel Liang, Pearson.

REFERENCE BOOKS:

1. Core Java 2, Vol 1(Vol 2) Fundamentals(Advanced), 7/e, Cay.S.Horstmann,Gary Cornell, Pearson.
2. Big Java2,3/e, Cay.S. Horstmann,Wiley.
3. Object Oriented Programming through Java, P.Radha Krishna, University Press.
4. JAVA& Object Orientation an Introduction, 2/e, John Hunt, Springer.
5. Introduction to JAVA Programming, 7/e, Y. Daniel Liang, Pearson. , TMH.

OPERATING SYSTEMS

UNIT-I

Introduction: Computer –system organization, Computer- system Architecture, Operating- system Structure, Operating-system Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special-purpose systems, Computing Environments , Operating-system Structure:, Operating-system Services, User , Operating-system Interface, System calls, System programs, Operating-system Design and Implementation, , Operating-system structure, Virtual Machine.

UNIT-II

Process Management:

Processes: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems, Communication in Client-Server systems

Threads: Overview, Multithreading Models, Thread Libraries, Java Threads, Threading Issues, OS Examples

CPU Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Multiple- Processor Scheduling, Thread Scheduling, Operating system Examples
Process Synchronization: Background, The Critical- section problem, Petersons solution, Synchronization Hardware, Semaphores, Classic problems of Synchronization, Monitors, Atomic Transactions.

UNIT-III:

Memory management: Main memory: Swapping, Contiguous memory Allocation, Paging, Structure of the Page table, Segmentation Virtual memory: Background, Demand paging, copy- on-Write, Page Replacement, Allocation of frames, Thrashing, Memory-Mapped Files.

UNIT-IV:

File-system Interface: Concept, Access Methods, Directory structure, File system Mounting, File sharing, Protection.

File-system Implementation: File-system Structure, Implementation, Directory Implementation, Allocation Methods, Free- Space Management, Efficiency and Performance, Recovery, Log-Structured File systems, NFS Mass –storage Structure: Overview, Disk Structure, Disk Attachment, Disk Scheduling, Disk and swap-space Management, RAID Structure, Stable- Storage Implementation, Tertiary-Storage Structure I/O systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O requests to Hardware Operations, STREAMS, Performance.

UNIT-V

Deadlocks: System model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock avoidance Deadlock Detection and Recovery form Deadlock. Protection: Goals of Protection, Principles of protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability – Based systems, Language-Based Protection

Security: The Security Problem, Program Threads, System and Network Threats, Cryptography as a security tool, User Authentication, Implementing security Defenses, Firewalling to protect systems and Networks.

TEXT BOOKS:

1. Operating system concepts, 7/e, Abraham Silberschatz, Galvin, John Wiley & sons , Inc.

REFERENCES BOOKS:

1. Operating systems, 6/E, William stallings, PHI/Pearson.
2. Operating systems 3/e, Dietal, Dietal, Pearson.
3. Operating systems, 2/e, Dhamdhere, TMH.
4. An introduction to Operating systems, Concepts and practice, Pramod Chandra P. Bhat, PHI
5. Operating systems, Elmasri, Carrick, Levine, TMH.
6. Operating systems, 3/e ,Nutt, Chaki, Neogy Pearson.
7. Operating systems, Brian L. Stuart, Cengage.
8. Operating systems, Haldar, Aravind, Pearson.
9. Operating systems, PAL Choudhury, PHI.
10. Operating systems: design and Implementation, 3/e, Tanenbaum, Woodhull.

SOFTWARE ENGINEERING

UNIT - I

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. (Text Book 3)

The software problem: Cost, schedule and quality, Scale and change.

UNIT-II:

Software Process: Process and project, component software process, Software development process models : Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project. Project management process.

UNIT-III

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation.

Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

UNIT-IV

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics.

UNIT-V

Coding and Unit testing: Programming principles and guidelines, incrementally developing code, managing evolving code, unit testing, code inspection, metrics.

Testing: Testing concepts, testing process, black-box testing, white-box testing, metrics.

TEXT BOOKS:

1. A Concise introduction to software engineering (undergraduate topics in computer science), Pankaj Jalote, Springer International Edition.
2. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
3. Software Engineering, 3/e, & 7e Roger S. Pressman, TMH

REFERENCE BOOKS:

1. Software Engineering, 8/e, Sommerville, Pearson.
2. Software Engineering principles and practice, W S Jawadkar, TMH
3. Software Engineering concepts, R Fairley, TMH

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OPTIMIZATION TECHNIQUES

UNIT-I:

Development: Definition, Characteristics and Phrases, scientific method. Types of models, general methods for solving, operations research modes.

Allocation: introduction linear programming formulation, graphical solution, simplex methods, artificial variable technique, duality principle.

UNIT-II:

Transportation problem: Formulation, optimal solution, unbalanced transportation, assignment problem: formulation, optimal solution, variations problem, degeneracy i.e. non square $M \times N$ matrix, restrictions sequencing: Introduction, optimal solution for processing each of n jobs through three machines, travelling salesman problem(i.e.) shortest acyclic route models.

UNIT-III:

Replacement: Introduction, replacement of items that deteriorate when money value is not counted and counted, and replacement of items that fail completely (i.e.) group replacements.

Waiting lines: Introduction , single channel, poisson arrivals, exponential service time infinite population and unrestricted queue.

UNIT-VI:

Inventory: Introduction, single item, deterministic models, production is instantaneous or at a constant rate , shortages are allowed or not allowed and with drawls from stock is continuous, purchase inventory model with one price break ,shortages are not allowed , instantaneous production demand production or purchase cost is relevant, stochastic models, simple problems.

UNIT-V:

Theory of Games: Introduction, minmax (maximum), criterion and optimal strategy solution of games with saddle points, rectangular without saddle points. Dynamic programming: Introduction, Bellman's Principle of optimality, solutions for simple problems.

Project Management: PERT and CPM , difference between PERT and CPM, PERT/CPM network components and precedence relations, Time Estimates for activities.

TEXT BOOKS:

1. Operations Research, S.D.Sharma, Ramnath, & Kedarnath co, Meerut.
2. Operations Research, An introduction , 8/e, Taha, Pearson.

REFERENCE BOOKS:

1. Operations Research, P.K.Gupta, D.S. Hira, S.Chand.
2. Operations Research, R.D.Asrhedkar, R.V.Kulkarni.
3. Operations Research, Problems & sollutons, 3/e, JKSharma, Macmillan.
4. Operations Research, 8/e, Hillier, Liberman, TMH.
5. Operations Research, 2/e, Panneerselvam.

COMPUTER GRAPHICS

UNIT-I:

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT-II:

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. (p.nos 204-227 of text book-1).

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen- Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm

UNIT-III:

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermit curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

UNIT-IV:

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

UNIT-V:

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

TEXT BOOKS:

1. Computer Graphics *C version*, Donald Hearn, M.Pauline Baker, Pearson
2. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson

REFERENCE BOOKS:

1. Computer Graphics, Donald Hearn and M.Pauline Baker, 2/E, PHI
2. Computer Graphics, Zhigand xiang, Roy Plastock, Schaum's outlines, 2/E, TMH
3. Procedural elements for Computer Graphics, David F Rogers, 2/e, TMH
4. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.
5. Principles of ComputerGraphics, Shalini Govil, Pai, 2005, Springer.

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OOPS THROUGH JAVA LAB

- Use JDK 1.5 or above on any platform e.g. Windows or Unix.
- Student is expected to complete any 16 programs.

1. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. every subsequent value is the sum of the 2 values preceding it. Write A Java Program (WJJP) that uses both recursive and non recursive functions to print the nth value of the Fibonacci sequence.
2. WJJP to demonstrate wrapper classes and to fix the precision.
3. WJJP that prompts the user for an integer and then prints out all the prime numbers upto that Integer.
4. WJJP that checks whether a given string is a palindrome or not. Ex. MALAYALAM is a palindrome.
5. WJJP for sorting a given list of names in ascending order.
6. WJJP to check the compatibility for multiplication, if compatible multiply two matrices and find its transpose.
7. WJJP that illustrates how runtime polymorphism is achieved.
8. WJJP to create and demonstrate packages.
9. WJJP, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
10. WJJP that reads on file name form the user then displays information about whether the file exists, whether the file is readable/writable, the type of file and the length of the file in bytes and display the content of the using FileInputStream class.
11. WJJP that displays the number of characters, lines and words in a text/text file.
12. Write an Applet that displays the content of a file.
13. WJJP that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +-*?% operations. Add a text field to display the result.
14. WJJP for handling mouse events.
15. WJJP demonstrating the life cycle of a thread.
16. WJJP that correctly implements Producer-Consumer problem using the concept of Inter Thread Communication.

17. WJJP that lets users create Pie charts. Design your own user interface(with Swings & AWT).
18. WJJP that allows user to draw lines, rectangles and ovals.
19. WJJP that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result and then sends the result back to the client. The client displays the result on the console. For ex: The data send from the client is the radius of a circle and the result produced by the server is the area of the circle.
20. WJJP to generate a set of random numbers between two numbers x_1 and x_2 , and $x_1 > 0$.
21. WJJP to create an abstract class named shape, that contains an empty method named number Of Sides(). Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method number Of Sides(), that contains the number of sides in the given geometrical figure.
22. WJJP to implement a Queue, using user defined Exception Handling (also make use of throw, throws).
23. WJJP that creates 3 threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds. (Repeat the same by implementing Runnable).
24. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviours, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.

DATA STRUCTURES LAB**Exercise 1:**

Write recursive program which computes the n^{th} Fibonacci number, for appropriate values of n . Analyze behavior of the program Obtain the frequency count of the statement for various values of n .

Exercise 2:

Write recursive program for the following

- a) Write recursive and non recursive C program for calculation of Factorial of an integer
- b) Write recursive and non recursive C program for calculation of GCD (n, m)
- c) Write recursive and non recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:

- a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
- b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
- c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise 4:

- a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order
- b) Write C program that implement Quick sort, to sort a given list of integers in ascending order
- c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order

Exercise 5:

- a) Write C program that implement heap sort, to sort a given list of integers in ascending order
- b) Write C program that implement radix sort, to sort a given list of integers in ascending order
- c) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise 6:

- a) Write C program that implement stack (its operations) using arrays
- b) Write C program that implement stack (its operations) using Linked list

Exercise 7:

- a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
- a) Write C program that implement Queue (its operations) using arrays.
- b) Write C program that implement Queue (its operations) using linked lists

Exercise 8:

- a) Write a C program that uses functions to create a singly linked list
- b) Write a C program that uses functions to perform insertion operation on a singly linked list
- c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise 9:

- a) Adding two large integers which are represented in linked list fashion.
- b) Write a C program to reverse elements of a single linked list.
- c) Write a C program to store a polynomial expression in memory using linked list
- d) Write a C program to representation the given Sparse matrix using arrays.
- e) Write a C program to representation the given Sparse matrix using linked list

Exercise10:

- a) Write a C program to Create a Binary Tree of integers
- b) Write a recursive C program for traversing a binary tree in preorder, inorder and postorder.
- c) Write a non recursive C program for traversing a binary tree in preorder, inorder and postorder.
- d) Program to check balance property of a tree.

Exercise 11:

- a) Write a C program to Create a BST
- b) Write a C program to insert a node into a BST.
- c) Write a C program to delete a node from a BST.

**OPERATING SYSTEM & COMPUTER
GRAPHICS LAB**

1. Implementation of DDA Line Algorithm
2. Implementation of Bresenham's Line Algorithm
3. Implementation of Midpoint Circle Algorithm
4. Implementation of Midpoint Ellipse Algorithm
5. Implementation of Two Dimensional Transformations
6. Implementation of Two Dimensional Composite Transformations
7. Simulate the Following cpu Scheduling Algorithms
 - A) Round Robin B) Sjf
 - C) Fcfs D) Priority
8. Multiprogramming-Memory Management- Implementation Of Fork (), Wait (), Exec () And Exit ()
9. Simulate The Following
 - a. Multiprogramming with A Fixed Number Of Tasks (Mft)
 - b. Multiprogramming with A Variable Number Of Tasks (Mvt)
12. Simulate Bankers Algorithm for Dead Lock Avoidance
13. Simulate Bankers Algorithm for Dead Lock Prevention.
14. Simulate The Following Page Replacement Algorithms.
 - A) Fifo B) Lru C) Lfu
15. Simulate the Following File Allocation Strategies
 - A) Sequenced B) Indexed C) Linked
