R20

Code No: R20A0504

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Operating Systems

(CSE, IT, CSE-AIML, CSE-DS & CSE-IOT)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 A Discuss, with examples, how the problem of maintaining coherence of cached data manifests itself in the following processing environments: **[6M]**
i. Single-processor systems
ii. Multiprocessor systems
iii. Distributed systems

B How Linux is different from Windows operating system? Explain about Linux file system. **[8M]**

OR

2 A Explain how operating system provides various services to user. **[7M]**

B List any five Linux utilities. Explain these utilities with syntax and example. **[7M]**

SECTION-II

3 A Briefly explain different types of shells. Write a shell program for checking whether the given number is palindrome or not. **[7M]**

B Explain the difference between Long-Term, Short-Term and Medium-Term scheduler. **[7M]**

OR

4 A A scheduling mechanism should consider various scheduling criteria to realize the scheduling objectives. List and explain all the criteria. **[7M]**

B Consider the following processes with Burst time in Nano seconds **[7M]**

Process	CPU Burst Time	Priority
P1	6	2
P2	12	4
P3	1	5
P4	3	1
P5	4	3

*** Priority -> 1 – High, 5-Low

i. Draw the Gantt Chart for the priority scheduling
ii. Calculate the average waiting time using priority scheduling
iii. Calculate the average turnaround time using priority scheduling
iv. Calculate the throughput

SECTION-III

5 A What are the different ways a deadlock can be handled? Explain in detail deadlock prevention. **[7M]**

B What is a race condition? How do we avoid race conditions? What are four **[7M]**

conditions for a good solution to the critical region (section) problem?

OR

6 A Consider the following snapshot of a system with four processes P1-P4 and four resource types A, B, C, & D. **[7M]**

	Allocation				Max.				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	0	0	1	3	0	0	1	2	1	5	2	0
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6				
P4	0	6	3	2	0	6	5	2				

Answer the following question using the banker's algorithm:

i. What is the content of matrix "Need"?
ii. What are the maximum instances of each recourse type?
iii. If a request from process P1 arrives for (0, 4, 2, 0) can the request be granted immediately?

B Discuss about solution to dining philosopher's problem using semaphores. **[7M]**

SECTION-IV

7 A Briefly explain message passing and shared memory in inter process communication. **[7M]**

B Consider the reference string is given as 0, 1, 5, 3, 0, 1, 5, 3, 4. Analyse the behaviour of FIFO algorithm in two cases. **[7M]**

Case 1: Number of frames = 3

Case 2: Number of frames = 4

Does this page replacement algorithm suffer from Belady's anomaly?

OR

8 A Discuss about system calls which are implemented in UNIX for inter-process communication on different systems. **[7M]**

B Explain how Page Fault is handled in demand paging system. **[7M]**

SECTION-V

9 A What are files? Explain the file types in operating system. **[7M]**

B Suppose that a disk drive has 2000 cylinders, numbered 0 to 1999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current head position, what is the total distance that the disk arm moves to satisfy the pending requests for each of the following disk scheduling algorithm? **[7M]**

i. FCFS ii. SSTF iii. C-SCAN

OR

10 A Explain the following system calls for file I/O operations: **[8M]**

i. create
ii. write
iii. stat
iv. ioctl

B Write a note on SCAN and CSCAN disk scheduling algorithms with example. **[6M]**

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Code No: R20A0505

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Design and Analysis of Algorithms

(CSE, IT, CSE-AI&ML, B.Tech-AIDS & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Discuss briefly about various asymptotic notations with examples.	**[7M]**
	B	Consider an array of elements [-15, -6, 0, 7, 9, 23, 54, 82, 103, 115, 123]. Among these elements search a key element -10 using binary search. Specify computing time.	**[7M]**

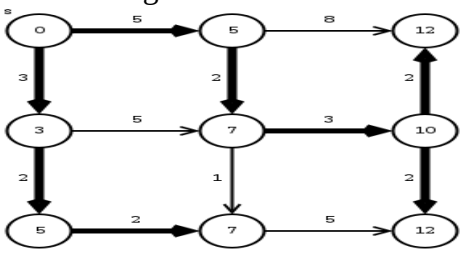
OR

2	***A***	A sorting method is said to be stable if at the end of the method identical elements occur in the same order as in the original unsorted set. Is merge sort a stable sorting method? Explain.	**[7M]**
	B	Show how to multiply the complex numbers $a + bi$ and $c + di$ using only three multiplications of real numbers. The algorithm should take a, b, c, and d as input and produce the real component $ac - bd$ and the imaginary component $ad + bc$ separately.	**[7M]**

SECTION-II

3	***A***	Suppose we start with n sets, each containing a distinct element. Show that if u unions are performed, then no set contains more than u + 1 elements.	**[7M]**
	B	For the following expression obtain an expression tree. Label the nodes with their MR value and obtain the optimal code generated by CODE2 for the two cases N = 1 and N = 2. Assume that no operator is either commutative or associative. (a + b)*(c + d *(e + f)/(g + h)).	**[7M]**

OR

4	***A***	Construct Knapsack instance for n=5, m=100 and profits (p1, p2, p3, p4, p5) = (10, 22, 33, 66, 50) and (w1, w2, w3, w4, w5) = (10, 20, 30, 40, 50).	**[7M]**
	B	Find the below directed graph. Consider the node 0 as source node and find the shortest paths to remaining vertices. 	**[7M]**

SECTION-III

5	***A***	Explain how dynamic program is efficient than greedy method.	**[7M]**

	B	What is Job scheduling problem? Let n=5, (P1, P2, P3, P4, P5)=(20, 15, 10, 5, 1) and (d1,…d5)=(2, 2, 1, 3, 3) Find the optimal schedule.	**[7M]**

OR

6	***A***	Describe the subproblem graph for matrix-chain multiplication with an input chain of length n. How many vertices does it have? How many edges does it have, and which edges are they?	**[7M]**
	B	Find the optimal tour for the following matrix using dynamic programming.	**[7M]**

$$C = \begin{pmatrix} 0 & 2 & 9 & 10 \\ 1 & 0 & 6 & 4 \\ 15 & 7 & 0 & 8 \\ 6 & 3 & 12 & 0 \end{pmatrix}$$

SECTION-IV

7	***A***	Give a backtracking algorithm for the knapsack problem using the dynamic state space tree.	**[7M]**
	B	Explain briefly about Hamilton cycle problem with example graph.	**[7M]**

OR

8	***A***	Draw the state space tree for n=3 and m=3 colors.	**[7M]**
	B	Determine the order of magnitude of the worst-case computing time for the backtracking procedure that finds all Hamiltonian cycles.	**[7M]**

SECTION-V

9	***A***	Explain Cook's theorem in detail.	**[7M]**
	B	Draw the portion of State space tree generated by LCBB for the knapsack problem of the instance N = 5, (p1, p2, ..., p5) = (13, 15, 7, 2, 4), (w1, w2, ..., w5) = (4, 6, 3, 4, 2) and m = 12 by using fixed tuple size information.	**[7M]**

OR

10	***A***	Explain about Non-deterministic algorithms. Provide the examples for P and NP algorithms.	**[7M]**
	B	Explain travelling sales person problem with an example using branch and bound.	**[7M]**

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R20

Code No: R20A0506

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Computer Organization

(CSE, CSE-CS, CSE-AIML, CSE-DS & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks

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SECTION-I

1	***A***	Draw a simple block diagram of functional units of a computer and explain the functions of basic functional units.	**[7M]**
	B	What is data representation. Discuss the various types of data representations.	**[7M]**
		OR	
2		Discuss error detection and error correction codes.	**[14M]**
		SECTION-II	
3		Explain the register transfer language model.	**[14M]**
		OR	
4		List and explain the types of instructions.	**[14M]**
		SECTION-III	
5	***A***	Discuss various addressing modes with suitable example of each.	**[7M]**
	B	Explain CISC processor.	**[7M]**
		OR	
6		Explain the concept of Control Memory in a Micro Programmed Control Unit.	**[14M]**
		SECTION-IV	
7	***A***	Discuss memory hierarchy levels.	**[7M]**
	B	What is cache. Discuss the cache memory.	**[7M]**
		OR	
8		What is associative memory? Explain various mapping techniques in detail.	**[14M]**
		SECTION-V	
9		List and explain various peripheral devices used in input and output organization.	**[14M]**
		OR	
10	***A***	Provide a detailed overview of Direct Memory Access (DMA) and the role of a DMA Controller in data transfer.	**[7M]**
	B	List and explain I/O device interfaces.	**[7M]**

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R20

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Probability and Statistics

(CSE, IT, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIDS & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 ***A*** A random variable X has the following probability function **[7M]**

X	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

Determine (i) K (ii) P ($0 \le X \le 4$) (iii) Mean.

B A random variable X has the following probability function: **[7M]**

X	4	5	6	4
P(X)	0.1	0.3	0.4	0.2

Determine (i) Expectation (ii) Variance (iii) Standard deviation.

OR

2 ***A*** The joint probability density function is given by **[10M]**

$$f(x,y) = \begin{cases} 10xy, 0 < x < y < 1 \\ 0, elsewhere \end{cases}$$ Then find

(i) Marginal probability density function of X

(ii) Marginal probability density function of Y

B Define Conditional Probability density functions of X and Y. **[4M]**

SECTION-II

3 ***A*** The mean and variance of a binomial distribution are 4 and 4/3 respectively then find P(X≥1). **[7M]**

B Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are **[7M]**

i) at least one ii) at most one

OR

4 In a normal distribution, 7% of items are under 35 and 89% are under 63. Determine the mean and variance of the distribution. **[14M]**

SECTION-III

5 ***A*** Find the coefficient of correlation between X and Y for the following data: **[7M]**

X	10	12	18	24	23	27
Y	13	18	12	25	30	10

B Find the mean values of the variable X and Y and correlation coefficient from the following regression equations. 2Y-X=50 and 3Y-2X=10. **[7M]**

OR

6 Obtain the rank correlation coefficient for the following data. **[14M]**

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

SECTION-IV

7 ***A*** The mean and Standard deviation of a population are 11795 and 14054 respectively. If $n = 50$; Find the 95% Confidence interval for the Population mean. **[7M]**

B An ambulance service claims that it takes on the average less than 10 minutes to reach its distribution in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance. **[7M]**

OR

8 A population consists of six numbers 4,8,12,16,20,24. Consider all possible samples of size two which can be drawn without replacement from this population. Find (i) The population mean. (ii) The population standard deviation (iii) The mean of the sampling distribution of means (iv) The standard deviation of the sampling distribution of means. **[14M]**

SECTION-V

9 ***A*** Two horses A and B were tested according to the time to run a particular track with the following results **[7M]**

Horse-A	28	30	32	33	33	29	34
Horse-B	29	30	30	24	27	29	---

Test whether the two horses have the same running capacity.

B Two random samples are drawn from two normal populations. Test whether the two samples have the same variance at 5% level. **[7M]**

Sample-I	20	16	26	27	23	22	18	24	25	19	---	----
Sample-II	27	33	42	35	32	34	38	28	41	43	39	37

OR

10 A die is thrown 264 times with the following results. Show that the die is biased. Test at 5% level of significance by chi-square test. **[14M]**

[Given χ^2=11.07 for 5 d.f at 0.05 LOS]

Face	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

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R20

Code No: R20A0061

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Managerial Economics and Financial Analysis

(CSE, IT, CSE-CS, CSE-AIML, CSE-IOT, B.Tech-AIDS & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Explain Nature and scope of managerial economics.	**[7M]**
	B	Describe Micro and Macro economics concepts	**[7M]**
		OR	
2	***A***	What is law of demand? List out the demand determinants factors.	**[7M]**
	B	Elaborate various methods of demand forecasting.	**[7M]**

SECTION-II

3	***A***	Discuss the Cobb-Douglas production function	**[7M]**
	B	Explain internal and external economies of scale.	**[7M]**
		OR	
4	***A***	Elucidate different types of cost.	**[7M]**
	B	Define Break Even Point. What are the assumptions and limitations of BEP?	**[7M]**

SECTION-III

5	***A***	Explain price output determination under monopoly competition.	**[7M]**
	B	What is perfect competition. Write the features of perfect competition.	**[7M]**
		OR	
6	***A***	Make out the objectives of pricing.	**[7M]**
	B	What is joint stock company? Mention the features of joint stock company.	**[7M]**

SECTION-IV

7	***A***	What are the factors determining the requirement of working capital.	**[7M]**
	B	Discuss the various sources of financing.	**[7M]**
		OR	
8		The following balances were extracted from the books of Thomas as on 31st March, 2018	**[14M]**

Particulars	₹	Particulars	₹
Purchases	75,000	Capital	60,000
Returns inward	2,000	Creditors	30,000
Opening stock	10,000	Sales	1,20,000
Freight inwards	4,000	Returns outward	1,000
Wages	2,000		
Investments	10,000		
Bank charges	1,000		
Land	30,000		
Machinery	30,000		
Building	25,000		
Cash at bank	18,000		
Cash in hand	4,000		
	2,11,000		2,11,000

Additional information:

i. Closing stock Rs. 9,000
ii. Provide depreciation @ 10% on machinery
iii. Interest accrued on investment Rs. 2,000

Prepare trading account, profit and loss account and balance sheet.

SECTION-V

9 ***A*** List out the advantages and disadvantages of traditional methods of capital budgeting. **[7M]**

B A five-year project has a projected net cash flow of Rs.15,000, Rs.25,000, Rs.30,000, Rs.20,000, and Rs.15,000 in the next five years. It will cost Rs.50,000 to implement the project. If the required rate of return is 20 percent, conduct a discounted cash flow calculation to determine the NPV. **[7M]**

OR

10 **[14M]**

Liabilities	Rs.	Assets	Rs.
Equity Share Capital	5,00,000	Land & Building	1,00,000
Preference share capital	2,00,000	Machinery	4,00,000
General Reserve	1,00,000	Furniture	50,000
Secured Loan	3,00,000	Inventory	3,00,000
Sundry Creditors	1,00,000	Sundry Debtors	3,00,000
		Cash/Bank Balance	50,000
	12,00,000		**12, 00, 000**

Calculate Following Ratios from the above balance sheet:

1. Current Ratio
2. Liquid Ratio
3. Proprietary Ratio
4. Stock Working capital Ratio
5. Capital Gearing Ratio
6. Debt Equity Ratio

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R20

Code No: R20A0503

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, January 2024

Data Structures Using Python

(CSE, IT, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT, B.Tech-AIDS & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	***A***	Explain different types of variables in python with an example.	**[6M]**
	B	Explain about abstract classes in python with an example.	**[8M]**
		OR	
2	***A***	How to declare a constructor method in python? Explain.	**[6M]**
	B	Explain polymorphism with inheritance in python with an example?	**[8M]**

SECTION-II

3	***A***	Define Linear Data Structure. Explain any two Linear Data Structures with an example.	**[7M]**
	B	What are the different operations that can be performed on a list? Explain with examples.	**[7M]**
		OR	
4	***A***	Write in brief about Sets in python. Write operations with suitable examples.	**[7M]**
	B	Write a Python program that counts the number of occurrences of a letter in a string, using dictionaries.	**[7M]**

SECTION-III

5	***A***	What is an array? Discuss different types of arrays with examples.	**[5M]**
	B	Write a Python program for Merge Sort.	**[9M]**
		OR	
6	***A***	Sort the following list of elements by using bubble sort 30, 56, 78, 99, 12, 43, 10, 24, 85	**[5M]**
	B	Write a Python program for Quick Sort.	**[9M]**

SECTION-IV

7	***A***	Write a Python function to count the number of nodes in a singly linked list.	**[7M]**
	B	Convert the following infix expression into postfix expression A + B – C * D * E $ F $ G	**[7M]**
		OR	
8	***A***	Define a single linked list. Write the structure of the linked list with a neat sketch.	**[5M]**
	B	Write a python program to implement Queue using Singly linked list.	**[9M]**

SECTION-V

9	***A***	Write a short note on:	
		i) Directed Graphs	**[2M]**
		ii) Undirected Graphs	**[2M]**
		iii) Weighted Graphs	**[2M]**

	B	Explain AVL Tree and types of rotation with an example	**[8M]**
		OR	
10	***A***	Compare BFS and DFS with suitable examples.	**[6M]**
	B	Construct a binary search tree by inserting the following integer keys 49, 27, 12, 11, 33, 77, 26, 56, 23, 6.	
		a) Check whether the tree is almost complete or not?	**[4M]**
		b) Determine the height of the tree	**[4M]**

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