R17

Code No: R17A0504

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June/July 2024

Data Structures using C++

(IT)

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 in detail about asymptotic notations with an examples.	**[7M]**
	B	Define Merge Sort. Explain the working procedure of Merge Sort.	**[7M]**
		OR	
2	**A**	What is Quick Sort? Apply Quick Sort Algorithm, prove that the time complexity is O(n log n).	**[7M]**
	B	Why Sorting Techniques are important? Explain selection sort with an example.	**[7M]**

SECTION-II

3	**A**	What is a threaded binary tree? Explain**.**	**[7M]**
	B	Write a program to implement Queue ADT using arrays.	**[7M]**
		OR	
4	**A**	Discuss about linked implementation of stack ADT.	**[7M]**
	B	Describe the general terminology associated with the stack.	**[7M]**

SECTION-III

5	**A**	What is a Heap? Explain the insertion technique with the help of an example.	**[7M]**
	B	Analyze the multiway external sorting with an example.	**[7M]**
		OR	
6	**A**	What is a priority queue? Explain its applications.	**[7M]**
	B	What is an External Sorting? Explain the principle behind external sorting.	**[7M]**

SECTION-IV

7	**A**	What is Hash Function? List and explain the types of hash function.	**[7M]**
	B	Define Rehashing? By using hash function, insert the elements 37, 90, 55, 22, 17, 49, and 87 when the table size is 10.	**[7M]**
		OR	
8	**A**	Analyze the Extensible Hashing with an example.	**[7M]**
	B	Explain in detail about linear probing and quadratic probing.	**[7M]**

SECTION-V

9	**A**	Explain binary search tree operations with an example.	**[7M]**
	B	Briefly explain about applications of stack.	**[7M]**
		OR	
10	**A**	Discuss about the ADT B- Tree operations.	**[7M]**
	B	Write an algorithm to traverse a graph using breadth first search.	**[7M]**

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R17

Code No: R17A0503

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June/July 2024

Mathematical Foundation of Computer Science

(CSE)

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***	Define Converse ,Inverse & Contrapositive with examples.	**[7M]**
	B	Show that the following set of premises are inconsistent. $\boldsymbol{P \rightarrow Q}$,$\boldsymbol{P \rightarrow R}$, $\boldsymbol{Q \rightarrow \sim R}$,$\boldsymbol{P}$.	**[7M]**
		OR	
2	***A***	Show that $(P \vee Q) \rightarrow R \equiv (P \rightarrow R) \wedge (Q \rightarrow R)$	**[7M]**
	B	Obtain PCNF of A = (p ∧ q)∨ (¬p ∧ q)∨ (q ∧ r)	**[7M]**

SECTION-II

3	***A***	What is a compatibility relation? Explain the procedure to find the maximal compatibility blocks.	**[7M]**
	B	Verify $f(x) = 2x + 1$, $g(x) = x$ for all $x \in R$ are bijective from $\boldsymbol{R \rightarrow R}$.	**[7M]**
		OR	
4	***A***	Define and give an examples for group, semigroup, & abelian group.	**[7M]**
	B	Explain the concepts of homomorphism and isomorphism of groups with examples.	**[7M]**

SECTION-III

5	***A***	The question paper of mathematics contains two questions divided into two groups of 5 questions each. In how many ways can an examinee answer six questions taking atleast two questions from each group.	**[7M]**
	B	Applying pigeon hole principle show that of any 14 integers are selected from the set S = {1, 2, 3… 25 } there are atleast two whose sum is 26. Also write a statement that generalizes this result.	**[7M]**
		OR	
6	***A***	Out of 9 girls and 15 boys how many different committees can be formed each consisting of 6 boys and 4 girls?	**[7M]**
	B	Explain Pigeon hole principle and give an example	**[7M]**

SECTION-IV

7	***A***	Find the sequence generated by the following generating function $(2x-3)^{3}$.	**[7M]**
	B	Solve the recurrence relation $a_r = a_{r-1} + a_{r-2}$.	**[7M]**
		OR	
8	***A***	Solve $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$, $n \geq 2$ with the initial conditions $a_0 = 1$, $a_1 = 1$	**[7M]**
	B	Solve $a_n - 4a_{n-1} + 4a_{n-2} = n + 1$ given $a_0 = 0$, $a_1 = 1$.	**[7M]**

SECTION-V

9	***A***	A graph G has 21 edges, 3 vertices of degree 4 and the other vertices are of degree 3.Find the number of vertices in G?	**[7M]**
	B	Define isomorphism. Explain Isomorphism of graphs with a suitable example	**[7M]**
		OR	
10	***A***	Give an example of a graph that has neither an Eulerian circuit nor a Hamiltonian cycle.	**[7M]**
	B	Find the chromatic polynomial & chromatic number for $K_{3,3}$.	**[7M]**

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R17

Code No: R17A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June/July 2024

Probability and Statistics

(CSE)

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_i	0	1	2	3	4	5	6
$p(x_i)$	0	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Find (i) k (ii) Mean (iii) Variance

B In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution. **[7M]**

OR

2 A 20% of items produced from factory are defective. Find the probability that in sample of 5 chosen at random (i) None is defective (ii) one is defective (iii) $p(1 < x < 4)$. **[7M]**

B If the mean of Poisson variable is 1.8, then find (i) $p(x > 1)$ (ii) $p(x = 5)$ (iii) $p(0 < x < 5)$. **[7M]**

SECTION-II

3 A Calculate the coefficient of correlation between X and Y from the following data: **[7M]**

X	15	18	20	24	30	35	40	50
Y	85	93	95	105	120	130	150	160

B Find the most likely production corresponding to rainfall 40 from the following data: **[7M]**

	Rain fall (X)	Production (Y)
Average	30	500 Kgs
Standard deviation	5	100 Kgs
Coefficient of Correlation	0.7	

OR

4 A A random sample of 5 college students is selected and their grades in mathematics and statistics are found to be **[7M]**

	1	2	3	4	5
Mathematics	85	60	73	40	90
Statistics	93	75	65	50	80

Calculate the rank correlation coefficient between them.

B Calculate the regression line of Y on X from the data given below: **[7M]**

Price(X)	10	12	13	12	16	15
Amount Demanded(Y)	40	38	43	45	37	43

SECTION-III

5 A Explain the procedure for test of significance for difference of means of two large samples. **[7M]**

B In a city A 20% of a random sample of 900 school boys had a certain physical defect. In another city B 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? **[7M]**

OR

6 A A population consists of six numbers 5, 10, 14, 18, 13 and 24. Consider all possible samples of size two which can be drawn without replacement from the population. Find (a) The mean of the population (b) The standard deviation of the population (c) The mean of the sampling distribution of means and (d) The standard deviation of sampling distribution of means. **[10M]**

B A random sample of 500 points on a heated plate resulted in an average temperature of 73.54 degrees Fahrenheit with standard deviation of 2.79 degrees Fahrenheit. Construct a 99% confidence interval for the average temperature of the plate. **[4M]**

SECTION-IV

7 A The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom ($t_{0.05} = 1.833$ at 9 d.f) **[4M]**

B Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins and the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assume that the weight distributions are normal, test the hypothesis that the true variances are equal at 5% level of significance. (Given $F_{0.05} = 3.35$ at $(10,8)$ d.f) **[10M]**

OR

8 A The table gives the biological values of protein from 6 cow's milk and 6 buffalo's milk. Examine whether the differences are significant at 5% level of significance. **[7M]**

Cow's milk	1.8	2.0	1.9	1.6	1.8	1.5
Buffalo's milk	2	1.8	1.8	2.0	2.1	1.9

B A die is thrown 264 times with the following results. Show that the die is biased. [Given $\chi^2_{0.05} = 11.07$ for 5 d.f] **[7M]**

No. appeared on the die	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

SECTION-V

9 A Patients arrive at a hospital at random with a mean arrival rate of 3 per hour. The department is served by one doctor, who spends on average 15 minutes with each patient. Actual consulting times being exponentially distributed. Find **[7M]**

a) The portion of time that the doctor is idle.
b) The mean number of patients waiting to see the doctor.
c) The probability of there being more than 3 patients waiting.

B In a public Telephone both the arrivals are on the average 15 per hour. A call **[7M]**

on the average takes 3 minutes. If there is just one phone, find (i) expected number of callers in the booth at any time (ii) The proportion of the time the booth is expected to be idle.

OR

10 A A gambler has Rs.2. He bets Rs.1 at a time and wins Rs.1 with the probability 0.5. He stops playing if he loses Rs.2 or wins Rs.4. **[10M]**

(a) What is the transition probability matrix of the related Markov chain?

(b) What is the probability that he has lost his money at the end of 5 plays?

B Check whether the following Markov chain is regular and ergodic? **[4M]**

$$\begin{bmatrix} 1 & 0.5 & 0.5 & 0 \\ 0.5 & 0 & 0 & 0.5 \\ 0.5 & 0 & 0 & 0.5 \\ 0 & 0.5 & 0.5 & 0.5 \end{bmatrix}$$

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R17

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, June 2024

Electronic Devices and Circuits

(CSE & IT)

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***	Differentiate between Zener breakdown & avalanche breakdown and mention applications of Zener diode.	**[7M]**
	B	Make use of diode current equation and find the reverse saturation current for a silicon PN junction diode which passes a current of 15 mA at 270 C when the forward bias voltage is 680 mV.	**[7M]**

OR

2	***A***	With a neat figures, discuss about temperature dependence of V-I characteristics of PN junction diode.	**[7M]**
	B	Given a diode with a forward voltage drop of 0.6V and a series resistor of 1kΩ connected to a 10V supply, plot the load line and determine the operating point (Q-point) for both forward and reverse bias conditions.	**[7M]**

SECTION-II

3	***A***	Draw the circuit diagram of a Full wave rectifier and find out the Ripple Factor, Efficiency and Peak Factor.	**[7M]**
	B	A full wave rectifier with a centre tapped transformer supplies a dc current of 100mA to a load resistance of R = 20Ω. The secondary resistance of transformer is 1Ω. Each diode has a forward resistance of 0.5Ω. Determine the following. i. rms value of the signal voltage across each half of the secondary. ii. dc power supplied to the load. iii. PIV rating for each diode. iv. ac power input to the rectifier	**[7M]**

OR

4	***A***	Determine (i) DC output voltage (ii) PIV, an ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turn's ratio of 10:1. Assume that the diode is an ideal one.	**[7M]**
	B	Determine the value of inductance to use in the inductor filter connected to a full wave Rectifier operating at 60Hz to provide a d.c output with 4% Ripple for a 100 Ω load.	**[7M]**

SECTION-III

5	***A***	Compare the performance of BJT in CE, CB, and CC configuration.	**[7M]**

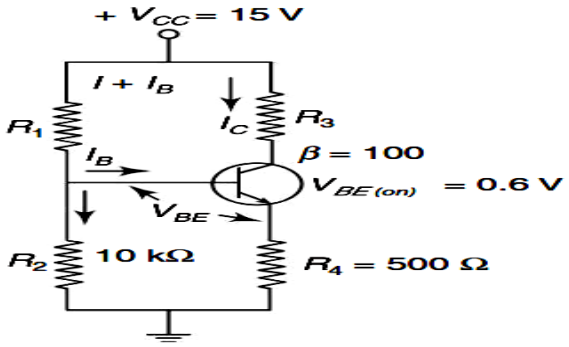
	B	Find the value of the I_B and Current amplification factor (α) in a common base transistor circuit, the emitter current I_E is 10 mA and the collector current I_C is 9.8 mA.	**[7M]**

OR

6	***A***	Draw the Common Base configuration circuit, its output characteristics and indicate different regions.	**[7M]**
	B	Given a common-emitter transistor circuit with *hie*=1kΩ, *hfe*=50, *hre* =2.5×10^{-4}, and *hoe*=25μS, calculate the input impedance (*R*in), output impedance (*R*out), voltage gain (*Av*), and current gain (*Ai*).	**[7M]**

SECTION-IV

7	***A***	Calculate R_1 and R_3 as shown in the following circuit, if I_C is 2mA and V_{CE} is 3V	**[7M]**



	B	Explain bias compensation can be achieved using a thermistor and sensitor with relevant circuit diagrams.	**[7M]**

OR

8	***A***	Calculate the operating point for a germanium transistor with a β value of 100 and a VBE of 0.2V, employed in a fixed bias amplifier circuit with specified parameters such as VCC (16V), RC (5kΩ), and RB (790kΩ)	**[7M]**
	B	Explain the principle operation of Collector to Base Bias arrangement	**[7M]**

SECTION-V

9	***A***	An N-Channel JFET has IDSS is 8 mA and VP is -5V. Determine the minimum value of VDS for pinch-off region and drain current IDS, for VGS is -2V in the pinch-off region.	**[7M]**
	B	Explain the drain source characteristics & transfer characteristics of N-Channel Enhancement type MOSFET.	**[7M]**

OR

10	***A***	Analyze the drain source characteristics & transfer characteristics of N-Channel JFET.	**[7M]**
	B	Determine ID, gmo and gm when a JFET has Vp=-5V, IDSS=8mA and VGS=-2.5V..	**[7M]**

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