



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous Institution – UGC, Govt. of India)

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DEPARTMENT OF INFORMATION TECHNOLOGY II B.TECH I SEMESTER R15 SUPPLEMENTARY PREVIOUS QUESTION PAPERS



LIST OF SUBJECTS

CODE	NAME OF THE SUBJECT
R15A0504	Data Structures using C++
R15A0461	Digital Logic Design
R15A0503	Mathematical Foundation of Computer Science
R15A0024	Probability and Statistics
R15A0401	Electronic Devices and Circuits

Code No: **R15A0504****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22**Data Structures using C++****(CSE & IT)**

Roll No									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question From each SECTION and each Question carries 10 marks.

PART-A (25 Marks)

- 1). a Define a stack. [2M]
- b What are different types of algorithms, based on the different types of steps in an Algorithm? [3M]
- c What is space complexity? [2M]
- d Write an algorithm to create a node. [3M]
- e What is Big O notation represents? [2M]
- f Explain postfix notation. [3M]
- g Define Binary tree. [2M]
- h Explain Linear list. [3M]
- i Briefly explain priority queue. [2M]
- j Explain graph. [3M]

PART-B (50 MARKS)**SECTION-I**

- 2 Classify different types of Data Structures. [10M]

OR

- 3 Write an algorithm for section sort and Merge Sort. [10M]

SECTION-II

- 4 Explain any four operations performed on linked lists with program. [10M]

OR

- 5 Develop an algorithm to create a stack with Linked list. [10M]

SECTION-III

- 6 Define queue. Write an algorithm to implement queue operations such as create, insert, delete. [10M]

OR

- 7 Explain the properties of AVL tree, explain the structure of AVL tree, and multiway search tree. [10M]

SECTION-IV

- 8 Explain Hashing. Explain Open Hashing technique. [10M]

OR

9 Explain hash function. Compare closed hashing with open hashing technique. [10M]

SECTION-V

10 Write a c++ program to search an element from Binary tree. [10M]

OR

11 Explain Breadth First Traversal (BFT). [10M]

Code No: **R15A0461****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

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II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22**Digital Logic Design****(CSE & IT)**

Roll No									
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Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question From each SECTION and each Question carries 10 marks.

PART-A (25 Marks)

- 1). a Convert (67A9)₁₆ into decimal [2M]
- b Add (+80) and (-70) using 2's complement [3M]
- c What are universal gates and why they are called as universal gates [2M]
- d Implement the following function using only NOR Gates $F=a.(b+ c) + (b. c)$. [3M]
- e What is a multiplexer? What is the function of a multiplexer's select input [2M]
- f Write the functions of a decoder and multiplexer [3M]
- g Differentiate between Latch and flip flop. [2M]
- h Draw the circuit diagram of Ring counter [3M]
- i Differentiate between RAM and ROM [2M]
- j What are PLAs and PALs? [3M]

PART-B (50 MARKS)**SECTION-I**

- 2 The binary numbers listed have a sign bit in the leftmost position and if negative numbers are in 2's complement form. Perform the arithmetic operations indicated and verify the answers. [10M]
 - (i) 101011 + 111000 (ii) 001110 + 110010 (iii) 111001 – 001010
 - (iv) 101011 – 100110

OR

- 3 i) Simplify $A(B+C)+AB+ABC$ [10M]
- ii) Write the truth table and symbols of AND and OR gates

SECTION-II

- 4 i) Reduce the following function using K-Map. [10M]
 $F(A,B,C,D,E) = \sum m(1,4,8,10,11,20,22,24,25,26) + d(0,12,16,17)$
- ii) Write down the procedure to convert a given AND-OR gate network to all NAND gate network and illustrate with an example.

OR

- 5 Realize the following function with i) Multilevel NAND-NAND network and [10M]
 - ii) Multilevel NOR-NOR network.
- $$Y = A B + B C + D + E F (B + D)$$

SECTION-III

6 What is a combinational logic circuit? Implement a Full adder using two half adders and one OR gate. [10M]

OR

7 Implement 4*16 decoder using two 3*8 decoders. [10M]

SECTION-IV

8 What is the drawback of JK flip flop, design a flip flop which overcomes this drawback and explain with neat diagram [10M]

OR

9 Draw the circuit diagram of a 4-bit binary counter with parallel load and explain its working with its function table [10M]

SECTION-V

10 Explain different types ROMs. [10M]

OR

11 Implement the following Boolean functions using PLA with 3 AND gates. [10M]
 $F1(ABC) = \Sigma(3,5,7)$, $F2 = \Sigma(4,5,7)$.

Code No: R15A0503

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22**Mathematical Foundation of Computer Science****(CSE & IT)**

Roll No									

Time: 3 hours**Max. Marks: 75****Note:** This question paper contains two parts A and B

Part A is compulsory which carries 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question From each SECTION and each Question carries 10 marks.

PART-A (25 Marks)

- 1). a Define tautology with example. [2M]
- b Define Bijective function with an example. [3M]
- c Let $F:R \rightarrow R$ be given by $f(x) = x^3 - 2$ find f^{-1} [2M]
- d Find the coefficient of $x^3 y^2 z^2$ in $(2x - y + z)^7$. [3M]
- e What is meant by Rooted tree [2M]
- f Find the sequence generated by the generating function $(2x - 3)^3$ [3M]
- g Define Hamilton cycle [2M]
- h Solve recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$, $a_0 = 10$, $a_1 = 41$. [3M]
- i Define isomorphism. [2M]
- j Define Euler circuit and planar graph [3M]

PART-B (50 MARKS)**SECTION-I**

- 2 Show that 't' is a valid conclusion from the following premises $p \rightarrow q$, $q \rightarrow r$, $r \rightarrow s$, $\sim s$ and $p \wedge t$ [10M]

OR

- 3 Obtain Product of sum of the following formulas (i) $(P \wedge Q \wedge R) \vee (\sim P \wedge R \wedge Q)$ [10M]
 $\vee (\sim P \wedge \sim Q \wedge \sim R)$ (ii) $P \vee (\sim P \rightarrow (Q \vee (\sim Q \rightarrow R)))$

SECTION-II

- 4 Draw the Hasse diagram for $X = \{2, 3, 6, 24, 36, 48\}$ and relation \leq be such that $x \leq y$, if x divides y. [10M]

OR

- 5 1. Let $X = \{1, 2, 3\}$ and f, g, h & s are the functions from X to X given by f = $\{(1, 2), (2, 3), (3, 1)\}$ [10M]
g = $\{(1, 2), (2, 1), (3, 3)\}$
h = $\{(1, 1), (2, 2), (3, 1)\}$
s = $\{(1, 1), (2, 2), (3, 3)\}$

Find $f \circ g$, $g \circ f$, $f \circ h \circ g$, $s \circ g$, $g \circ s$, $s \circ s$, $f \circ s$, $f \circ h$, $f \circ s \circ h$, $f \circ f$

SECTION-III

6 a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and other 3 will have 5 books each? [5M]

b) Using multinomial theorem, expand $(2X-3Y+4Z)^3$ [5M]

OR

7 Illustrate pigeon hole principle and its applications [10M]

SECTION-IV

8 Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2} = 0$ for $n \geq 2$ where $a_0 = 1$, $a_1 = 2$ [10M]

OR

9 Find the recurrence relation and initial condition for the sequence 2, 10, 50, 250 and also find general term [10M]

SECTION-V

10 Explain and illustrate BFS and DFS with examples [10M]

OR

11 a). Write an algorithm for depth first search spanning tree. [5M]

b). Define chromatic number and explain it with four examples. [5M]

Code No: **R15A0024****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

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II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22**Probability and Statistics**

(CSE & IT)

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PART-A (25 Marks)

- 1). a Prove that correlation coefficient is the geometric mean of the two regression coefficients. [2M]
- b Define [3M]
- i) Sample Space
- ii) Conditional probability
- c Define a random variable. [2M]
- d The mean and variance of a binomial distribution are 4 and $4/3$ respectively. Find n. [3M]
- e Find the value of finite population correction factor for $n=10$ and $N=1000$. [2M]
- f Define the Type-I and Type -II Errors. [3M]
- g Define degrees of freedom. [2M]
- h Define Chi-Square distribution. [3M]
- i Define mean arrival rate in the Queuing Theory. [2M]
- j Write a regular Markov Chain. [3M]

PART-B (50 MARKS)**SECTION-I**

- 2 Calculate the rank Correlation Coefficient for the following data [10M]

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

OR

- 3 In a bolt factory, machines A,B and C manufacture 25%,35% and 40% of the total of their output 5%,4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective .What are the probabilities that it was manufactured by machine A,B and C [10M]

SECTION-II

- 4 A Continuous random variable has the p.d.f [10M]

$$f(x) = \begin{cases} k(1-x^2) & \text{if } 0 \leq x \leq 1 \\ 0 & , \text{ otherwise} \end{cases}$$

Determine

- i. K ii. Mean iii. Variance

OR

- 5 Derive Mean and Variance of Binomial distribution [10M]

SECTION-III

- 6 A population consists of four numbers 2,3,4,5 .Consider all possible samples of size two that can be drawn with replacement from this population. Find [10M]

- i) The population Mean
- ii) The population standard deviation
- iii) The mean of the sampling distribution of means

OR

- 7 An ambulance service claims that it takes on the average less than 10 minutes to reach its destination 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 significance. [10M]

SECTION-IV

- 8 What is the size of smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence [10M]

OR

- 9 Explain briefly the Variance Ratio test (or F-test) and write it's properties [10M]

SECTION-V

- 10 A fast food restaurant has one drive-in window .It is estimated that cars arrive according to a Poisson Distribution at the rate of 2 every 5 minutes and that there is enough space to accommodate a line of 10 cars. Other arriving cars can wait outside the space,if necessary .It takes 15 minutes on an average to fill an order, but the service time actually varies according to an exponential distribution. Determine the following [10M]

- a) The probability that the facility is idle.
- b) The expected number of customers waiting to be served.

OR

- 11 A training process is considered as a two state Markov Chain. If it rains, it is considered to be in state '0' and if doesn't rain, the chain is in the state of '1'. The transition probability of the Markov Chain is defined by [10M]

$$P = \begin{pmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{pmatrix}$$

Find the probability that it will rain for 3 days from today assuming that it is raining today. Assume that the mutual probability of state 0 or state 1 as 0.4 and 0.6 respectively.

Code No: R15A0401

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22**Electronic Devices and Circuits**

(ECE, CSE & IT)

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PART-A (25 Marks)

- 1). a Define Depletion region and explain how the p-n junction formed [2M]
- b List the applications of Varactor diode [3M]
- c Derive expression for the efficiency of a Half wave rectifier circuit [2M]
- d What is Zener breakdown [3M]
- e Explain how transistor works as an amplifier [2M]
- f Draw H-parameter model of a CE transistor [3M]
- g What is need for biasing a transistor? [2M]
- h Derive the stability factor for S and S' for fixed bias circuit [3M]
- i Write the applications of JFET [2M]
- j Why are n-channel MOSFETs preferred over P-channel MOSFET? [3M]

PART-B (50 MARKS)**SECTION-I**

- 2 Derive the expression for diffusion capacitance in PN junction [10M]
OR

- 3 Explain the operation of varactor diode with neat diagram [10M]

SECTION-II

- 4 Determine the rating of a transformer to deliver 125 watts of dc power to a load [10M]
for the following. (i) Half wave rectifier. (ii) Full wave rectifier (iii) Bridge
rectifier

OR

- 5 Compare and contrast Zener breakdown and Avalanche breakdown [10M]

SECTION-III

- 6 Compare AV, AI, Ri and Ro of CE, CB and CC configurations [10M]
OR

- 7 Give the approximate H-parameter conversion formulae for CC and CB [10M]
configuration in terms of CE.

SECTION-IV

- 8 In a silicon transistor with a fixed bias, $V_{cc} = 9\text{ V}$, $R_c = 3\text{ k}\Omega$, $R_B = 8\text{ k}\Omega$, $\beta = 50$, $V_{BE} = 0.7\text{ V}$. Find the operating point and stability factor [10M]

OR

9 What is thermal runaway? Derive relevant expressions to obtain thermal stability [10M]

SECTION-V

10 Explain the four distinct regions of the output characteristics of JFET [10M]

OR

11 Derive the expressions for Z_i , Z_o and A_v for common drain J-FET amplifier [10M]
