

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, April 2023**Data Structures using C++**

(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 space complexity? [2M]
- b Illustrate Bubble sort with an example. [3M]
- c List the properties of binary trees? [2M]
- d What is the use of threaded binary tree? [3M]
- e Demonstrate Insertion of elements into a Max Heap. [2M]
- f What are the applications of priority queues? [3M]
- g Interpret hash function? [2M]
- h Explain Rehashing in detail [3M]
- i What are the applications of graphs? [2M]
- j Define adjacency matrix [3M]

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

- 2 Explain asymptotic notations in detail. [10M]
- OR

- 3 Illustrate linear and non linear data structures with examples. [10M]

SECTION-II

- 4 Discuss Stack ADT and its operations. [10M]
- OR

- 5 Explain circular queue and its operations. [10M]

SECTION-III

- 6 Discuss Implementation of max priority queue ADT. [10M]
- OR

- 7 Write a short note on Multiway merge and Polyphase merge. [10M]

SECTION-IV

- 8 Explain Merge Sort algorithm with the help of an example? [10M]
- OR

- 9 Illustrate binary search algorithm with an example. [10M]

SECTION-V

- 10 Explain in detail deletion of an element in Binary Search Tree in different cases? [10M]

OR

- 11 Describe AVL trees and explain its operations in detail. [10M]

Code No: R15A0505**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)****II B.Tech I Semester Supplementary Examinations, April 2023****Principles of Programming Languages****(CSE)**

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 Left Recursive Grammar Rule. [2M]
- b What is Lexeme and Token. [3M]
- c Define Binding and Binding Time. [2M]
- d What is a dangling pointer? [3M]
- e Define pass-by-result and pass-by-value-result parameter passing methods. [2M]
- f Write notes on short-circuit evaluation. [3M]
- g How message passing is implemented in Ada? [2M]
- h Describe briefly about Monitors. [3M]
- i What is imperative language. [2M]
- j Compare functional and imperative Languages. [3M]

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

- 2 a).Explain in detail about language evaluation criteria. [5M]
- b).Discuss in detail about programming paradigms. [5M]

OR

- 3 a).Write BNF notation for if-else statements. [5M]
- b).List and explain different phases of compilation process. [5M]

SECTION-II

- 4 a).Explain various primitive data types with suitable examples. [5M]
- b).Explain Categories of Arrays. [5M]

OR

- 5 a).Discuss about type-checking. [5M]
- b).Define name and structure type compatibility. What are relative merits of these two? [5M]

SECTION-III

- 6 a).Briefly discuss design issues of functions. [5M]
- b).Explain about different mechanisms to implement polymorphism in C++. [5M]

OR

- 7 a).Explain about control structures. [5M]
- b).Explain different types of parameter passing techniques. [5M]

SECTION-IV

8 Explain Thread class in JAVA and its methods. [10M]
OR

9 What is exception handling? How exceptions are handled in C++ and JAVA. [10M]

SECTION-V

10 a).Explain about Logic programming. [5M]
b).Write about functional forms in LISP. [5M]

OR

11 a).Explain the Basic elements of Prolog. [5M]
b).What are the applications of logic programming? Explain. [5M]

Code No: R15A0503

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

II B.Tech I Semester Supplementary Examinations, April 2023
Mathematical Foundation of Computer Science
(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 Write a note on Tautology with an example. [2M]
- b Write the converse and contrapositive of the statement: "If P is a square, then P is a rectangle". [3M]
- c Give suitable examples for a relation which is not equivalence relation. [2M]
- d What do you mean by isomorphism? Give examples of isomorphic graphs. [3M]
- e State principle of inclusion. [2M]
- f Give any three applications of Pigeonhole principle. [3M]
- g What is homogeneous recurrence relation? [2M]
- h Write the characteristic equation for the following recurrence relation. [3M]
- i What is a planar graph? Give examples of planar and non-planar graphs. [2M]
- j Give an example graph which is Hamiltonian but not Eulerian. [3M]

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

- 2 Show that the following is inconsistent $P \rightarrow Q, R \rightarrow S, P \vee R, \sim (Q \vee S)$. [10M]
- OR

- 3 Find the formulas in Disjunctive Normal Form equivalent to the following well formed formulas. [10M]
- $$(\neg R) \rightarrow (((P \vee Q) \rightarrow R) \rightarrow \neg Q)$$

SECTION-II

- 4 Explain properties of binary relations with examples. [10M]
- OR

- 5 Compute the transitive closure of the relation. [10M]
- $$R = \{(1,1), (1,2), (1,3), (2,3), (3,1)\}$$
- defined over a set
- $S = \{1,2,3\}$
- .

SECTION-III

- 6 Write the 3-combinations and 3-permutations of $\{3.a, 2.b, 1.c, 3.d\}$. [10M]
- OR

- 7 How many ways are there to distribute 12 different books among 15 people if no person is to receive more than one book? [10M]

SECTION-IV

- 8 Find a generating function for the recurrence relation [10M]
- $$a_n - a_{n-1} + 6a_{n-2} = 0 \text{ For } n \geq 2.$$

OR

9 Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$ for $n \geq 2$. [10M]

SECTION-V

10 State and explain graph coloring problem. Give its applications. [10M]

OR

11 Show that the complete bi-partite graph $K_{3,3}$ is not planar graph [10M]

Code No: R15A0401

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

II B.Tech I Semester Supplementary Examinations, April 2023

Electronic Devices and Circuits

(ECE & CSE)

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 Draw the ideal diode model for forward and reverse bias. [2M]
- b Compare the V-I Characteristics of Ideal diode and non-ideal diode. [3M]
- c Draw the circuit diagram of half wave rectifier. [2M]
- d Draw the block diagram of the regulated power supply. Name the function of each block. [3M]
- e Enumerate the operating regions of a transistor. In which regions it operates like a switch. [2M]
- f The operating point of a Class B amplifier is located at which portion in the load line. What is its maximum efficiency? [3M]
- g What do you mean by Thermal runaway? [2M]
- h List out the advantages of self-biasing circuit? [3M]
- i Draw the drain characteristics of JFET [2M]
- j Mention three different regions of operation of MOSFET. In which region MOSFET acts as resistor? [3M]

PART-B (50 MARKS)

SECTION-I

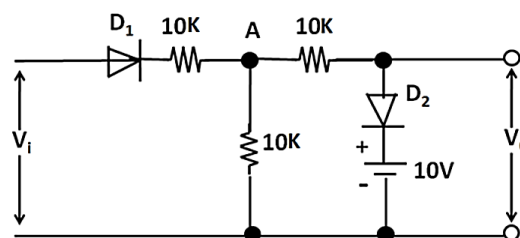
- 2 Construct a PN-junction diode and illustrate the formation of the depletion region in a p-n junction. How does the width of this region change when the junction is: (i) Forward biased (ii) Reverse biased. At the temperature of 27°C, calculate the thermal voltage. [10M]

OR

- 3 Define static and dynamic resistance of a junction diode. Derive an expression for dynamic resistance. [10M]

SECTION-II

- 4 [10M]



Consider the diode circuit shown in Fig. Sketch V_o if $V_i = 40 \sin \omega t$.

Indicate all voltage levels. Assume that all diodes are ideal.

OR

- 5 Explain the working principle and operation of centre tapped transformer based full wave rectifier. [10M]

SECTION-III

- 6 Draw and explain input and output characteristics of an NPN transistor in CE configuration. Suppose the base current is $100\mu\text{A}$ and I_{CO} is 0.5mA . Calculate the collector and emitter currents for CE configuration. Assume $\alpha=0.9$. [10M]

OR

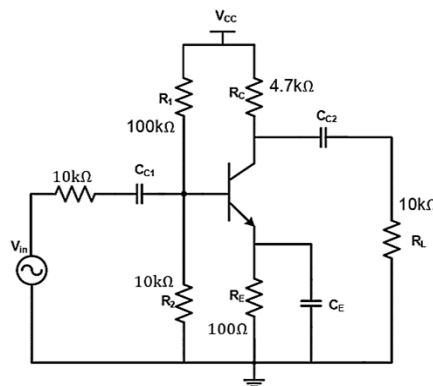
- 7 Develop hybrid model for transistor in CE configuration. [10M]

SECTION-IV

- 8 Derive the expressions for operating point and stability factor of voltage divider bias method. [10M]

OR

- 9 For the amplifier shown in the Figure below, assume $h_{ie} = 1\text{K}\Omega$ and $h_{fe} = 100$. Also $h_{oe} = h_{re} = 0$. Find A_v , A_{vS} , R_i and R_o . Assume all capacitors to be short circuit. [10M]



to be short circuit.

SECTION-V

- 10 Explain the operation of N-channel enhancement MOSFET and draw its I_D - V_{DS} characteristics. [10M]

OR

- 11 Explain the transfer and drain characteristics of Junction Field Effect Transistor. [10M]

Code No: R15A0461

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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II B.Tech I Semester Supplementary Examinations, April 2023

Digital Logic Design

(CSE)

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 Prove that $ABC + ABC' + AB'C + A'BC = AB + AC + BC$ [2M]
- b Find the complement of the $F = x'yz' + x'y'$ applying Demorgan's theorem. [3M]
- c What are the universal gates? Why they are called universal gate? [2M]
- d Minimize the following Boolean function using K-map: [3M]
 $F(A, B, C, D) = \sum m(0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$
- e List the steps involved in design procedure of combinational circuits. [2M]
- f Differentiate between combinational and sequential circuits. [3M]
- g What is race condition? How it can be avoided? [2M]
- h Convert JK Flipflop to T Flipflop. [3M]
- i Compare PAL and PLA. [2M]
- j Write a note on EEPROM memory. [3M]

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

- 2 Using the basic Boolean formulas, prove that the expression on the left side equals the expression on the right:
 - (i) $(x + y)(x'z' + z)(y' + xz)' = x'y$ [5M]
 - (ii) $(x + y)(x' + z) = xz + x'y$ [5M]

OR
- 3
 - (i) Find the 16's complement of B2FA
 - (ii) Convert B2FA to binary [2M]
 - (iii) Find the 2's complement of the result in (ii)(above result) [3M]
 - (iv) Convert the answer in (iii) to hexadecimal and compare with the answer in (i). [2M]

SECTION-II

- 4 For the following function determine the minimal sum and minimal product and also identify the essential prime implicants and implicants: [10M]
 $f(w, x, y, z) = \sum m(0, 1, 2, 4, 5, 7, 9, 12) + d(8, 11)$
- 5 With the use of maps, find the simplest sum-of-products form of the function $F = fg$ and draw corresponding logic diagram where [10M]

$$f = abc' + c'd + a'cd' + b'cz' \text{ and}$$

$$g = (a + b + c' + d')(b' + c' + d)(a' + c + d')$$

SECTION-III

- 6 Define Multiplexer. Use 2×1 multiplexer to implement the logic function: [10M]

$$F(A, B, C, D) = \sum m(1, 2, 4, 7, 9, 11, 13, 15)$$

OR

- 7 Write the truth table of 3 bit gray to binary code conversion show the realization using 2:1 MUXs [10M]

SECTION-IV

- 8 Explain the operation of JK Master-Slave flip-flop with the help of a circuit diagram, symbol and truth table. [10M]

OR

- 9 Design 4-bit ring counter and explain its working with the help of timing diagram. [10M]

SECTION-V

- 10 Explain the read and write operations of memory unit with the help of timing waveforms. [10M]

OR

- 11 Implement the following function using PAL:

$$f1(x, y, z) = \sum m(1, 2, 4, 6, 7),$$

[3M]

$$f2(x, y, z) = \sum m(2, 4, 5, 6),$$

[3M]

$$f3(x, y, z) = \sum m(1, 4, 6)$$

[4M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, April 2023

Probability and Statistics

(CSE)

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) What is meant by central tendency & what are the measures of it ? **2M**
 b) Verify whether poisson distribution is probability mass function. **3M**
 c) Give the definition of Spearman rank correlation coefficient **2M**
 d) Write the fitting procedure of a straight line $y = a + bx$ **3M**
 e) Write a short notes on Null and alternative hypothesis, type I and type II errors **2M**
 f) What is meant by one tailed and two tailed tests **3M**
 g) Define power of test & standard error **2M**
 h) What is the use of F-test **3M**
 i) What are the characteristics of Queueing system **2M**
 j) Write a short notes on Gaussian random process **3M**

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

2.A random variable X has following probability distribution

X	0	1	2	3	4	5	6	7	8	9
P(X)	a	3a	5a	7a	9a	11a	13a	15a	17a	19a

(1) Determine 'a'

(2) Find(i) $P(x < 3)$ (ii) $P(x \leq 3)$ (iii) $P(x > 7)$ (iv) $P(2 \leq x \leq 5)$,

(v) Mean and variance of the distribution. [10M]

OR

3. Define Binomial distribution with example and find mean and variance of binomial distribution. [10M]

SECTION-II

4. A panel of two judges P and Q graded seven dramatic performances by independently awarding marks as follows.

Performance	1	2	3	4	5	6	7
Marks by P	46	42	44	40	43	41	45
Marks by Q	40	38	36	35	39	37	41

The eight performance was awarded 39 by judge P. What would be the expected marks awarded by judge Q for the same? [10M]

OR5. Fit a regression equation for the following data. Hence find Y when $X=25$ [10M]

X	0	5	10	15	20
Y	7	11	16	20	26

SECTION-III

6. A study of TV viewers was conducted to find the opinion about the mega serial “Ramayana”. If 56% of a sample of 300 viewers from south and 48% of 200 viewers from north preferred the serial, test the claim at 5% level of significance that i) there is a difference of opinion between south and north ii) “Ramayana” is preferred in the south. [10M]

OR

7. Explain briefly following i) Point estimation ii) Interval estimation iii) Maximum error of estimation. [10M]

SECTION-IV

8. Ten specimens of copper wires drawn from a large lot having the following breaking strengths (in kg) 518, 572, 570, 568, 572, 578, 572, 569, 548. Test whether mean breaking strengths of the lot may be taken to be 518kg weight. [10M]

OR

9. When the first proof of 392 pages of a book of 1200 pages were read, the distribution of printing mistakes were found to be as follows.

No. of mistakes in a page(x)	0	1	2	3	4	5
No. of pages	275	72	30	7	5	2

Fit a poisson distribution to the above data & test the goodness of fit. [10M]

SECTION-V

10. Patients arrive at a clinic according to a poisson distribution at the rate of 30 patients per hour. The waiting room does not accommodate more than 13 patients not including the one i.e, examine. Examination time per patient is exponential with mean rate 20 per hour. i) Find the effective arrival rate at the clinic ii) What is the probability that an arriving patient will not wait iii) What is the expected waiting time until the patient is discharged from the clinic. And State Kendal’s notation. [10M]

OR

11. a) A training process is considered as a two state Markov chain. If it rains, it is considered to be state in 0. If it does not rain, the chain is in the state of 1. The transition probability of the Markov chain is defined by $P \begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$. Find the probability of state 0 or 1 as 0.4 & 0.6 respectively. [5M]

b) Which of the following matrices are regular [5M]

i) $\begin{bmatrix} 1/3 & 0 \\ 1/3 & 1 \end{bmatrix}$ ii) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ iii) $\begin{bmatrix} 1/2 & 1/4 & 1 \\ 0 & 1/2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$
