



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

Sponsored by CMR Educational Society

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC - „A“ Grade - ISO 9001:2015 Certified) Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad – 500100, Telangana State, India.  
Contact Number: 040-23792146/64634237, E-Mail ID: [mrcet2004@gmail.com](mailto:mrcet2004@gmail.com), website: [www.mrcet.ac.in](http://www.mrcet.ac.in)

## DEPARTMENT OF INFORMATION TECHNOLOGY II B.TECH I SEMESTER R18 SUPPLEMENTARY PREVIOUS QUESTION PAPERS



## LIST OF SUBJECTS

<b>CODE</b>	<b>NAME OF THE SUBJECT</b>
<b>R18A0461</b>	<b>Analog and Digital Electronics</b>
<b>R18A1201</b>	<b>Computer Organization and Architecture</b>
<b>R18A0506</b>	<b>Discrete Mathematics</b>
<b>R18A0503</b>	<b>Data Structures</b>
<b>R18A0504</b>	<b>Operating Systems</b>
<b>R18A0024</b>	<b>Probability and Statistics</b>

Code No: R18A0461

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, June 2022****Analog and Digital Electronics****(CSE & IT)**

<b>Roll No</b>									
----------------	--	--	--	--	--	--	--	--	--

**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

\*\*\*

- 1a** Explain the formation of P-N Junction diode and its operation with the help of V-I Characteristics [10M]
- b** Determine the levels of reverse saturation current at temperatures of 35° C and 45° C for a junction which has  $I_o=30\text{nA}$  at 25° C. [4M]
- 2a** Explain the temperature dependence of V-I characteristics of P-N diode. [6M]
- b** A silicon diode has reverse saturation current of 30 nA at 300°K. Find the junction current when the applied voltage is (a) 0.7V forward bias and (b) 10V reverse bias. [8M]
- 3a** Draw input and output characteristics of an NPN transistor in CE configuration and explain [8M]
- b** Calculate the values of  $I_c$  and  $I_E$  for a transistor with  $\alpha_{dc}=0.99$  and  $I_{CBO}=5\mu\text{A}$ . Consider  $I_B$  is measured as  $20\mu\text{A}$  [6M]
- 4a** Explain how transistor works as an amplifier [8M]
- b** Compare CB, CE and CC Configurations in all aspects. [6M]
- 5a** i) Determine the value of base if  $(211)_b = (152)_8$  [5M]  
ii) illustrate the equation  $(AB+CD)'$  with NAND gates. [5M]
- b** Explain the properties of XOR gate. [4M]
- 6a** Explain in brief about Binary codes. [8M]
- b** Realize an 2 input EX-OR gate using minimum number of 2 input NAND gates [6M]
- 7a** Identify all the prime implicants and essential prime implicants of the following functions using K-Map.  $F(A, B, C, D) = \sum m(0,1,2,5,6,7,8,9,10,13,14,15)$  [7M]
- b** Simplify the following function F using don't care conditions d in product of sums form  $F = A'B'D + AB'C + B'C'D + AB'CD'$   
 $d = A'BD + BCD'$  [7M]
- 8a** Design a 4-bit Binary to Gray converter using basic gates [7M]
- b** Design the half adder circuit using NAND gates [7M]

\*\*\*\*\*

Code No: **R18A1201****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, June 2022****Computer Organization and Architecture****(IT)**

<b>Roll No</b>										
----------------	--	--	--	--	--	--	--	--	--	--

**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions  
All Questions carries equal marks.

\*\*\*

- 1 Develop Booth Multiapplication algorithm for  $(1011) X (1101)$ . [14M]
- 2 A. Evaluate the value of X from the following, [3M]
  - I.  $(9876)_{10} + (1E9C)_{16} = (X)_{10}$  [4M]
  - II.  $(11011.01)_2 + (1010.001)_2 = (X)_2$
- B. Explain division restoring and non restoring techniques in detail [7M]
- 3 Explain the internal units of 8086 microprocessor. [14M]
- 4 a) Explain addressing modes with examples [7M]  
b) Explain the Architecture of micro-programmed design [7M]
- 5 a) What are the demerits of associate mapping? [7M]  
b) How are the limitations of earlier techniques overcome in direct mapping? [7M]
- 6 Explain various semiconductor memory technologies. [14M]
- 7 Describe the DMA controller with neat diagram. [14M]
- 8 a) Describe the pipeline hazards. [7M]  
b) Explain how the pipeline performance is evaluated. [7M]

\*\*\*\*\*

Code No: R18A0506

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, June 2022****Discrete Mathematics**

(CSE &amp; IT)

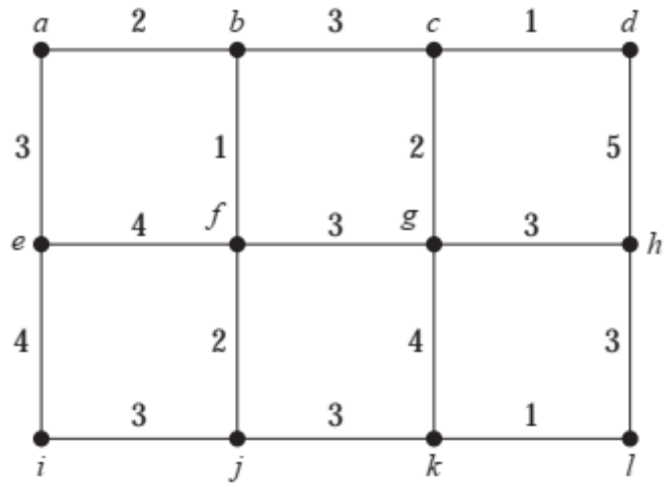
<b>Roll No</b>									
----------------	--	--	--	--	--	--	--	--	--

**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

\*\*\*

- 1** a. Show that  $S \vee R$  is Tautologically implied by  $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$  [7M]  
S) [7M]  
b. Prove the Logical Equivalence  $(P \rightarrow Q) \wedge [\neg Q \wedge (R \vee \neg Q)] \Leftrightarrow \neg(Q \vee P)$
- 2** a. Show that  $\neg \forall x(P(x) \rightarrow Q(x))$  and  $\exists x(P(x) \wedge \neg Q(x))$  are logically equivalent. [5M]  
b. Show that 't' is a valid conclusion from the following premises  $p \rightarrow q$ ,  $q \rightarrow r$ ,  $r \rightarrow s$ ,  $\neg s$  and  $p \vee t$  [9M]
- 3** a. Let  $f$  be the function from  $\{a, b, c\}$  to  $\{1, 2, 3\}$  such that  $f(a) = 2$ ,  $f(b) = 3$ , and  $f(c) = 1$ . Is  $f$  invertible, and if it is, what is its inverse? [7M]  
b. Let  $f$  be the function from  $\{a, b, c, d\}$  to  $\{1, 2, 3, 4\}$  with  $f(a) = 4$ ,  $f(b) = 2$ ,  $f(c) = 1$ , and  $f(d) = 3$ . Is  $f$  a bijection? [7M]
- 4** a. Let  $f$  be the function from  $\mathbb{R}$  to  $\mathbb{R}$  defined by  $f(x) = x^2$ . Find [7M]  
a)  $f^{-1}(\{1\})$   
b)  $f^{-1}(\{x \mid 0 < x < 1\})$ .  
c)  $f^{-1}(\{x \mid x > 4\})$ .  
b. Draw the Hasse diagram representing the partial ordering  $\{(a, b) \mid a \text{ divides } b\}$  on  $\{1, 2, 3, 4, 6, 8, 12\}$ . [7M]
- 5** Show that the set of all  $n^{\text{th}}$  roots of unity forms a group with respect to multiplication. [14M]
- 6** a. Prove that a subset  $S \neq \emptyset$  is a subgroup if for any pair of elements  $a, b \in S$ ,  $a * b^{-1} \in S$ . [7M]  
b. Prove that every cyclic group is abelian group. [7M]
- 7** Solve the recurrence relation  $a_n - a_{n-1} - 12a_{n-2} = 0$ , given that  $a_0 = 0$ ,  $a_1 = 1$ . [14M]
- 8** Use Prim's algorithm to find a minimum spanning tree in the weighted graph shown in Figure below. [14M]



\*\*\*\*\*

Code No: **R18A0503****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, June 2022****Data Structures****(CSE & IT)**

<b>Roll No</b>									
----------------	--	--	--	--	--	--	--	--	--

**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

\*\*\*

- 1 List various operations of singly linked list. Explain how to insert a node anywhere in the list and show how to delete a node in the list. [14M]
- 2 What is a circular linked list? Implement traversing, searching and insertion operations in it. [14M]
- 3 Write an algorithm to insert and delete a key from circular queue. Convert the following infix expression to postfix expression:  $((A-(B+C)*)/(E+F))$  [14M]
- 4 Explain the concept of priority queue. Construct max heap for the following: 140,80,30,20,10,40,30,60,100,70,160,50,130,110,120. [14M]
- 5 State and explain merge sort with an example. Evaluate time complexity and space complexity of an algorithm. [14M]
- 6 How to represent graphs and explain graph traversal methods DFS and BFS with suitable examples. [14M]
- 7 With suitable examples explain the concept of double hashing and rehashing. [14M]
- 8 Show how to insert and delete an element from binary search tree. Explain in-order traversal of threaded binary tree with an example. [14M]

\*\*\*\*\*

**Code No: R18A0504****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech I Semester Supplementary Examinations, June 2022****Operating Systems****(CSE & IT)**

<b>Roll No</b>									
----------------	--	--	--	--	--	--	--	--	--

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

Answer Any **Five** Questions  
All Questions carries equal marks.

\*\*\*

- 1 Explain in detail the types of system calls provided by a typical operating system. [14M]
- 2 What do you mean by a Thread? Explain the various types of threads. Also, explain the concept of Multi-threading with its benefits in detail. [14M]
- 3 What are the main objectives of Process Scheduling? Write about different types of Schedulers and Scheduling Criteria. Give an example of Round Robin Scheduling Algorithm. [14M]
- 4 Differentiate how Inter process Communication happens through Semaphores and Message Passing. [14M]
- 5 What is meant by Paging? What are the principles for Page allocation? Explain the details of hardware support for paging? What are the advantages and disadvantages of paging? [14M]
- 6 Compare the performance of Page replacement algorithms: Not Recently Used (NRU) and Least Recently Used (LRU). [14M]
- 7 Explain the use of directory organization of files. Explain in detail the implementation of Tree structured directory. [14M]
- 8 What is a Deadlock? Explain the optimal techniques for Deadlock prevention and avoidance. [14M]

\*\*\*\*\*



**Code No: R18A0024**

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, June 2022**

**Probability and Statistics**

**(CSE & IT)**

<b>Roll No</b>										
----------------	--	--	--	--	--	--	--	--	--	--

**Time: 3 hours**

**Max. Marks: 70**

Answer Any **Five** Questions  
All Questions carries equal marks.

\*\*\*

- 1 A random variable X has the following Probability function [14M]

X	-3	-2	-1	0	1	2	3
P(x)	k	0.1	k	0.2	2k	0.4	2k

Find i) k      ii) Mean      iii) Variance

- 2 For the continuous random variable X whose probability density function is given by [14M]

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

where C is constant  
Find C, mean and variance of X

- 3 It has been claimed that in 60% of all solar heat installations the utility bill reduced by at atleast one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in [14M]  
i)four of five installations    ii)atleast four of five installations

- 4 In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution. [14M]

- 5 Following are the rank obtained by 10 students in two subjects, Statistics and Mathematics. To what extent the knowledge of the students in two subjects is related? [14M]

Sstatistics	1	2	3	4	5	6	7	8	9	10
Mmathematics	2	4	1	5	3	9	7	10	6	8

- 6 If  $X=2Y+3$  and  $Y=KX+6$  are the regression lines of  $X$  on  $Y$  and  $Y$  on  $X$  [14M]  
respectively  
a) Show that  $0 \leq k \leq 1/2$  b) If  $k=1/8$  find  $r$  and  $(x, y)$
- 7 If the population is 3,6,9,15,27 [14M]  
a) List all possible samples of size 3 that can be taken without replacement from the finite population.  
b) Calculate the mean of each of the sampling distribution of means.  
c) Find the standard deviation of sampling distribution of means.
- 8 Experience had shown that 20% of a manufactured product is of the top quality. [14M]  
In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level.

\*\*\*\*\*