



# 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

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

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

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, February 2021****Digital Logic Design****(CSE & IT)**

<b>Roll No</b>									
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**Time: 2 hours 30 min****Max. Marks: 75**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 Find the 9's complement of decimal 6,248 and express it in 2421 code. Show that 2421 code is a self-complementing through finding the 1's complement of the above result. [15M]
- 2 Convert the following expression into sum of products and product of sums and draw the corresponding logic diagrams. [15M]  

$$x' + x(x + y')(y + z')$$
- 3 Find the SOP and POS forms of the following Boolean function using K-map: [15M]  

$$F(A, B, C) = \sum m(0, 2, 8, 9, 10, 15) + d(1, 3, 6, 7)$$
- 4 Implement the following four Boolean expressions using logic gates: [15M]  

$$D = A \oplus B \oplus C$$

$$E = A'BC + AB'C$$

$$F = ABC' + (A' + B')C$$

$$G = ABC$$
- 5 Describe the following with truth table and block diagram and convert [15M]
  - I. JK flip-flop to D flip-flop:
  - II. JK flip-flop to SR flip-flop
  - III. D flip-flop to T flip-flop
- 6
  - a. What is Full adder design and explain Full adder using two half adders. [10M]
  - b. Explain 2 to 4 decoder. [5M]
- 7 Design 10 bit synchronous counter using D-Flip flop [15M]
- 8
  - a). Explain the read and write operations of memory unit with the help of timing waveforms. [10M]
  - b) Write differences between ROM, PLA and PAL [5M]

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**Code No: R15A0504****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech I Semester Supplementary Examinations, February 2021****Data Structures using C++****(CSE & IT)**

<b>Roll No</b>									
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**Time: 2 hours 30 min****Max. Marks: 75**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 What is Heap Sort? Illustrate Heap sort procedure with example and write its Pseudo code in C++ [15M]
- 2 Write C++ program for Insertion sort? What is the Time complexity of Insertion sort? [15M]
- 3 Write a C++ Pseudo Code for Tree Traversing techniques? Discuss briefly about Tree Traversing Techniques with examples. [15M]
- 4 Write a C++ Program to implement Linked List using Template Classes. [15M]
- 5 What is External Sorting ?explain briefly about External sorting Algorithm with example [15M]
- 6 What is the Procedure of Multi Way Merge ? Discuss with neat example [15M]
- 7
  - a) What are the Differences between Linear Probing and Quadratic Probing? [6M]
  - b) What are the Types of Collision Resolution Techniques in Hashing? [9M]  
Explain it.
- 8
  - a) Discuss Graph elementary operations and its applications. [6M]
  - b) What is BFS? Discuss BFS Procedure with Neat Example. [9M]

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Code No: R15A0401

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, February 2021**

**Electronic Devices and Circuits**

**(ECE, CSE & IT)**

<b>Roll No</b>									
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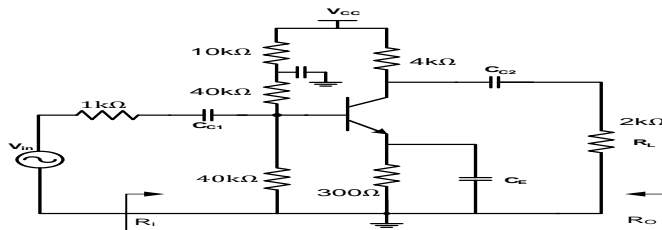
**Time: 2 hours 30 min**

**Max. Marks: 75**

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

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- 1 What is a p-n junction? Explain 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? Explain [15M]
- 2 Compare and contrast Zener breakdown and Avalanchebreakdown. [15M]
- 3 Draw the circuit diagram of full-wave centre tapped rectifier and explain its operation using input-output waveforms. [15M]
- 4 A full-wave bridge rectifier with a 120-Vrms sinusoidal input has a load resistor of 1 kΩ. [15M]
  - i) If silicon diodes are employed, what is the dc voltage available at the load?
  - ii) Determine the required PIV rating of each diode.
  - iii) Find the maximum current through each diode during conduction.
- 5 Explain input and output characteristics of transistor in CE configuration with neat diagram. [15M]
- 6 A transistor with  $h_{ie} = 1.1 K\Omega$ ,  $h_{fe} = 50$ ,  $h_{re} = 2.5 \times 10^{-4}$ ,  $h_{oe} = 25 \mu \frac{A}{V}$  is connected in C.E. configuration given in Figure below. Calculate :  $A_i = \frac{I_o}{I_i}$ ,  $A_{is} = \frac{I_o}{I_s}$ ,  $A_v$ ,  $A_{vs}$ ,  $R_i$  and  $R_o$  [15M]



- 7 Draw the circuit diagram of a self bias and derive expression for Stability factor. [15M]
- 8 Describe the construction and working principle of depletion mode MOSFET and draw its characteristics. [15M]

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Code No: R15A0503

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, February 2021****Mathematical Foundation of Computer Science****(CSE & IT)**

<b>Roll No</b>									
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**Time: 2 hours 30 min****Max. Marks: 75**

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

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- 1 Demonstrate the pdf of  $(p \wedge q) \vee (\sim p \vee r) \vee (q \vee r)$  [15M]
- 2 Show that  $R \wedge (P \vee Q)$  is a valid conclusion from premises  $P \vee Q$ ,  $Q \rightarrow R$ ,  $P \rightarrow M$  and  $\neg M$ . [15M]
- 3 A) If  $f: A \rightarrow B$ ,  $g: B \rightarrow C$  and  $h: C \rightarrow D$  are functions, then  $h \circ (g \circ f) = (h \circ g) \circ f$ . [8M]  
B) Show that the relation  $R$  is defined by  $N \times N$  by  $(a, b) \in R$ ,  $(c, d) \in R$  if and only if  $a+d=b+c$  is an equivalence relation [7M]
- 4 A) Let  $X = \{1, 2, 3, 4, 5, 6, 7\}$  and  $R = \{(x, y) / (x-y) \text{ is divisible by } 3\}$  in  $x$ . Show that  $R$  is an equivalence relation. [8M]  
B) Let  $A = \{2, 4, 8, 16, 32\}$ , draw the Hassediagram for  $R = \{(a, b) / b \text{ is divisible by } a\}$  [7M]
- 5 A) State and prove principle of inclusion and exclusion. [8M]  
B) A sample of 80 people revealed that 25 like cinema and 60 like television programmes, find the number of people who like both cinema and television programmes. [7M]
- 6 A) How many different arrangements of letters of "MISSISSIPPI"? [8M]  
B) In how many ways 28 different books can be given to 6 students, so that 2 of the students will have 4 books each and other 4 will have 5 books each? [7M]
- 7 Solve the recurrence relation  $a_n - 7a_{n-1} + 12a_{n-2} = 0$ , for  $n \geq 2$ . [15M]
- 8 What is minimum cost spanning tree? Explain Prims and Kruskals with an example. [15M]

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

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**II B.Tech I Semester Supplementary Examinations, February 2021****Probability and Statistics****(CSE & IT)**

<b>Roll No</b>									
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**Time: 2 hours 30 min****Max. Marks: 75**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 A random variable X has the following probability function [15M]

x	0	1	2	3	4	5	6	7
p(x)	0	K	2K	2K	3K	K <sup>2</sup>	2K <sup>2</sup>	7K <sup>2</sup> + K

Determine K (ii) Mean (iii) Variance

- 2 In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find [15M]
- (i) How many students score between 12 and 15?  
(ii) How many score above 18?  
(iii) How many score below 8?

- 3 Find coefficient of correlation between X and Y [15M]

X	1	2	3	4	5	6	7	8	9
Y	12	11	13	15	14	17	16	19	18

- 4 Price indices of cotton(X) and wool (Y) are given below for the 12 months of a year. Obtain the equations of lines of regression between the indices. [15M]

X	78	77	85	88	87	82	81	77	76	83	97	93
Y	84	82	82	85	89	90	88	92	83	89	98	99

- 5 A population consists of six numbers 4, 8, 12, 16, 20 and 24. Consider all possible samples of sizes two which can be drawn without replacement from this population. Find (i) The mean of the population (ii) The standard deviation of the population (iii) The mean of the sampling distribution of means (iv)The standard deviation of sampling distribution of means [15M]
- 6 A random sample of 400 items is found to have mean 82 and standard deviation of 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if  $\bar{x} = 82$ . [15M]
- 7 Two independent samples of 8 and 7 items respectively had the following values [15M]

Sample I	11	11	13	11	15	9	12	14
Sample II	9	11	10	13	9	8	10	-

Is the difference between the means sample significance?

- 8 A toll gate is operated on a frequency where car cars arrive according to a Poisson distribution with mean frequency of 1.2 cars per minutes. The time of completing payment follows an exponential distribution with mean of 20 seconds. **[15M]**  
Find (i) the idle time of the counter (ii) average number of cars in the system  
(iii) average number of cars in the queue (iv) average time that a car spends in the system.

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