# 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, website: www.mrcet.ac.in

## DEPARTMENT OF INFORMATION TECHNOLOGY

## II B.TECH I SEMESTER R17 SUPPLEMENTARY PREVIOUS QUESTION PAPERS

# LIST OF SUBJECTS

| CODE | NAME OF THE SUBJECT |
|---|---|
| R17A0510 | Computer Organization |
| R17A0504 | Data Structures using C++ |
| R17A0503 | Mathematical Foundation of Computer Science |
| R17A0024 | Probability and Statistics |
| R17A0401 | Electronic Devices and Circuits |
| R17A0461 | Digital Logic Design |

**R17**

**Code No: R17A0510**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech I Semester Supplementary Examinations, July/August 2021

**Computer Organization**

**(CSE & IT)**

| Roll No | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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

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

***

**1** a) What is the purpose of addressing modes? Explain various addressing mode techniques. **[7M]**
b) Design and explain 4-bit adder-subtractor and 4-bit arithmetic circuit to perform addition and subtraction using full adders. **[7M]**

**2** a) Explain the complete design of simple system to implement RTL code using direct connections, bus and tri-state buffers. **[7M]**
b) Design the bus system for 4 registers and explain the working of it? **[7M]**

**3** a) Explain the organizations of micro programmed control unit with neat sketch. **[7M]**
b) What is address sequencing? Explain the conditional branching and mapping of instruction in it. **[7M]**

**4** a) Explain micro sequencer organization with a neat sketch. **[7M]**
b) Discuss the following:
Computer configuration for micro program, Symbolic micro program and binary micro program. **[7M]**

**5** a) What are the different data transfer and data manipulation instructions and explain with example. **[7M]**
b) Design 4 bit Adder and Subtractor circuit and explain its operations. **[7M]**

**6** a) Write the Division algorithm and explain with an example. **[7M]**
b) Differentiate CISC and RISC microprocessors? Explain the architecture of CISC and RISC microprocessors **[7M]**

**7** a) Explain instruction execution in a 4 stage pipeline with flowchart. **[7M]**
b) What are the different major hazards in pipelined execution **[7M]**

**8** a) Draw a neat block diagram of memory hierarchy in a computer system. Compare the parameters size, speed and cost per bit in the hierarchy. **[7M]**
b) Explain ROM and RAM with respect to their block diagrams **[7M]**

**********

**R17**

**Code No: R17A0504**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech I Semester Supplementary Examinations, July/August 2021

**Data Structures using C++**

**(CSE & IT)**

| Roll No | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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

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

***

**1** a) Sort the following list of elements by using merge sort: **[7M]**

101, 56, 245, 389, 51, 678, 89, 9, 121, 3, 46, 712.

b) Write an algorithm for Fibonacci series. Calculate the running time complexity for using recursive function **[7M]**

**2** a) Distinguish between Linear search and Binary search **[7M]**

b) Implement linear and binary search using C++ **[7M]**

**3** Explain various operations of stack and implement it using C++. **[14M]**

**4** (a) Write a C ++ program to perform various operation of queue. **[7M]**

(b) Analyze an algorithm to convert an expression from infix to postfix notation. Convert ( ( A + B ) * C – ( D – E ) ) ^ ( F + G) to postfix expression. **[7M]**

**5** Explain about Priority Queue Insert(), Deletion() operations. Analyze the difference between the queues and priority queues. **[14M]**

**6** Examine the features of Extensible Hashing in data structures **[14M]**

**7** What is collision?. List the Collision avoidance techniques. **[14M]**

**8** Define the Graph. Explain the BFS and DFS algorithms with an example **[14M]**

**********

**R17**

**Code No: R17A0503**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech I Semester Supplementary Examinations, July/August 2021

**Mathematical Foundation of Computer Science**

**(CSE & IT)**

| Roll No | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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

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

***

**1** a) Identify whether the following Inference is valid or Invalid. If Invalid, state the fallacy **[7M]**

P→Q
Q→~R
R
P V (J ^ S)

_____
J ^ S

**[7M]**

b) Identify whether the following Inference is valid or Invalid.

"No professors are ignorant"
"All ignorant people are rain"
Therefore, "No professors are rain"

**2** a) Identify whether the following Inference is valid or Invalid. If Invalid, state the fallacy **[5M]**

P→~Q
R→Q
R→~P
---
~P

b) Let p, q, and r be the propositions **[9M]**
p: You have the flu.
q: You miss the final examination.
r: You pass the course.
Express each of these propositions as an English sentence.
a) p → q b) ¬q ↔ r c) q → ¬ r d) p ∨ q ∨ r

**3** Draw the Hasse diagram representing the divisibility relation on the set A={ 1,2,3,4,6,12,24}, and write their properties **[14M]**

**4** a) Discuss all the fundamental rules of Semingroups and monads. **[4M]**

b) Let A={a,b,c}.Draw the Hasse diagram representing the subset relation on the power set P(A) **[10M]**

**5** a) How many words with or without dictionary meaning can be formed using the letters of the word EQUATION so the vowel and consonant are side by side? **[7M]**

b) There are two books each of 5 volumes and two books each of two volumes. In how many ways can these books be arranged in a shelf so that the volumes of the same book should remain together? **[7M]**

**6** a) How many words can be formed by 3 vowels and 6 consonants taken from 5 vowels and 10 consonants? **[7M]**

b) How many different outcomes are possible by tossing 10 similar coins? **[7M]**

**7** Solve the recurrence relation **[14M]**

$$F_n = 10F_{n-1} - 25F_{n-2} \quad \text{where} \quad F_0 = 3 \quad \text{and} \quad F_1 = 17$$

**8** Explain DFS and BFS Graph traversal is the problem of visiting all the vertices of a graph in some systematic order **[14M]**

**********

**R17**

**Code No: R17A0024**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech I Semester Supplementary Examinations, July/August 2021

**Probability and Statistics**

**(CSE & IT)**

| Roll No | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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

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

***

**1** For the discrete probability distribution **[14M]**

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| F | 0 | 2k | 2k | 3k | $K^2$ | $2k^2$ | $7k^2+k$ |

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

**2** The probability that the life of a bulb for 100 days is 0.05. Find the probability that out of 6 bulbs (i) at least one (ii) greater than four (iii) none, will be having a life of 100 days. **[14M]**

**3** Find the coefficient of correlation between X and Y for the following data **[14M]**

| X | 10 | 12 | 18 | 24 | 23 | 27 |
|---|---|---|---|---|---|---|
| Y | 13 | 18 | 12 | 25 | 30 | 10 |

**4** Calculate the regression equations of Y on X from the data given below, taking deviations from actual means of X and Y. **[14M]**

| Price(Rs) | 10 | 12 | 13 | 12 | 16 | 15 |
|---|---|---|---|---|---|---|
| Amount Demanded | 40 | 38 | 43 | 45 | 37 | 43 |

Estimate the likely demand when the price is Rs.20.

**5** A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group there 150 students having mean IQ of 75 with S.D of 15 in the second group there are 250 students having mean IQ of 70 with S.D of 20. Is there is significance difference between the means of 2 groups. **[14M]**

**6** (a) Explain the five step procedure of testing of hypothesis. **[7M]**

(b) Define **[3M]**
(i) Type I and Type II errors
(ii) One tailed and two tailed test. **[4M]**

**7** A random sample of 10 boys had the following I.Q's 70,120,110,101,109 88,83,98,107 and 100. **[14M]**

(a) Do these data support the assumption of population mean I.Q of 100?

(b) Find a reasonable range in which most of the mean I.Q values of samples of 10 boys lie.

**8** A bank plans to open a single server drive-in banking facility at a certain centre. It is estimated that 25 customers will arrive each hour on average. If on average, it requires 3 minutes to process a customer's transaction , determine **[14M]**

(i) The proportion of time that the system will be idle,

(ii) On the average , how long a customer will have to wait before reaching the server,

(iii) The fraction of customers who will have to wait.

**************

**R17**

**Code No: R17A0401**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech I Semester Supplementary Examinations, July/August 2021

**Electronic Devices and Circuits**

**(EEE, ECE, CSE & IT)**

| Roll No | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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

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

***

| | | | |
|---|---|---|---|
| **1** | a) | How P-N junction acts as a diode? Explain it by taking different biasing conditions. | **[8M]** |
| | b) | Perform load line analysis of a PN-junction diode. | **[6M]** |
| **2** | a) | Describe the characteristics of tunnel diode with the help of a neat energy band diagrams. | **[8M]** |
| | b) | Explain the principle of operation and characteristics of a Photo Diode. | **[6M]** |
| **3** | a) | Draw the Half-wave Rectifier circuit and then explain its operation with a neat equivalent circuits and waveforms. | **[5M]** |
| | b) | Derive the expressions of Vavg, Vrms, Ripple factor, Conversion Efficiency and PIV for Half-wave Rectifier without filter. | **[9M]** |
| **4** | a) | Perform comparative analysis of various filters. | **[5M]** |
| | b) | Design Bridge rectifier circuit using L-section filter and then derive its ripple factor expression. | **[9M]** |
| **5** | a) | Illustrate and describe different current components of Bipolar Junction Transistor. | **[8M]** |
| | b) | Draw and explain the input and output characteristics of common base configuration. | **[6M]** |
| **6** | a) | Compare and contrast CE, CB and CC configurations in terms of current gain, voltage gain, input impedance and output impedance. | **[8M]** |
| | b) | The source and load resistances connected to a BJT amplifier in CE configuration are 680 Ω and 1 KΩ respectively. Compute $A_V$, $A_I$, $R_i$ and $R_O$, if the h-parameters are listed as $h_{ie}$ = 1.1 kΩ; $h_{re}$ = 2x $10^{-4}$, $h_{fe}$ = 50 and $h_{oe}$ = 20 mhos. | **[6M]** |

| | | | |
|---|---|---|---|
| **7** | a) | Analyse fixed bias circuit by deriving necessary equations. Also, give its advantages and disadvantages. | **[9M]** |
| | b) | What is the need to fix the operating point of a transistor? Explain. | **[5M]** |
| **8** | | Draw the basic structure and circuit arrangement of an n- channel Metal oxide Semiconductor Field Effect Transistor (MOSFET) in enhancement mode and depletion mode. Also, explain the drain and transfer characteristics of it in both those modes. | **[14M]** |

**************

**Code No: R17A0461** **R17**

# MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

**(Autonomous Institution – UGC, Govt. of India)**

## II B.Tech I Semester Supplementary Examinations, July/August 2021

**Digital Logic Design**

**(IT)**

| Roll No | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

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

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

***

**1** a) Convert the following to Decimal and then to Hexa decimal. (i) $(423416)_8$ (ii) $(100100112)_2$ **[8M]**

b) Obtain the truth table of the following Boolean function and express the function as sum of Min terms and product of maxterms F = (A+B) (B+C). **[6M]**

**2** a) Minimize the following Boolean function using k-map and realize using NAND gates F(A, B, C, D)= Σm(0, 2, 4, 6, 8, 10, 12, 14). **[8M]**

b) List the properties of EX-OR **[6M]**

**3** a) Simplify expression F(a,b,c,d) =π(1,3,6,9,13,14) + d(4,11,15) in POS form , construct two-level gate structure for the minimized function. **[8M]**

b) Write the advantages of Tabulation method over K-Map method **[6M]**

**4** a)Simplify F (A,B,C,D) = Σm( 1,3,5,8,9,11,15) + Σd (2,13). If don't care conditions are not taken into care what will be the simplified Boolean function? Write your comments on it. Implement both circuits using logic gates. **[8M]**

b) What is a karnaugh map? State the limitations of karnaugh map. **[6M]**

**5** a) Design D Flip Flop by using SR Flip Flop and draw the timing diagram **[8M]**

b) Write the differences between combinational and sequential circuits **[6M]**

**6** a)Design & implement BCD to Excess-3 code converter **[8M]**

b) Explain in brief about carry-look ahead adder **[6M]**

**7** a)Draw the circuit of JK flip flop using NAND gates and explain its operation **[8M]**

b) Draw the circuit diagram for 4 bit shift register with D flip flops. **[6M]**

**8** a)Obtain PLA realization of the following Functions **[8M]**

i) F1 = ∑ m (0,1,2,4,9,10,12,15) ii) F2 = ∑ m (0,2,3,4,9,12,14,15)

b)Name the components involved in ROM, give a simple example **[6M]**

**********