



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

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(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 R18 SUPPLEMENTARY PREVIOUS QUESTION PAPERS



LIST OF SUBJECTS

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

Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

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

- 1 Illustrate the working and characteristics of PN junction diode under forward bias and reverse bias with relevant diagrams, represent the static and dynamic resistance of the diode in the characteristic curve. [14M]
- 2
 - a) Describe the Diode Equivalent Circuits [8M]
 - b) Differentiate the Zener diode and PN diode [6M]
- 3 Explain working of transistor in common base configurations and draw its input and output characteristics, derive the expression for output current. [14M]
- 4
 - a) Derive relation between α , β and γ [6M]
 - a) Describe the working of PNP transistor [8M]
- 5
 - a) Convert $(1A05.2C4)_{16}$ into binary, decimal and octal [8M]
 - b) Simplify using postulates and theorems of Boolean algebra [6M]
 - i) $(X+Y'+XY)(X+Y')X'Y$
 - ii) $(AB+C+D)(C'+D)(C'+D+E)$
- 6 Perform the addition of two decimal numbers 9 and -4 using 2's complement method. [6M]
 - b) For each of the following expressions, construct the corresponding logic circuit using AND/OR/INVERT logic. [8M]
 - i) $Y = \overline{AB(C+D)}$
 - ii) $Z = \overline{\overline{W+PQ}}$
- 7 Obtain the minimal expression and also specify Prime Implicants and Essential Prime Implicants for the given expression using K-map method. [14M]
 $f(A,B,C,D) = \sum m(1,2,3,7,8,9,10,11,14,15)$ and draw the simplified logic diagram
- 8
 - a) Implement the full Subtractor circuit using half subtractor and justify with boolean expressions. [8M]
[6M]
 - a) Define race around condition? How it can be avoided?

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

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Regular/Supplementary Examinations, February
2021****Computer Organization and Architecture
(IT)**

Roll No									
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Time: 2 hours 30 min**Max. Marks: 70**Answer Any **Five** Questions
All Questions carries equal marks.

- 1 a) Draw and explain Von Neumann Architecture. [7M]
b) Perform the $(+21)+(-16)$ and $(-23)+(+13)$ arithmetic operations using 2's complement representation for negative numbers [7M]
- 2 a) Perform division of 1000 and 0011 using restoring division algorithm. [7M]
b) Explain ripple carry adder. [7M]
- 3 What are the different addressing modes used in assembly language instructions? [14M]
- 4 Explain in detail about the organization of micro program sequencer and how it is used for address sequencing in a micro programmed control unit [14M]
- 5 Explain various mapping procedures of cache memory with an example. [14M]
- 6 a) Differentiate static and dynamic RAMs [7M]
b) Discuss memory hierarchy with a neat diagram. [7M]
- 7 a) Demonstrate the mechanism of DMA [7M]
b) What is direct memory transfer? Give an overview and the block diagram of a DMA controller [7M]
- 8 What is Hazard? Explain structural hazards, data hazards and control hazards. [14M]

Code No: R18A0506

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

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

**Discrete Mathematics
(CSE & IT)**

Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

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

- 1 a** Define tautology and describe truth table for $P \rightarrow (Q \rightarrow R)$. [7M]
- b** Find DNF of $P \rightarrow ((P \rightarrow Q) \wedge \sim (\sim Q \vee \sim P))$ [7M]
- 2 a** Show that RVS is valid conclusion from the premises: $C \vee D$, $(C \vee D) \rightarrow \sim H$, $\sim H \rightarrow (A \wedge \sim B)$, $(A \wedge \sim B) \rightarrow R \vee S$ [7M]
- b** Identify whether $(P \vee Q) \vee \sim R$ is a tautology or not? [7M]
- 3 a** Define a relation? Explain the properties of relations and the operations on relations? [7M]
- b** What is partial order set and construct Hasse diagram for positive divisors of 36? [7M]
- 4 a** Define Lattice and explain its properties. [7M]
- b** Discuss equivalence relation with two suitable examples. [7M]
- 5 a** Explain about isomorphism with suitable example. [7M]
- b** List all the permutations on $A = \{a, b, c\}$. [7M]
- 6 a** How many arrangements are there for the word 'MISSISSIPPI' with no two pair of consecutive same letters? [7M]
- b** Prove that $H = \{0, 2, 4\}$ forms a subgroup of $(\mathbb{Z}_6, +)$. [7M]
- 7 a** Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$ $n \geq 2$, $a_0 = 10$, $a_1 = 41$. [7M]
- b** Solve the recurrence relation $a_{n+1} = 8a_n$, $n \geq 0$ where $a_0 = 4$. [7M]
- 8 a** Discuss about spanning trees and minimal spanning trees with suitable examples. [7M]
- b** Explain the terms weighted digraphs, region graph and chromatic numbers. [7M]

Code No: **R18A0503****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**
(Autonomous Institution – UGC, Govt. of India)**II B.Tech I Semester Regular/Supplementary Examinations, February 2021****Data Structures**
(CSE & IT)

Roll No										
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Time: 2 hours 30 min**Max. Marks: 70**Answer Any **Five** Questions
All Questions carries equal marks.

- 1 Define **Singly linked list**, discuss advantages of **Singly linked list**, disadvantages [14M]
of **Singly linked list** and also write a program to demonstrate various operations
such as creation, insertion, deletion and display of **Singly linked list** .
- 2 Differentiate **Singly linked list** and **doubly Linked List with** respect to [14M]
Traversing, Searching with the help of a neat diagram.
- 3 Define Stack , Queue,Priority Queue, heaps, compare linear queue with [14M]
priority queue, also discuss applications of Stack and Queue.
- 4 Discuss representation of Stack using Linked List and also write a program to [14M]
demonstrate implementation of Stack using linked list and perform the operations
insert, delete and display.
- 5 Differentiate between Linear Search and Binary Search, also write program on [14M]
Linear Search and Binary Search.
- 6 Discuss representation of graphs, graph traversal methods DFS and BFS [14M]
with suitable example.
- 7 What is the structure to represent node in a skip list? Write the constructor for [14M]
skip list. Explain skip list with suitable example.
- 8 Define and explain different AVL tree rotations in detailed manner. [14M]

Code No: **R18A0504****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech I Semester Regular/Supplementary Examinations, February 2021****Operating Systems****(CSE & IT)**

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Time: 2 hours 30 min**Max. Marks: 70**

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

- 1** What are the main differences between operating systems for mainframe computers and personal computers? **[14M]**
- 2**
 - a. What are system calls? Explain the different categories of the system calls. **[7M]**
 - b. What is the purpose of the command interpreter? Why is it usually separate from the kernel? **[7M]**
- 3**
 - a. Explain process states. **[7M]**
 - b. Explain the concept of semaphores. Illustrate with an example. **[7M]**
- 4**
 - a. Explain in detail Contiguous Memory Allocation. **[7M]**
 - b. What is synchronization? Explain its hardware **[7M]**
- 5**
 - a. Differentiate between internal and external fragmentation. **[7M]**
 - b. What is thrashing? What are the causes for thrashing? **[7M]**
- 6** Consider the reference stream 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults while using FCFS and LRU using 2 frames? **[14M]**
- 7** Explain the following i) file types ii) file operation iii) file attributes. **[14M]**
- 8** Suppose the head of a moving head disk with 200 tracks, numbered 0 to 199, is currently serving a request at track 55. If the queue of requests is kept in FIFO order: 86, 147, 91, 177, 94, 150, 102, 175,130. What is the total head movement to satisfy these requests for the following disk scheduling algorithms? **[14M]**

(a) FCFS (b) SCAN (C) C- SCAN

Code No: R18A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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II B.Tech I Semester Regular/Supplementary Examinations, February 2021

Probability and Statistics
(CSE & IT)

Roll No									
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Time: 2 hours 30 min

Max. Marks: 70

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

- 1** a) The Probability density function of a random variable X is [7M+7M]
- | | | | | | | | |
|-------|---|----|----|----|----|-----|-----|
| X : | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| P(X): | k | 3k | 5k | 7k | 9k | 11k | 13k |
- Find (i) $P(X < 4)$ (ii) $P(X \geq 5)$ (iii) $P(3 < X \leq 6)$.
- b) X is a continuous random variable with probability density function given by
- $$f(x) = \begin{cases} kx & (0 \leq x < 2) \\ 2k & (2 \leq x < 4) \\ -kx + 6k & (4 \leq x < 6). \end{cases}$$
- Find k and mean value of X.
- 2** a) A variate X has the probability distribution [7M+7M]
- | | | | |
|---------|-----|-----|-----|
| X : | -3 | 6 | 9 |
| P(X=x): | 1/6 | 1/2 | 1/3 |
- Find $E(X)$ and $E(X^2)$. Hence evaluate $E(2X+1)^2$.
- b) Find the expectation of number of tosses require when a coin is tossed until head appears or five tails occurs.
- 3** a) The mean and variance of a binomial variate X with parameters n and p are 16 and 8. Find $P(X=1)$. [7M+7M]
- b) A typist makes an average 2 mistakes per page. What is the probability of a particular page having no errors in it?
- 4** In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S. D. of the distribution. [14M]
- 5** Calculate the correlation coefficient for the following heights of fathers(X) and sons(Y): [14M]
- | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|
| X: | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 |
| Y: | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 |
- 6** Fit a linear regression equation of y on x to the following data: [14M]
- | | | | | | |
|----|---|---|---|---|---|
| X: | 5 | 8 | 7 | 6 | 4 |
| Y: | 3 | 4 | 5 | 2 | 1 |
- 7** Explain about types of sampling? [14M]

- 8** a) A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs.? [7M+7M]
- b) In a sample of 1000 people in Maharashtra 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance?
