



# 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 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>R18A0503</b>	<b>Data Structures</b>
<b>R18A0506</b>	<b>Discrete Mathematics</b>
<b>R18A0504</b>	<b>Operating Systems</b>
<b>R18A0024</b>	<b>Probability and Statistics</b>
<b>R18A1201</b>	<b>Computer Organization and Architecture</b>

Code No: R18A0461

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, July/August 2021****Analog and Digital Electronics****(CSE & IT)**

<b>Roll No</b>									
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**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 Illustrate the Quantitative theory of PN junction diode with no applied voltage or open circuit condition with relevant diagrams. [14M]
- 2
  - a) Describe the Break Down Mechanisms in lightly doped and heavily doped diodes [8M]
  - b) Explain difference between intrinsic and extrinsic semiconductors. [6M]
- 3 Explain working of transistor in common collector configurations and draw its input and output characteristics, develop the expression for output current. [14M]
- 4
  - a) Define and derive the relation between  $\beta$  and  $\alpha$  [6M]
  - b) Describe how the Transistor acts as an amplifier [8M]
- 5
  - a) Convert  $(101110.01101)_2$  into octal, decimal and Hexadecimal [6M]
  - b) State and prove Boolean theorems and properties. [8M]
- 6
  - a) Perform the subtraction of two decimal numbers 8 and 4 using 2's complement method. [6M]
  - b) Explain about Gray code. [4M]
  - c) Distinguish between Canonical and Standard Form [4M]
- 7 Simplify the following Boolean expressions using K- map and implement them using logic gates.
  - (a)  $F(A, B, C, D) = AB'C' + AC + A'CD'$  [7M]
  - (b)  $F(W, X, Y, Z) = W'X'Y'Z' + WXY'Z' + W'X'YZ + WXYZ$  [7M]
- 8
  - a) Implement a full adder using 8X1 multiplexer. [6M]
  - b) With the help of neat circuit diagram explain the working of JK flip flop and also explain how race around condition is eliminated in it. [8M]

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

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**II B.Tech I Semester Supplementary Examinations, July/August 2021****Data Structures****(CSE & IT)**

<b>Roll No</b>									
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**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 Define Circular Linked List, discuss advantages of Circular Linked List, disadvantages of Circular Linked List and also write a program to demonstrate various operations such as creation, insertion, deletion, search and display of Circular Linked List . [14M]
- 2 Differentiate Circular Linked List and Doubly linked list respect to Traversing, Searching with the help of a program. [14M]
- 3 Discuss representation of Circular Queue using Linked List and also write a program to demonstrate implementation of Circular Queue using linked list and perform the operations insert, delete and display. [14M]
- 4 Differentiate between Stack using Array and Queue using Array with the help of program. [14M]
- 5 Differentiate between Merge Sort and Heap Sort, also write program on Merge Sort and Heap Sort. [14M]
- 6 Write an algorithm for Depth First Search and derive its time complexity. [14M]
- 7 What is hashing? Explain the different hash table representations in detail. [14M]
- 8 Given the following input sequence, [14M]  
Input: 21,26,30,9,4,14,28,18,15,10,2,3,7. Construct the corresponding AVL tree by inserting each number one by one and show the required rotation after the insertion of an element, if the tree becomes imbalanced.

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Code No: R18A0506

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**II B.Tech I Semester Supplementary Examinations, July/August 2021**

**Discrete Mathematics**

**(CSE & IT)**

<b>Roll No</b>									
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Time: 3 hours

Max. Marks: 70

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

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- 1 a** Define converse, contrapositive and inverse of an implication. [7M]  
**b** Prove the Logical Equivalence  $(P \rightarrow Q) \wedge [\neg Q \wedge (R \vee \neg Q)] \Leftrightarrow \neg(Q \vee P)$  [7M]
- 2 a** Explain the use of predicates with suitable examples. [7M]  
**b** Show that  $R \rightarrow S$  can be derived from the premises  $P \rightarrow (Q \rightarrow S), (\neg R \vee P)$  and  $Q$ . [7M]
- 3 a** Discuss about properties of lattices, sub lattices and some special lattices with examples. [7M]  
**b** Differentiate between Lattices and partial ordered sets. [7M]
- 4 a** Construct the Hasse diagram for the divisibility relation  $A = \{3, 6, 12, 36, 72\}$ . [7M]  
**b** Let  $f(x) = x+2, g(x) = x-2, h(x) = 3x$  for all  $x \in R$  where  $R$  is set of Real Numbers then find  $g \circ f, f \circ g, h \circ f, f \circ (g \circ h)$  [7M]
- 5 a** Define semigroup and monoid. Give an example of a monoid which is not a group. Justify your answer. [7M]  
**b** Show that if eight people are in a room, atleast two of them have birthday that occur on the same day of the week. [7M]
- 6 a** Differentiate between homomorphism and isomorphism with suitable example. [7M]  
**b** In how many ways can we partition 12 similar coins into 5 numbered non-empty boxes? [7M]
- 7 a** Solve the recurrence relation using generating function  $a_n - 6a_{n-1} = 0$  for  $n \geq 1$  where  $a_0 = 1$  [7M]  
**b** Solve  $a_n - 5a_{n-1} + 6a_{n-2} = 0, a_0 = 0, a_1 = 1$ . [7M]
- 8 a** Explain the steps involved in deriving a spanning tree from given undirected graph using breadth-first search algorithm. [7M]  
**b** Prove that in any non-directed graph there is an even number of vertices of odd degree. [7M]

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Code No: **R18A0504****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

**II B.Tech I Semester Supplementary Examinations, July/August 2021****Operating Systems**

(CSE &amp; IT)

<b>Roll No</b>									
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**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 a. Explain about the components of modern computer system? [7M]  
b. What are three advantages and one disadvantage of multiprocessor systems? [7M]
- 2 a. Distinguish among following terminologies i) Multiprogramming [7M]  
systems ii) Multitasking Systems iii) Multiprocessor systems.  
b. Describe the actions taken by a kernel to context-switch between kernel-level threads. [7M]
- 3 Explain different types of CPU Schedulers.  
i. Preemptive and non preemptive scheduling [5M]  
ii. I/O bound and CPU bound [5M]  
iii. Scheduler and dispatcher [4M]
- 4 Five batch jobs A, B, C, D and E arrive at a computer center at almost at the same time. They have estimated running times of 10,6,2,4 and 8 minutes. Their priorities are 3,5,2,1 and 4 respectively, with 5 being the highest priority. For each of the following scheduling algorithm determine the turnaround time of each process and waiting time of each process. Ignore process switching overhead. Mention which algorithm results in minimal average waiting time. [14M]  
i) Round Robin  
ii) Priority scheduling  
iii) First come first served  
iv) Shortest job first.

For case i) Assume that system is multiprocessing, and each job gets its fair share of the CPU. (time quantum 2 minutes). For cases (ii), (iii) and (iv) assume that only one job runs at a time, until it finishes. All jobs are completely CPU bound.

- 5 Consider a swapping system in which memory consists of the following hole sizes in memory order: 12 KB, 4 KB, 24 KB, 15 KB, 9 KB, 7 KB, 10 KB, and 11 KB. Which hole is taken for successive segment requests of: (i) 14 KB (ii) 8 KB (iii) 5 KB for first fit, best fit, worst fit, and next fit approaches? [14M]

- 6** a. Describe the hardware implementation of a page table with translation Look-aside Buffer. [7M]
- b. What is virtual memory? Explain Suppose we have a demand paged memory. The page table is held in registers. it takes 8ms to service a page fault if an empty page is available or the replaced page is not modified, and 20ms if the replaced page is modified. memory access time is 100ns. Assume that the page to be replaced is modified 70% of the time. what is the maximum acceptable page fault rate for an effective access time of no more than 200ns? [7M]
- 7** Explain about the linear list and hash table data structures to implement a directory. [14M]
- 8** a. A system has 3 devices D1, D2 and D3 and 3 processes P1, P2, and P3. P1 is holding D1 and waiting for D3. P2 is holding D2 and waiting for D1. P3 is holding D3 and waiting for D2. Draw resource allocation graph and wait-for graph. Is the system in deadlock state or not? Explain. [7M]
- b. Is disk scheduling, other than FCFS scheduling, useful in a single-user environment? Justify your answer. [7M]

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Code No: **R18A0024**

**MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

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

**Probability and Statistics**

**(CSE & IT)**

<b>Roll No</b>									
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**Time: 3 hours**

**Max. Marks: 70**

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

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- 1**      a) The Probability function of a random variable X is **[7M]**  
           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  
           Find (i) The value of k    (ii) P(0 < X < 5)
- b) The frequency function of a continuous random variable is given by **[7M]**  
           f(x) = k x (2 - x),    0 ≤ x < 2.  
           Find the value of 'k' and mean value of x.
- 2**      a) A variate X has the probability distribution **[7M]**  
           x :      -3                      6                      9  
           P(X=x): 1/6                      1/2                      1/3  
           Find Variance of the distribution.
- b) Define random variable. Explain discrete and continuous probability **[7M]**  
           distributions with examples.
- 3**      a) A multiple choice questionnaire has 12 questions with 5 options A-E. **[7M]**  
           A student is completely unprepared and wrote the test. If test follows  
           binomial probability law, find  
           (i) Exactly two answers are correct  
           (ii) At least two answers are correct  
           (iii) More than 7 answers are correct.
- b) Define Poisson distribution. Obtain mean and variance of the **[7M]**  
           distribution.
- 4**      Define normal distribution and also explain the properties of normal **[14M]**  
           distribution.
- 5**              Find rank correlation coefficient between X and Y: **[14M]**  
           X:    60      62      64      62      68      62      70      64  
           Y:    91      72      68      72      72      68      72      68
- 6**      Obtain the equations of two lines of regression for the following data: **[14M]**



X:	65	66	67	67	68	69	70	72
Y:	67	68	65	68	72	72	69	71

- 7** a) A random sample of size 81 was taken whose variance is 20.25 and mean is 32, construct 98% confidence interval? [7M]
- b) Write the general procedure for testing of hypothesis? [7M]
- 8** a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. [7M]
- b) In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? [7M]

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

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

<b>Roll No</b>									
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**Time: 3 hours****Max. Marks: 70**Answer Any **Five** Questions

All Questions carries equal marks.

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- 1 a) What are the functional units of a computer system? Discuss in detail. [7M]  
b) Draw a flowchart for adding and subtracting two fixed point binary numbers where negative numbers are signed 1's complement presentation. [7M]
- 2 a) Multiply 7 and 3 using Booth's algorithm [7M]  
b) Differentiate between fixed point and floating-point representation [7M]
- 3 a) With a neat diagram explain X86 architecture. [7M]  
b) Explain arithmetic micro-operations. [7M]
- 4 Explain hardwired control unit and micro programmed control unit [14M]
- 5 Discuss the following  
a) Memory Interleaving [7M]  
b) characteristic of memory hierarchy [7M]
- 6 a) Explain LRU replacement LRU algorithm. [7M]  
b) Define cache memory. Explain advantages of cache memory. [7M]
- 7 a) Differentiate privileged and non-privileged instructions. [7M]  
b) List the functionalities of I/O interface. Draw and explain a combined input/output interface circuit? [7M]
- 8 a) What is cache coherence problem? Explain various protocols to handle it. [7M]  
b) Write about i) No-operations ii) instruction reordering iii) annulling [7M]

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