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

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

R18

Code No: R18A0461

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Analog and Digital Electronics

(CSE & IT)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1a Explain the construction and working of Zener diode and its characteristics. **[8M]**

b The reverse current of a semiconductor diode is measured as 25nA at 25^0C and as 75nA at a temperature T. Calculate T. **[6M]**

OR

2a Derive the diode current equation? **[10M]**

b For a Ge diode, the I0=2µA and the voltage of 0.26V is applied. Calculate the forward and reverse dynamic resistance values at room temperature. **[4M]**

SECTION-II

3a Draw the input & output characteristics of a NPN transistor in CB configuration & explain **[8M]**

b For a silicon, α=0.995 emitter current is 10mA & leakage current I_{C0}=0.5µA. Find I_C, I_B, β, and I_{CEO} **[6M]**

OR

4a Define α and β and derive the relationship between α and β. **[10M]**

b Calculate I_B and I_C for a transistor with I_E=2.5 mA, α=0.98 and I_{CBO}=10µA. **[4M]**

SECTION-III

5a Perform the following Number base conversions: **[8M]**

i. (63572)8 = () 10

ii. (101001101)2 = () 16

iii. (AE78)16 = () 10

iv. (967.54)10 = () 2

b Implement the following Boolean functions **[6M]**

(i) F = A (B +CD) +BC’ with NOR gates

(ii) F = (A +B)’ (CD +E) with NAND gates

OR

6 Expand

a. AB’+ABD’+A+ABC’D to minterms and maxterms. **[6M]**

b. (B’C’+D)’+D+BC+AD to three literals. **[4M]**

c. Without reducing, convert the following expressions to NOR logic (1+X) XZ **[4M]**

SECTION-IV

7a Reducing the Boolean expression using K –Map AB’C +B+BD’ ABD’ A’C **[6M]**

b Simply the expression ∏M (0,1,2,4,5,6,9,11,12,13,14,15) and implemented it in NOR logic **[8M]**

OR

8a	Obtain minimal expression for $f = \Sigma (6, 7, 8, 9) + d (10, 11, 12, 13, 14, 15)$ using 4 variable k-map.	**[6M]**
b	Design the following Boolean function using basic gates	
	a.) $F (A, B, C, D) = \Sigma m (1, 2, 5, 8, 6, 10,12,14)$	**[4M]**
	b.) $F (A, B, C, D) = \pi M (1, 2, 5, 6, 12)$	**[4M]**

SECTION-V

9a	What is SR flip-flop? Explain its operation and draw the truth table.	**[8M]**
b	Convert SR flip-flop to T & D flip-flop.	**[6M]**

OR

10a	Explain various methods of triggering a flip-flop	**[4M]**
b	Explain the working principle of JK Flip-flop using Logic diagram, Truth table, Excitation table and timing diagram.	**[10M]**

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R18

Code No: R18A0503

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Data Structures

(CSE & IT)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 Define data structure. Explain different types of data structures. Also perform deletion operation in circular linked list. **[14M]**

OR

2 Explain the searching, insertion and deletion operations of doubly linked list. **[14M]**

SECTION-II

3 Explain representation of arrays along with their advantages and disadvantages. Discuss about stack ADT concept with neat sketch. **[14M]**

OR

4 Discuss the basic operations performed on simple queue with an example. Find the equivalent prefix of : 8 6 3 + * 1 2 3 - / - **[14M]**

SECTION-III

5 Write a program to implement the binary search. Explain the procedure of binary search method with suitable example. **[14M]**

OR

6 Explain bubble sort technique with an example. And rearrange the following numbers using quick sort: 10,6,3,7,17,26,56,32,72. **[14M]**

SECTION-IV

7 Define hashing. What are the properties of good hash function? With necessary examples explain four different hashing techniques. **[14M]**

OR

8 Define collision. What is linear probing? The following keys 10,16,11,1,3,4,23 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k)= k mod 10 and linear probing. What is the resultant hash table? **[14M]**

SECTION-V

9 Define binary search tree. Discuss searching, insertion and deletion operations with neat sketch. **[14M]**

OR

10 How to calculate height of an AVL tree? Explain the operations of insertion, deletion and searching operations. **[14M]**

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R18

Code No: **R18A0506**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Discrete Mathematics

(CSE & IT)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 a. Show that each of these statements can be used to express the fact that there is a unique element x such that P (x) is true. **[7M]**
$\exists x P(x) \wedge \forall x \forall y (P(x) \wedge P(y) \rightarrow x = y)$

b. Show that $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences (Solve the Problem without using Truth Tables) **[7M]**

OR

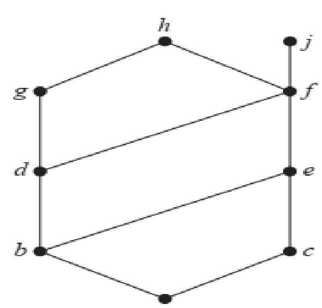
2 a. Show that each of these statements can be used to express the fact that there is a unique element x such that P (x) is true. **[7M]**
$\exists x \forall y (P(y) \leftrightarrow x = y)$

b. Show that $\neg \forall x (P(x) \rightarrow Q(x))$ and $\exists x (P(x) \wedge \neg Q(x))$ are logically equivalent (Solve the Problem without using Truth Tables). **[7M]**

SECTION-II

3 a. Let f be the function from {a, b, c, d} to {1, 2, 3} defined by f (a) = 3, f (b) = 2, f (c) = 1, and f (d) = 3. Is f an onto function? **[7M]**

b. Find the lower and upper bounds of the subsets {a, b, c}, {j, h}, and {a, c, d, f } in the poset with the Hasse diagram shown in Figure below. **[7M]**



OR

4 a. Let g be the function from the set {a, b, c} to itself such that g(a) = b, g(b) = c, and g(c) = a. Let f be the function from the set {a, b, c} to the set {1, 2, 3} such that f (a) = 3, f (b) = 2, and f (c) = 1. What is the composition of f and g, and what is the composition of g and f ? **[7M]**

b. Draw the Hasse diagram representing the partial ordering {(a, b)|a divides b} on {1, 2, 3, 4, 6, 8, 12}.

SECTION-III

5 Define Ring. Prove that Set of Integers of all Integers is a Ring with respect to Addition and Multiplication of Integers as the ring composition. **[14M]**

OR

6 Show that every cyclic group of order n is isomorphic to the group <Zn, tn>. **[14M]**

SECTION-IV

7 Solve the recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 2^n$ by the method of generating function with initial conditions $a_0 = 2$ and $a_1 = 1$. **[14M]**

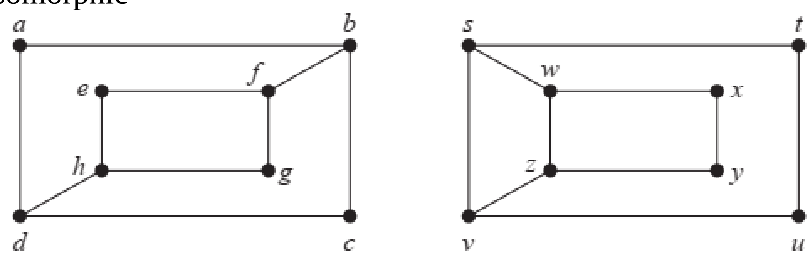
OR

8 Solve the recurrence relation $a_{n+2} + 2a_{n+1} - 15a_n = 6n + 10$, given that $a_0 = 1$, $a_1 = \frac{1}{2}$. **[14M]**

SECTION-V

9 a. A tree has two vertices of degree 2, one vertex of degree 3 and three vertices of degree 4. How many vertices of degree 1 does it have? **[7M]**

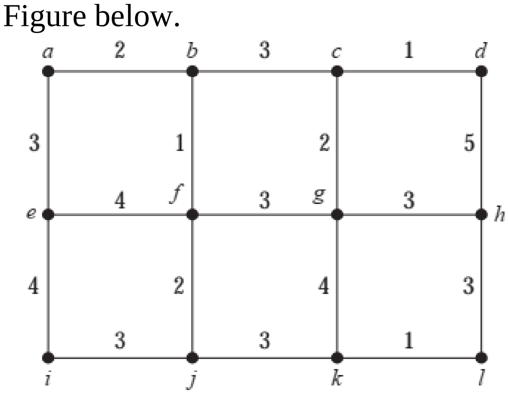
b. Determine whether the graphs G and H shown in the figure below are isomorphic **[7M]**



G H

OR

10 a. Use Kruskal's algorithm to find a minimum spanning tree in the weighted graph shown in Figure below. **[7M]**



b. Suppose that the function f from V1 to V2 is an isomorphism of the graphs G1 = (V1, E1) and G2 = (V2, E2). Show that it is possible to verify this fact in time polynomial in terms of the number of vertices of the graph, in terms of the number of comparisons needed. **[7M]**

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R18

Code No: R18A0504

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Operating Systems

(CSE & IT)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	What is an Operating System? Explain the types and services of operating system with examples.	**[14M]**
	OR	
2	Define a Process. Explain the different states of a Process, Process State transitions, and Process Control Block (PCB) in detail with a neat sketch.	**[14M]**

SECTION-II

3	Analyze which of the following algorithms could result in starvation: FCFS, SJF, and Priority. How to overcome the problem of starvation?	**[14M]**
	OR	
4	Explain Dining Philosopher's Problem in detail.	**[14M]**

SECTION-III

5	Write a detailed note on internal & external fragmentation and compaction.	**[14M]**
	OR	
6	Consider the following page reference strings:1,2,3,4,2,1,5,6,2,1,2,3,2,1,2,3,6 Identify how many number of page faults would occur for the LRU and Optimal Page replacement algorithm, assuming three frames. Remember that all frames are initially empty, so your first unique pages will cost one fault each.	**[14M]**

SECTION-IV

7	Explain the different file access methods in detail.	**[14M]**
	OR	
8	Write a detailed note on Device drivers and Device independent I/O software. Explain the use of directory organization of files. Explain in detail the implementation of Tree structured directory.	**[14M]**

SECTION-V

9	What is a Deadlock? Explain Banker's algorithm to avoid a Deadlock. What are the problems in its implementation?	**[14M]**
	OR	
10	Consider a disk queue with requests for I/O to blocks on cylinders 183, 37,122,14,124,65,67. If the disk head is start at 53, then find out the total head movement with respect to FCFS, SSTF, SCAN, C-SCAN and LOOK scheduling.	**[14M]**

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R18

Code No: R18A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Probability and Statistics

(CSE & IT)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 A random variable X has the following probability distribution. **[14M]**

X=x	1	2	3	4	5	6	7	8
P(X=x)	K	2k	3k	4k	5k	6k	7k	8k

Find

i) K
ii) Mean
iii) Variance
iv) $P(X \leq 2)$

OR

2 A Continuous Random variable has the p.d.f $f(x)=\begin{cases} kxe^{-\lambda x}, & x\geq 0, \lambda\geq 0 \\ 0, & \text{elsewhere} \end{cases}$ **[14M]**

Determine i. K ii. Mean iii. Variance

SECTION-II

3 If the Variance of Poisson Variate is 3. Find the probability that **[14M]**

i) $P(X=0)$
ii) $P(1\leq X<4)$
iii) $P(X>2)$

OR

4 In a Normal distribution, 7% of the items are under 35 and 89% are under 63. Determine the Mean and Variance of the distribution. **[14M]**

SECTION-III

5 Calculate the coefficient of correlation for the following data **[14M]**

X	9	8	7	6	5	4	3	2	1
Y	15	16	14	13	11	12	10	8	9

OR

6 For 20 army personal the regression of weight of Kidneys (Y) on weight of Heart (X) is Y=399X+6.394 and the regression of weight of heart on weight of kidneys is X=1.212Y + 2.461. Find the Correlation Coefficient between the two variables and also their means. **[14M]**

SECTION-IV

7 A population consists of five numbers 2,3,6,8 and 11.Consider all possible samples of size two which can be drawn with replacement from this population. **[14M]**

Find

a) The mean of the population
b) The standard deviation of the population
c) The mean of sampling distribution of means
d) The standard deviation of the sampling distribution of means

OR

8 A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs.487 with a standard deviation Rs.48. With what degree of confidence can we assert the average weekly salary of all teachers in the metropolitan area is between Rs.472 to Rs.502? **[14M]**

SECTION-V

9 Two types of new cars produced in U.S.A are tested for petrol mileage, one sample is consisting of 42 cars averaged 15kmpl .While the other sample consisting of 80 cars averaged 11.5 kmpl with population variances as $\sigma_1^2=2.0$ and $\sigma_2^2=1.5$ respectively. Test whether there is any significance difference in two petrol consumption of these two types of cars (use $\alpha=0.01$) **[14M]**

OR

10 In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in the state at 1% level of significance? **[14M]**

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R18

Code No: R18A1201

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech I Semester Supplementary Examinations, Dec-21/Jan-22

Computer Organization and Architecture

(IT)

Roll No										

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

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 a) Explain Fundamental blocks of a computer. **[7M]**
b) Design I/O Bus subsystems. **[7M]**

OR

2 Explain 4-bit ripple carry adder. **[14M]**

SECTION-II

3 a) Explain Flag register of 8086 microprocessor. **[7M]**
b) Compare the general-purpose registers with segment register. **[7M]**

OR

4 a) Explain the Architecture of Hardwired-programmed design **[7M]**
b) Distinguish micro-programmed architecture with hardwired-programming. **[7M]**

SECTION-III

[14M]

5 Illustrate Memory Interleaving technique with neat design.

OR

6 a) Explain the concept of data transfer from Main memory to CPU. **[7M]**
b) What is the need of cache memory? How the performance of cache memory is evaluated? **[7M]**

SECTION-IV

7 Explain programmed I/O interface with neat diagram. **[14M]**

OR

8 Define associating memory and explain various types of associating memory **[14M]**

SECTION-V

9 a)Design and explain basic structure of a pipeline. **[7M]**
b)What is the advantage of pipeline? **[7M]**

OR

10 Explain different types of Parallel processor architectures. **[14M]**

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