DEPARTMENT OF

INFORMATION TECHNOLOGY

II B.TECH I SEMESTER QUESTION BANK 2017-18

LIST OF SUBJECTS

CODE	NAME OF THE SUBJECT
R15A0503	Mathematical Foundation of Computer Science
R15A0504	Data Structures using C++
R15A0401	Electronic Devices and Circuits
R15A0024	Probability and Statistics
R15A0510	Computer Organization
R15A0461	Digital Logic Design

R15A0503

Mathematical Foundation
of Computer Science

R 15

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY
B.Tech II Year I Semester Examinations
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science Engineering and IT)

MODEL PAPER-I

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

      Part A is compulsory which carries 25 marks. Answer all questions in Part A.

      Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

1. a) Define Proposition with one example.   [2M]

    b) Write Short notes on normal forms.   [3M]

    c) Let F: R$\rightarrow$R be given by f(x) = x^3-2 find f^{-1} [2M]

    d) Let X= {1,2,3,4} Define a function f:X$\rightarrow$X. such that f$\neq$ I_x and is One – One   [3M]
       Find f^2, f^3, f^{-1}, fOf^{-1}

    e) Explain Binomial Theorem?   [2M]

    f) Find the coefficient of $X_1^2X_2^2X_3^2$ in $(2X-3Y+5Z)^{10}$ [3M]

    g) Find the generating functions for a_r= the number of non negative integral solutions of
      $e_1+e_2+e_3=r$ where $0\leq e_1\leq 3$, $2\leq e_2\leq 6$, e_3 is odd and $1\leq e_3\leq 9$ [2M]

    h) Solve the recurrence relation a_n= na_{n-1} for n≥1 where a_0=1   [3M]

    i) Define the following (a) Multi Graph (b) Complete Graph   [2M]

    j) Is $K_{2,3}$ is a complete bipartite Graph ?   [3M]

PART-B

2. What is logical deduction? Show that 't' is a valid conclusion from the following premises p$\rightarrow$q, q$\rightarrow$r, r$\rightarrow$s, ~s and p$\wedge$t

<div align="center">OR</div>

3. What do you mean by A$\Rightarrow$B. Show that the following implication without constructing truth table

      (i) (p$\rightarrow$q) $\rightarrow$q $\Rightarrow$(pVq)

      (ii) p$\rightarrow$q $\Rightarrow$ p $\rightarrow$ p $\wedge$q

4. Let X={1,2,3} and f, g ,h and s are the functions from X to X given by

      f = {<1,2>,<2,3>,<3,1>}

      g= {<1,2>,<2,1>,<3,3>}

      h= {<1,1>,<2,2>,<3,1>}

      s= {<1,1>,<2,2>,<3,3>}

    Find fOg, gOf, fOhOg, sOg, gOs, sOs, fOs, fOh, fOsOh, fOf.

<div align="center">*OR*</div>

5. What is a **Poset**? Draw the Poset(Hasse) diagram representing the partial order {(A,B): A≤B} on the

power set p(S) where S= {a,b,c} where ≤ represent   subset or equal to relation.

6. a) Determine the number of integer between 1 and 10,000,000 have the sum of digits equal to 18

   b) Determine the number of ways possible to wear 5 rings on 4 fingers.

<div align="center">***OR***</div>

7. State the **Pigeonhole principle** and explain its usage in different applications

8. What is a recurrence relation? What are its properties? Solve the recurrence relation using generating function $a_n - 6a_{n-1} = 0$ for $n \geq 1$ where $a_0 = 1$

<div align="center">***OR***</div>

9. Obtain the recurrence relation of Fibonacci series and solve it.

10. (a) Differentiate a Cycle and a Circuit in the given graph?

   (b) Apply Breadth First Search (BFS) algorithm on the following to obtain the spanning tree?
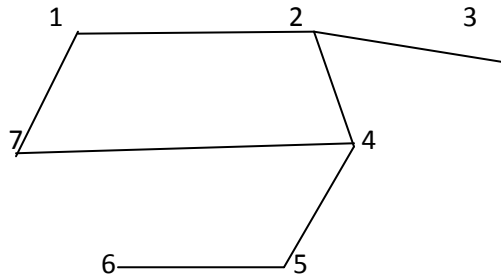
<div align="center">***OR***</div>

11. When do you say two graphs are Isomorphic to each other? Are the graphs given below isomorphic?
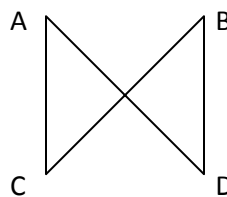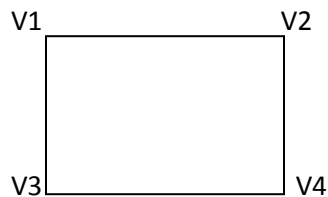
<div align="center">*****************</div>

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B.Tech II Year I Semester Examinations
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
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MODEL PAPER-II

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
   Part A is compulsory which carries 25 marks. Answer all questions in Part A.
   Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10
   marks and may have a, b, c as sub questions.

PART-A

1. a) Explain different logical connectives in mathematical logic   [2m]
   b) Verify the following formulas are well formed formulas are not?
      (i) P→(PVQ)   (ii) (P→(~P)) →~P   (iii)((~Q ∧P) ∧Q)   [3m]
   c) If A={1,2,3}, B= {4,5} find i) AXB   ii) BXA   [2m]
   d) When do you say a given relation is a Partial Order?   [3m]
   e) How many different arrangements are there of the letters a,a,a,b,c ?   [2m]
   f) Explain the principle of inclusion – exclusion?   [3m]
   g) Find the coefficient x^9 in $(1+x^3+x^8)^{10}$ [2m]
   h) Solve the recurrence relation $a_{n+1}=8a_n$ for n≥0 where $a_0=4$ [3m]
   i) What is a "Cut set"? Give example   [2m]
   j) Define Euler's Path, Cycle and give an example to each.   [3m]

PART-B

2. What do you mean by a **valid argument**? Show that ~p is a valid conclusion from the set of
premises(r→~q),rVs,s→~q, p→q using indirect method of proof
                                                  OR
3. Define the Principal Conjunctive Normal Form(PCNF). Obtain PCNF of the following formulas
   (i) (P ∧Q ∧R) V (~P ∧R∧Q) V(~P ∧~Q ∧~R)
   (ii) PV(~P→(QV(~Q→R)))

4. Define the following algebraic system and give example to each type.
   (i) Group   (ii) Abelion Group   (iii) Semi Group   (iv) Sub Group
                                                  OR
5. Find all the properties satisfied by the following algebraic systems under the binary operations 'X' and
   '+'.   (a) Set of Odd integers   (b) All Positive Real numbers
6. a) How do you use generating functions to find the number of non negative integral solutions to
      $X_1+X_2+X_3+X_4+X_5=10$

b) Find the number of arrangements of letters "MISSISSIPPI".

OR

7. a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have
4 books each and other 3 will have 5 books each.
b) Using multinomial theorem, expand $(2X-3Y+4Z)^3$

8. Solve the recurrence relation $a_n-7a_{n-1}+12a_{n-2}=0$ for $n\geq2$ where $a_0=1$, $a_1=2$

OR

9. Find the general expression for a solution to the recurrence relation $a_n-5a_{n-1}+6a_{n-2}=n(n-1)$ for $n\geq2$

10. Find the Chromatic number of the following graphs
(a) Complement of a Graph (K_3)
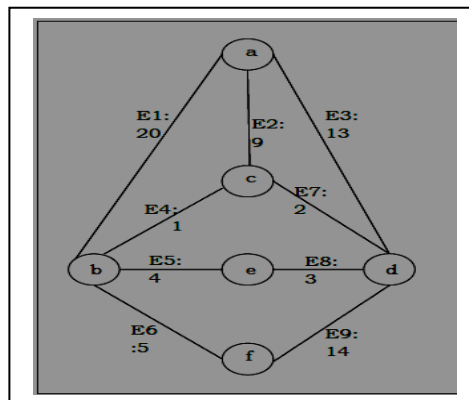(b) Complete Bipartite Graph $(K_{2,3})$
(c) k-Regular Graphs (K_3)

OR

11. What do you mean by the dual of a plane graph? State the properties of it. Find the dual of the
Following graph?

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MODEL PAPER-III

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
     Part A is compulsory which carries 25 marks. Answer all questions in Part A.
     Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

1.a) . Write the following statement into symbolic form   [2]

   All men are mortal

   Socrates is a men

   Therefore Socrates is a mortal   [3]

b) What is a well formed formula? Give examples

c) Construct Truth Table for $(P \rightarrow Q) \wedge (R \rightarrow Q)$ [2]

d) Negate each of the following   [3]

 (i) $\sim(x)(y) R(x,y)$ (ii) $\sim(x) \exists (y) R(x,y)$ (iii) $\sim(\exists x \exists y \sim R(x,y) \wedge \forall x \forall y \, p(x,y)$

e) What is permutation group? Explain with example?   [2]

 f) What do you mean by the degree sequence of a Graph?   [3]

 g) Define Spanning tree?   [2]

 h) Find the coefficient x^9 in $(1+x^3+x^8)^{10}$ [3]

 i) Solve the recurrence relation $a_n = na_{n-1}$ for $n \geq 1$ where $a_0 = 1$ [2]

 j) Is the graph C4 two colorable? Explain.   [3]

PART-B

2) Define the terms Principal Disjunctive Normal Form, and Principal Conjunctive Normal Form
   and Obtain the POS form of the following formulas.
   (i) $(P \wedge Q \wedge R) \vee (\sim P \wedge R \wedge Q) \vee (\sim P \wedge \sim Q \wedge \sim R)$
   (ii) $P \vee (\sim P \rightarrow (Q \vee (\sim Q \rightarrow R)))$

                                OR
3) Using automatic theorem show that $(P \vee Q) \wedge (Q \rightarrow R) \wedge (P \rightarrow M) \Rightarrow (R \vee M)$.

4) When do we say the given relation is a Partial Order on the given set? Draw the Hasse diagram for X={2,3,6,24,36,48} and relation ≤ be such that x≤y, if x divides y.

OR

5) Discuss each of the following algebraic structures and give example to each.
(i) Group   (ii) Abelian Group (iii) Semi Group   (iv) Sub Group

6) Using binomial theorem prove that $3^n = \sum_{i=0}^{n} n_{cr}(2^r)$

OR

7) a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and other 3 will have 5 books each?
   b) Using multinomial theorem, expand $(2X-3Y+4Z)^3$

8) What is a Recurrence relation? Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2} = 0$ for $n \geq 2$ where $a_0 = 1$, $a_1 = 2$ by characteristic roots method.

OR

9) Solve the recurrence relation of Fibonacci series

10) Find the Chromatic number of the following graphs
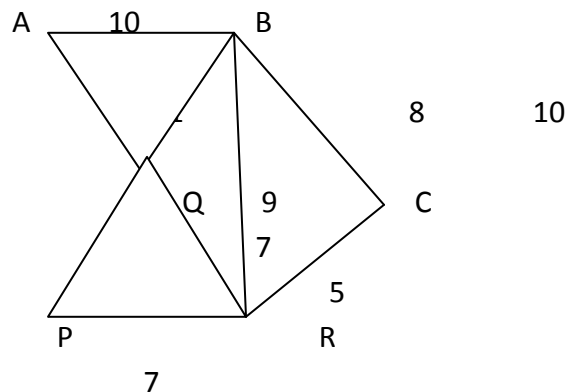   (a) Complete Graph (K_3)
   (b) Complete Bipartite Graph $(K_{2,3})$
   (c) Regular Graphs (K_3)

OR

11) Define Minimal Spanning Tree? Apply Kruskal's Algorithm to find a minimal spanning tree for the   weighted graph given below.

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MODEL PAPER-IV

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.
   Part A is compulsory which carries 25 marks. Answer all questions in Part A.
   Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

1. a) Define bound and free variable with one example.   [2m]
   b) When do we say a system of premises is consistent? Explain.   [3m]
   c) State how many equivalence classes the **mod3** relation on Z has? List them   [2m]
   d) Let X= {1,2,3,4} Define a function f:X→X. such that f≠I_x and is One – One   [3m]
      Find f^2, and f^{-1}.
   e) How many 4 digit even no.s are possible from {1,2,3,4,5,6,7}(repetitions not allowed) [3m]
   f) Find the coefficient of $X_1^2 X_2^2 X_3^2$ in $(2X-3Y+5Z)^{10}$ [2m]
   g) Find the generating functions for a_r= the number of non negative integral solutions of
      $e_1+e_2+e_3=r$ where $0 \le e_1 \le 3$, $2 \le e_2 \le 6$, e_3 is odd and $1 \le e_3 \le 9$ [2m]
   h) Explain the Principle of inclusion and exclusion   [3m]
   i) State Handshaking theorem of simple graphs   [2m]
   j) State the relationship between the degree sum of regions and vertices?   [3m]

PART-B

2 Using automatic theorem (PVQ)∧(Q→R) ∧(P→M) ⇒(RVM)

OR

3. What do you mean by Logical equivalence of formulas? Show that the following statements are logically equivalent without using truth table
      (i) ~P↔Q⇔P→Q   (ii) (P→R)∧(Q→R)⇔(PVQ)→R

4. Find all the properties that are satisfied by the following algebraic systems under the binary operations 'X' and '+'.
      (a) (O,x) and (O,+) where O is the set of Odd integers
      (b) (Z^+,x) and (Z^+,+) where Z^+ is the set of all positive integers

5. *What is a toset? Explain.* Draw the Hasse diagram for X={2,3,6,24,36,48} and relation ≤ be such that x≤y, if y is multiple of x.

6 Explain the process of calculating the Binomial Coefficients? And Compute the coefficients of x^3y^7 in   (a) $(x+10)^{10}$ and   (b) $(2x-9y)^{10}$

OR

7. Illustrate pigeonhole principle and discuss its applications

8. *What is a generating function?* Solve the recurrence relation using generating function a_n-$6a_{n-1}=0$ for n≥1 where $a_0=1$

OR

9. *Derive the recurrence relation* for Fibonacci series and solve it using substitution method.

10. (a) Define Euler's Path, Euler's Cycle and Euler's Trail?
   (b) Apply DFS algorithm to form the spanning tree by taking own graph.

OR

11 Explain the following
   (a) Isomorphism and sub graphs
   (b) Hamilton Paths
   (c) Minimum Spanning trees
   (d) Dual of a planar graph

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B.Tech II Year I Semester Examinations
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MODEL PAPER-V

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

     Part A is compulsory which carries 25 marks. Answer all questions in Part A.

     Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

1. a) Define **Tautology** and **Contradiction**? Give examples   [2m]

b) Define a 3 place predicate? Give example for a 3place predicate with bound variables   [3m]

c) If A={1,2,3}, B= {4,5} find i) AXB   ii) BXA   [2m]

d) Let A={1,2,3} Determine all Partitions of A?   [3m]

e) How many different arrangements of the word MISSISSIPPI ?   [2m]

f) Explain the principle of inclusion – exclusion?   [3m]

g) Find the coefficient x^9 in $(1+x^3+x^8)^{10}$ [2m]

h) Solve the recurrence relation $a_{n+1}=8a_n$ for n≥0 where $a_0=4$ [3m]

i) Define Chromatic number of Cycle graph of order n   [2m]

j) Define the Incidence matrix representation of a digraph   [3m]

PART-B

2. What do you mean by Logical equivalence of formulas? Show that the following statements are logically equivalent without using truth table

     (i) ~P↔Q⇔P→Q   (ii) (P→R)Λ(Q→R)⇔(PVQ)→R

OR

3. What is a normal form? Find the Sum of Products (SOP) Normal Form for the following formula

       PV(~P→(QV(~Q→R)))

4. Define a Lattice, Distributive Lattice. If A={1,2,3,5,30} and R is the divisibility relation, Prove that (A,R) is a lattice but not a Distributive Lattice.

OR

5. Let X={1,2,3} and f,g,h & s are the functions from X to X given by

       f= {<1,2>,<2,3>,<3,1>}

       g= {<1,2>,<2,1>,<3,3>}

       h= {<1,1>,<2,2>,<3,1>}

       s= {<1,1>,<2,2>,<3,3>}

Find fOg, gOf, fOhOg, sOg, gOs, sOs, fOs, fOh, fOsOh, fOf

6. a) Find the number of non negative integral solutions to $X_1+X_2+X_3+X_4+X_5=10$

b) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and other 3 will have 5 books each?

c) Using multinomial theorem, expand $(2X-3Y+4Z)^3$

OR

7. a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and other 3 will have 5 books each.

b) Find the number of arrangements of letters "TEMPLETON".

8. Find the recurrence relation and initial condition for the sequence 2,10,50,250 and also find general term

OR

9. What is a Recurrence Relation? State different approaches obtain the roots if. Solve the recurrence Relation using generating function $a_n-6a_{n-1}=0$ for $n\geq1$ where $a_0=1$

10. Define Minimal Spanning Tree? Find a minimal spanning tree applying Prim's Algorithm on the weighted graph shown below .
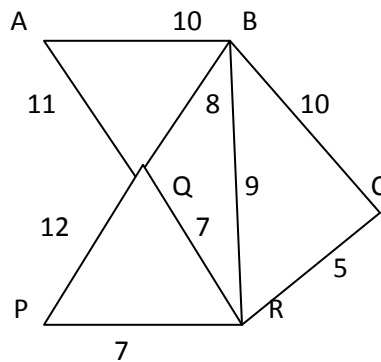
R15A0504

Data Structures using C++

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Data Structures using C++

MODEL PAPER-I

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1. a. Define Time Complexity?

   b. What is space complexity? Find out the Time Complexity of following code

```
int sum = 0;

int num = 35;


for (int i=1; i<=2*n; i++) {

        for (int j=1; j<=n; j++) {

                num += j*3;

                sum += num;

        }

}
```

```
        for (int k=1; k<=n; k++) {

                sum++;

        }
```

c. Define binary tree?

d. Inorder traversal = 4,2,5,1,3,6Preorder traversal = 1,2,4,5,3,6Find the post order traversal?

e. What is priority queue? Give an example?

f. Define heap data structure?

g. What is skip list? Explain with an example

h. What is external sorting mechanism?

i. Explain quadratic probing with an example?

j. Define

   i. DFS ii. BFS

PART-II

2. Explain the technique of bubble sort. Sort the following elements using bubble sort.

   98   56   12   23   86   29   42   34   67

(OR)

3. What is Binary search? Write a C++ Program to implement binary search technique?

4. Write a C++ program to implement stack ADT with templates?

(OR)

5. Write a C++ program to implement Queue using linked list?

6. Define heap data structure and explain with Example? (OR)

7. Explain multiway merge concept with an example?

8. What is the structure to represent node in a skip list.

(OR)

9. What is a dictionary? Define the abstract data type for it? Write the abstract class for the dictionary?

10. What is an AVL search tree? How do we define the height of it? Explain about the balance factor associated with a node of an AVL tree.

(OR)

11. Explain DFS with an example?

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DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Data Structures using C++

MODEL PAPER-II

Time: 3 hours   Max Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1. a. Briefly explain binary search technique?

   b. Write logic construct for bubble sort?

   c. Define threaded binary tree?

   d. Write a C++ construct to insert into binary tree.

   e. Write about priority queue?

   f. Write a C++ construct to delete an element from heap?

   g. What is the structure to represent node in a skip list.

   h. Briefly explain about double hashing?

   i. Write the properties of AVL tree?

j. Write the advantages of linked representation of binary search trees?

PART-II

2. Explain the technique of quick sort and sort the following list using quick sort?

23   12   98   56   34   99   65   34   75   81

(OR)

3. Write a C++ program to implement heap sort?

4. What is a Circular List? Write a C++ program to search in a circular linked list that has a header node?

(OR)

5. Write a C++ program to implement Queue using Arrays?

6. Define heap data structure? Construct Min heap and max heap for the following list

22   43   12   65   34   32   44   98   56   87   78

(OR)

7. Explain Multiway merge with an example?

8. Write a construct in C++ to erase a pair in the dictionary with key theKey in a skip list representation. What is the complexity of this method?

(OR)

9. Explain collision resolution techniques
        i. Chaining
        ii. Quadratic probing
        iii.
10. Draw the sequence of rotations required to perform a single right rotation and a double LR rotation in an AVL tree?

(OR)

11. Write a construct to implement insertion into and deletion from Binary search tree?

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DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Data Structures using C++

MODEL PAPER-III

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1. a. Briefly explain about time complexity?

b. Write logic construct for merge sort.

c. Write the ADT of Binary tree?

d. Write the pseudo code for inorder traversal?

e. Define the types of priority queue?

f. Write the applications of priority queue?

g. Write the ADT of dictionary?

h. What is rehashing?

i. What is the height of B Tree?

j. Explain LR rotation with an example?

PART-II

2. Explain selection sort with an example and write a C++ program to implement selection sort?

<p align="center">(OR)</p>

3. Explain Binary search with example and write a C++ program to implement binary search?

4. Define the Abstract data type for Queue. Write a C ++ program to implement Queue ADT using arrays.

<p align="center">(OR)</p>

5. Write a C ++ program using stack ADT that reads an infix expression, converts the expression to postfix form.

6. Write a C++ construct to insert and delete from heap?

<p align="center">(OR)</p>

7. Explain polyphase merge with an example?

8. Explain collision resolution techniques

    i. Linear probing
    ii. Double hashing

<p align="center">(OR)</p>

9. What is hashing with Chains? Explain? Compare this with Linear Probing?

10. Write a C++ program to implement BFS?

<p align="center">(OR)</p>

11. Write a C++ construct to insert into and delete from AVL tre

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B.TECH II YEAR I-SEM

Subject: Data Structures using C++

MODEL PAPER-IV

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1. a. What is frequency factor? Explain with an example?

   b. Write a C++ construct for logic of insertion sort?

   c. Write a C++ construct for push operation?

   d. Write a C++ construct for queue delete operation?

   e. Write ADT for priority queue?

   f. Define external sorting?

   g. What is collision resolution?

   h. Compare hashing and skip lists?

   i. Explain RL rotation?

j. Define balance factor?

PART-II

2. Explain all asymptotic notations with examples?

(OR)

3. Explain Merge sort with an example and write a C++ program to implement Merge sort.

4. Explain Binary tree traversals with an example?

(OR)

5. Explain threaded binary trees?

6. . Define heap data structure? Construct Min heap and max heap for the following list

    77   23   43   67   45   33   90   76   55   65

(OR)

7. Write a C++ program to implement heap data structure?

8. What is the structure to represent node in a skip list.

(OR)

9. Explain collision resolution techniques?

10. Write a C++ construct for LR and RL rotation. (OR)

11. Write a C++ program to implement binary search tree?

R15A0401

Electronic Devices and Circuits

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester supplementary Examinations, May 2017
Electronic Devices and Circuits
(ECE, CSE)

Roll No									

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　**Max. Marks: 75**

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART - A　　　　　　　　　　　　　　　　　　(25 Marks)

1.　a) Write the PN junction diode applications.　　　　　　　　　　　　[2M]

　　b) Explain the temperature dependence of V-I characteristics of PN diode　[3M]

　　c) Define Transformer utilization factor (TUF) of a rectifier.　　　　[2M]

　　d) What is a rectifier and how a PN junction diode used as a rectifier.　[3M]

　　e) Draw the hybrid parameter model for BJT.　　　　　　　　　　　[2M]

　　f) A transistor has I_B=100μA, I_{CO}=5 μA, α=0.95, Calculate I_C.　[3M]

　　g) What is biasing.　　　　　　　　　　　　　　　　　　　　　　[2M]

　　h) Explain early effect.　　　　　　　　　　　　　　　　　　　　[3M]

　　i) Draw the symbols of Depletion MOSFET and Enhancement MOSFET for both
　　　n channel and p channel.　　　　　　　　　　　　　　　　　　[2M]

　　j) Compare BJT and JFET.　　　　　　　　　　　　　　　　　　[3M]

PART - B　　　　　　　　　　　　　　　　　　(50 Marks)

SECTION - I

2 a)　Write the volt-ampere equation for PN junction diode. Draw and explain the V-I characteristics of PN junction diode under forward and reverse bias　　[5M]

　b) Explain about breakdown mechanisms in semiconductor devices.　　[5M]

OR

3. a) Explain the principle and operation of Tunnel diode and draw its V-I characteristics.　　　　　　　　　　　　　　　　　　　　　　[6M]

　b) Discuss about Zener Diode characteristics.　　　　　　　　　　[4M]

SECTION – II

4. a) Draw a neat diagram and explain working principle of full wave bridge rectifier.[5M]

　b) Draw the circuit for a half wave rectifier and derive the expression for
　　i) DC load voltage　ii) RMS current iii) Ripple factor　　　　　[5M]

OR

5. a) What are different types of filters? Compare them.　　　　　　　[5M]

b) A HWR circuit supplies 100mA DC current to a 250ohms load. Find the DC output voltage, PIV rating of a diode and the RMS voltage for the transformer supplying the rectifier. [5M]

SECTION – III

6. a). Explain the operation of transistor with current components in detail. [6M]
   b) Explain the operating modes of BJT. [4M]

OR

7. a) Explain the input and output V-I characteristics of common base configuration of BJT. [5M]
   b) Explain how the BJT can be used as an amplifier [5M]

SECTION – IV

8. a) Explain in detail about Thermal Runaway and how to avoid it. [5M]
   b) In a Self bias circuit containing $R_1=50K\Omega$, $R_2=25K\Omega$, $R_e=1K\Omega$, $R_c=3K\Omega$, $\beta=90$, $V_{CC}=12V$, $V_{BE}=0.7V$. Find the operating point, Stability factor S [5M]

OR

9. a) Give the advantages of h-parameter analysis. [4M]
   b) The h-parameters of a Transistor used in a CE circuit are $h_{ie}=1K\Omega$, $h_{re}=2\times10^{-4}$. $h_{fe}=50$, $h_{oe}=25\mu A/V$. The load resistance for the transistor is $1K\Omega$ in the collector circuit. Determine R_i, R_o, A_v, A_i in the amplifier stage (Assume $R_s=1K\Omega$). [6M]

SECTION – V

10. a) Explain in detail the working of JFET and draw its drain and transfer characteristics. [5M]
    b) Explain the construction and working of Enhancement MOSFET. [5M]

OR

11. a) Derive the expressions for Z_i, Z_o and A_v for common source J-FET amplifier [6M]
    b) Compare BJT and MOSFET [4M]

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MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

MODEL PAPER-I

Time: 3 hours   **Max. Marks: 75**

PART-A

Answer all the following questions:

1. (a)   What is a pn junction? How is it formed?   (2M)

   (b)   Sketch the energy-band Diagrams for intrinsic and extrinsic semiconductors   (3M)

   (c)   What is meant by rectifier?   (2M)

   (d)   Compare the performance measure of different filters.   (3M)

   (e)   Why Transistor is called Current Controlled Device?   (2M)

   (f)   What is early effect? How does it modify the V-I characteristics of a BJT?   (3M)

   (g)   What is meant by operating point? Explain its significance   (2M)

   (h)   What is the condition for thermal stability and thermal resistance?   (3M)

   (i)   Explain when a FET acts as a voltage variable resistor.   (2M)

   (j)   Explain the drain and transfer characteristics of a JFET in details   (3M)

PART-B

Answer all the following questions   **10x5=50**

2. (a)   Draw the V-I characteristics of a diode with zero cut-in voltage and equivalent resistance
         of 100Ω. Draw the load line if RL is also $100\ \Omega$.

   (b)   Explain V-I characteristics of pn junction Diode.

                                    (OR)

3. (a)   Explain the constructional and principal operations of SCR and PHOTO diode.

4.   Draw and explain the circuit diagram of full-wave rectifier with inductor filter. Derive the
         Ripple factor equation.

                                    (OR)

5.   Derive expressions for ripple factor, regulation and rectification efficiency of a
          Center tapped Transformer Full wave rectifier.

6. (a)   Explain different current components in a transistor.

   (b)   Explain how Transistor acts as an Amplifier
                                    (OR)

7.   Draw the circuit diagram of Common Emitter amplifier using accurate h-parameter
         model. Derive expressions for A_V, A_I, R_I & R_O.

8.   What are the compensation techniques used for V_{BE} and I_{CO}? Explain with the help of

         suitable circuits

                                    (OR)

 9. (a) Design a collector to base bias circuit using silicon transistor to achieve a stability factor of

         20, with the following specifications: V_{CC}=16V,V_{BE}= 0.7V,V_{CEQ}= 8V,I_{CQ}= 4mA &

         β=

(b) Derive condition for thermal stability?

10. (a) With the help of neat sketches and characteristic curves explain the construction & operation of a JFET and mark the regions of operation on the characteristics.

   (b) Derive expression for transconductance in a field effect transistor.

(OR)

11. (a) Explain the construction and principle of operation of Depletion type N-channel MOSFET

   (b) Compare BJT and FET

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B.Tech II Year I Semester Examinations

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

MODEL PAPER-II

Time: 3 hours   **Max. Marks: 75**

PART-A

Answer all the following questions:

1. (a)   What do you mean by potential barrier for a p-n junction?   (2M)

   (b)   What is the significance of negative resistance of a tunnel diode   (3M)

   (c)   Define peak inverse voltage (PIV).   (2M)

   (d)   Explain FWR working principle with circuit and waveforms.   (3M)

   (e)   What are the three regions of a Transistor?   (2M)

   (f)   What is thermal runway? How can it avoid?   (3M)

   (g)   What is faithful amplification?   (2M)

   (h)   Derive relation between α, β and γ?   (3M)

   (i)   Define the pinch off voltage (V_p) sketch the depletion region before and after

           Pinch-off?   (2M)

   (j)   Derive Expression for saturation drain current   (3M)

PART-B

Answer all the following questions: **5x10= 50 marks**

2. (a) Explain the effect of temperature on V-I characteristics of a diode.

   (b)   Distinguish between drift and diffusion current in a semiconductor.

3.　Explain the working of Tunnel diode with help of energy band diagrams and Draw V-I Characteristics

4. (a) A Full wave single phase rectifier makes use of 2 diodes, the internal forward resistance

of each is considered to be constant and equal to 30Ω. The load resistance is $1K\Omega$. The transformer secondary voltage is 200-0-200V (rms).Calculate V_{DC}, I_{DC}, and Ripple factor

(b)　A Zener voltage regulator circuit is to maintain constant voltage at 60 V, over a current range from 5 to 50 mA. The input supply voltage is 200 V. Determine the value of resistance R to be connected in the circuit, for voltage regulation from load current $I_L = 0$ mA to I_L max, the maximum possible value of I_L. What is the value I_L max?

<center>OR</center>

5. (a) Derive expression for FWR Rectifier i) DC load current ii) DC output voltage
iii) Peak Inverse Voltage of each diode IV) Efficiency v) Ripple factor

6. (a) Compare the three transistor amplifier configurations with related to A_I, A_V, R_i and R_O.

(b)　For the emitter follower with $R_S = 0.5K$, $R_L = 50K$, $h_{fe}= -50$, $h_{re}= 1K$, $h_{oe} = 25\mu A/V$, $h_{re} = 1$. Calculate A_V, A_I, Z_i and Z_O

<center>(OR)</center>

7).(a) Draw the circuit diagram of a transistor in CB configuration and explain the output characteristics with the help of different regions.

(b)　Calculate the collector current and emitter current for a transistor with $\alpha_{D.C.} = 0.99$ and $I_{CBO} = 50$ μA when the base current is $20\mu A$..

8.　Draw a Fixed bias circuit and explain its operation. Calculate the Stability factor S, S^1.

<center>(O</center>

9.   Define stability factors for a BJT with Self biasing method. Suggest how this method to effects on operating point of a BJT circuit

10. (a) Sketch the drain characteristics of MOSFET for different values of V_{GS} & mark different regions of operation.

(b)   Give the construction details of JFET and explain its operation.

(OR)

11. (a) Write short notes on applications of FET as a voltage variable resistor.

(b)   Explain the principle of CS FET amplifier with the help of circuit diagram. Derive the expressions for A_V, input impedance and output impedance

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

MODEL PAPER-IV

Time: 3 hours   **Max. Marks: 75**

PART-A

Answer all the following questions:

1.(a)   What is mean by zener breakdown   (2M)

(b)   Explain the effect of temperature on the V-I characteristics of pn junction diode   (3M)

(c)   What is meant by filter in rectifier circuits   (2M)

(d)   Bridge rectifier is becoming more and more popular, why?   (3M)

(e)   Write B.J.T specificationsand limitations   (2M)

(f)   Explain how transistor acts as an Amplifier?   (3M)

(g)   What is meant by stabilization   (2M)

(h)   What is thermal runway? How can it avoid?   (3M)

(i)   State the application of JFET and compare MOSFET   (2M)

(j)   When FET acts as a voltage variable resistor (V.V.R)?   (3M)

PART-B

Answer all the following questions: **5x10= 50 marks**

2.   Explain in detail, the reason for exponential rise in forward characteristic of a diode with suitable mathematical expression.

(OR)

3) a)   Explain the construction and working principal of photo diode.

b)   Draw the equivalent circuits of diode

4.   Draw the circuit diagram of a Full wave bridge rectifier. Explain the operation of circuit

with relevant waveforms

(OR)

5 a)   Compare the performance of Inductor filter and capacitor filter.

b)   Explain Full wave rectifier with neat diagram?

6a)   Define the hybrid parameters for a basic transistor circuit and give CE hybrid model.

(b)   Explain input and output characteristics of C.E Configuration

(OR)

7. (a) Summarise the salient features of the characteristics of BJT operatives in CE, CB and CC

configurations?

(b)   Calculate the collector current and emitter current for a transistor with $\alpha_{D.C.} = 0.99$ and $I_{CBO} =$
20 µA when the base current is 50µ A.

8.   Draw a Collector feedback bias circuit and explain its operation. Calculate the Stability

factor S

(OR)

9. (a) What is a load line? Explain its significance.

(b)   Find the Q-point of self-bias transistor circuit with the following specifications: $V_{CC} =$
22.5V, $R_L = 5.6k\Omega$, $R_C = 1k\Omega$, $R_I = 90k\Omega$, $R_2 = 10k\Omega$, $V_{BE} = 0.7V$ and $\beta = 55$. Assume

$I_B >> I_{CO}$.

10(a)   Bring out comparison between JFET and MOSFET.

(b)   Draw the circuit's diagram of common drain amplifier and derive expression for voltage

        gain

                                    (OR)

11. (a) Compare Depletion MOSFET and enhancement MOSFET

(b)   Explain in detail about generalized FET amplifier

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

MODEL PAPER-V

Time: 3 hours   **Max. Marks: 75**

PART-A

Answer all the following questions:

a)   What is diode equation?   (2M)

b)   Draw the V-I characteristics of SCR & define all related terms.   (3M)

c)   What is the purpose of bleeder resistance in a rectifier circuit using LC filter?   (2M)

d)   Write short note on Full wave rectifier (FWR) along with input output waveforms.(3M)

e)   Why hybrid parameters are called so? Define those   (2M)

f)   What factors are to be considered for selecting the operating point Q for an

        amplifier?   (3M)

g)   Why does potential divider method of biasing become universal?   (2M)

h)   Why FET is unipolar and BJT is Bipolar Device   (3M)

i)   Draw the symbols of JFET (N Channel/P channel) MOSFET (Depletion MOSFET

        (n-channel/p-channel) and Enhancement MOSFET (n-channel/p-channel)   (2M)

j)   Draw the low frequency hybrid equivalent circuit for CE,CB and CC   (3M)

PART-B

Answer all the following questions: **5x10= 50 marks**

2. (a) Explain the V-I characteristics of Zener diode and distinguish between Avalanche and Zener Break downs.

(b)   In a Zener diode regulator, the supply voltage = 300V, $V_Z = 220V$, $I_Z = 15mA$ and load current = 25mA. Calculate the value of resistor required to be connected in series with the Zener diode.

(OR)

3.   Draw the basic structure of Varactor diode and explain its operation and V-I Characteristics.

4.   A 230 V, 60Hz voltage is applied to the primary of a 5:1 step down, center tapped transformer used in a full wave rectifier having a load of 900Ω .If the diode resistance and the secondary coil resistance together has a resistance of 100Ω, determine

   i) Dc voltage across the load. ii) Dc current flowing through the load.

    iii) Dc power delivered to the load. iv) PIV across each diode.

(OR)

5. (a) Design ripple factor of LC filter for a Full wave rectifier

(b)   In a full-wave rectifier using an LC – filter L-10mH, C=100µF and $R_L = 500\Omega$.

   Calculate I_{DC} , V_{DC} for an input Vi=300sin (100 t)

6. (a) Draw the circuit diagram of a transistor in CB configuration and explain the output characteristics with the help of different regions.

(b) In a germanium transistor collector current is 51mA, when base current is 0.4mA. If h_{fe}

= β_{dc} = 125, Calculate cut off current, I_{CEO}.

(OR)

7. Explain the input and output characteristics of a transistor in CC configuration

(b) Calculate the values of I_E, α_{dc} and β_{dc} for a transistor with I_B=13µA,

I_C=200mA,I_{CBO}=6µA. Also determine the new level of I_C which will result from reducing

100mA

8. Draw a Self bias circuit and explain its operation. Calculate the Stability factor S,S^I,S_{II}

(OR)

9 (a) what is a load line? Explain its significance.

(b) Find the Q-point of self-bias transistor circuit with the following specifications: V_{CC}= 22.5V,

R_L=5.6kΩ,R_C=1kΩ,R_I=90kΩ,R_2=10kΩ,V_{BE}= 0.7V and β = 55. Assume I_B>>I_{CO}.

10) The field effect transistor is called a voltage-sensitive electronic control device. Explain

why is the case?

b) Name and define the circuit parameters of the JFET. How are they related to each other?

(OR)

11.(a) Explain the construction and principle of operation of Enhancement mode N-channel

MOSFET.

b) Compare BJT & FET.

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MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY, HYDERABAD

B.Tech II Year I Semester Examinations, Model Paper V -2016

Electronic Devices and Circuits

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE)

MODEL PAPER-VI

PART-A

Time: 3 hours   **Max. Marks: 75**

Answer all the following questions: **5x2= 10 marks**

(a) Sketch the V-I characteristics of p-n junction diode for forward bias?   (2M)
Explain zener diode as a voltage regulator.

(b)   (3M)

(c)   Distinguish between the incremental resistance and the apparent resistance of

the diode   (2M)

(d)   Derive efficiency of FWR.   (3M)

(e)   In a filter circuit, why capacitor is a parallel combination and series combination

for inductor.   (2M)

(f)   Define Transformer Utilization Factor (TUF).   (2M)

(g)   What is transistor?   (3M)

(h)   Draw voltage divider bias circuit; derive an expression for its stability factor.   (2M)

(i)   Explain transfer characteristics of JFET with its non-linear relations   (3M)

(j)   Explain tunneling effect   (2M)

PART-B

Answer all Answer all the following questions: **5x10= 50 marks**

2. (a)   Explain the concept of diode capacitance. Derive expression for transition capacitance?

(b)   Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at

   0

   25 C with reverse saturation current, $I_O = 25\mu A$ and at an applied voltage of 0.2V across

   the diode

(OR)

3.   With neat energy band diagrams, explain the V-I characteristics of Tunnel diode in detail.
        Also explain the negative-resistance region in the characteristics and applications of
        Tunnel diode.

4.   Draw the circuit diagram of full-wave rectifier with inductor filter. Explain its operation
        with necessary equations.

(OR)

5.   Derive the expression for the ripple factor of π-Section filter when used with a Full-
        wave-rectifier. Make necessary approximations.

6.(a)   Based on the currents flowing through a BJT illustrate the amplification process.

(b)   Compare CB, CC, and CE configurations

(OR)

7.   Draw the circuit diagram, AC equivalent & small signal equivalent of Common Emitter
        amplifier using accurate h-parameter model. Derive expressions for A_V, A_I, R_I & R_O.

8.   Explain the basic requirements of transistor biasing. Verify these requirements in
        collector to base bias circuit.

9.	Design a fixed bias circuit using silicon transistor, with the following specifications:

$V_{CC} = 16V$, $V_{BE} = 0.7V$, $V_{CEQ} = 8V$, $I_{CQ} = 4$ mA & $\beta = 50$.

10. (a) A self biased P-channel JFET has a pinch-off voltage of $V_P=5V$ and $I_{DSS}=12mA$ .the

supply voltage is 12V .Determine the values of R_D and R_S so that $I_D=5ma$ and $V_{DS}=6V$

(b)	List the advantages and disadvantages of FET over

MOSFET (OR)

11. (a) Explain self biasing of Common source JFET

(b)	Explain the significance of threshold voltage of an E-MOSFET.

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Probability and Statistics

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: **Probability and Statistics**

Model Paper-1

Part A

1. Answer All the questions   **[25 marks]**

a. Write the Properties of binomial distribution   [2m]
b. Define Joint probability density function   [3m]
c. Explain Positive and negative correlation   [2m]
d. Define Regression lines   [3m]
e. Explain one tailed and two tailed test   [3m]
f. what is a Standard error   [2m]
g.Give the Properties of t-distribution   [3m]
h. Define degrees of freedom   [2m]
i. Write the Characteristics of the queuing system   [2m]
j. What is a Markov chain   [3m]

Part B

Answer All the following   **[50 marks]**

2.a)A continous r.v has the p.d.f $f(x) = \begin{cases} kxe^{-\alpha x}, if\ x \geq 0\ and\ \alpha \geq 0 \\ 0,\ else\ where \end{cases}$ [10m]

Determine i)k   ii) mean   iii) variance
b) Suppose the weights of 800 male students are normally distributed with 28.8kg and SD of 2.06 kg.
Find the number of students whose weights are i) between 28.4 kg and 30.4kg ii) more than 31.3 kg

<div align="center">OR</div>

3) For the following bivariate(two dimensional) probability distribution of X and Y find i) P(X≤ 2,Y=2)
ii) $F_X(2)$ iii) P(Y=3) iv) P(X<3,Y≤ 4)   v) $F_Y(3)$ [10m]

X/Y	1	2	3	4
1	0.1	0	0.2	0.1
2	0.05	0.12	0.08	0.01
3	0.1	0.05	0.1	0.09

4. Find the karlpearson's coefficient of correlation for the paired data: [10m]

wages	100	101	102	100	99	97	98	96	95	102
Cost of living	98	99	99	95	92	95	94	90	91	97

<div align="center">OR</div>

5. The heights of mothers and daughters are given in the following table. From the two tables of regression estimate average height of daughter when the height of the mother is 64.5 inches   [10m]

Height of mother	62	63	64	64	65	66	68	70
Height of daughter	64	65	61	69	67	68	71	65

6. a) A sample of size 64 and mean 70 was taken from a population whose standard deviation is 10.
   Construct 95% confidence interval for the mean.   [5m]

   b) A coin is tossed 960 times .Head turned up 184 times. Find whether the coin is unbiased.   [5m]

OR

7. a) A lady stenographer claims that the she can take the dictation at the rate of 120 words per minute.
   Can we reject the claim on the basis of 100 trials in which she demonstrates a mean of 116 words with
    a SD of 15 words.   [5m]
  b) Explain the procedure for Testing of Hypothesis   [5m]

8. A survey of 320 families with 4children each revealed the following distribution

No# of boys	5	4	3	2	1	0
No# of girls	0	1	2	3	4	5
No# of families	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally popular?

OR

9. The following are the average weekly losses of worker hours due to accidents in 10 industrial   plant before and after a certain safety programme was put into operation:

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Test whether the safety programme is effective in reducing the number of accidents at 5%LOS

10. Patients arrive at a clinic according to a Poisson distribution at the rate of 30 patients per hour. The
     waiting room does not accommodate more than 13 patients not including the one i.e, examine.
     Examination time per patient is exponential with mean rate 20 per hour.   [10m]
     i) Find the effective arrival rate at the clinic
     ii) What is the probability that an arriving patient will not wait
     iii) What is the expected waiting until the patient is discharged from the clinic.

OR

11. The transition probability matrix is given by P=$\begin{bmatrix} 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \\ 0.7 & 0.2 & 0.1 \end{bmatrix}$ and p_0=[0.4   0.4   0.2]
     i) Find the distribution after three transitions   [10m]
     ii)Find the limiting probabilities

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Probability and Statistics

Model Paper-2

Part A
1. Answer All the questions **[25 marks]**

a) Define Mathematical Expectation [2m]
b)List the properties of Poisson distribution [3m]
c)Differentiate Correlation and Regression [2m]
d)Derive Angle between two Regression lines [3m]
e)A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence. [3m]
f) State Central limit theorem [2m]
g)Write the applications of χ^2 distribution [3m]
h)Find the value of $F_{0.95}$ for 12 and 15 d.o.f [2m]
i) what is a Pure birth process [3m]
k) Define Transition matrix [3m]

Part B
Answer All the questions [50 marks]

2 a) If the p.d.f of a r.v x is given by $f(x) = \begin{cases} k(1-x^2), & 0 < x < 1 \\ 0, & otherwise \end{cases}$ [5m]
find i) k and ii) the cumulative distribution function of x
b) The average number of phone calls /minute coming into a switch board between 2pm and 4pm is 2.5.Determine the probability the probability that one particular minute there will be i) 4 or fewer ii) more than 6 calls [5m]

OR

3. A sales tax officer has reported that the average sales of the 500 business that he has to deal with during a year is Rs.36,000 with a standard deviation of Rs.10,000. Assuming that the sales in these business are normally distributed ,find :
i) The number of business as the sales of which are greater than Rs.40,000
ii)The percentage of business the sales of which are likely to range between Rs.30,000 and Rs.40,000 [10m]

4 a) Fit a straight line $Y=a_0+a_1X$ for the following data and estimate the value of Y when X=25 [5m]

X	0	5	10	15	20
Y	7	11	16	20	26

b) Show that the maximum value of rank correlation coefficient is 1 [5m]

OR

5. The marks obtained by 10 students in mathematics and statistics are given below. Find the rank correlation coefficient between the two subjects   [10m]

Marks in mathematics	25	28	30	32	35	36	38	42	45	39
Marks in Statistics	20	26	29	30	25	18	26	35	46	35

6. In an investigation on the machine performance the following results are obtained:

	No# of units inspected	No# of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at 5%LOS   [10m]

OR

7. The average income of 100 people of a city is Rs 210 with a standard deviation of Rs 10. For another sample of 150 people the average income is Rs 220 with a standard deviation of Rs 12. Test significance between the difference of two means at 5% LOS   [10m]

8. The following is the distribution of the daily number power failures reported in a city

No# of power failures	0	1	2	3	4	5	6	7	8	9
No# 0f days	9	43	64	62	42	36	22	14	6	2

Test the goodness of fit of Poisson distribution at 5% LOS   [10m]

OR

9. Prices of shares of a company on the different day in a month were found to be 66,65,69,70,69,71,70,63,63,64 and 68. Determine whether the mean price of the share in the month is 65   [10m]

10. A fast food restaurant has one drive in window . It is estimated that cars arrive according to a Poisson distribution at the rate of 2 every 5 minutes and that there is enough space to accommodate a line of 10 cars. Other arriving cars can wait outside this space ,if necessary . It takes 15 minutes on the average to fill an order, but the service time actually varies according to an exponential distribution . Determine the following   [10m]
a) The probability that the facility is idle
b) The expected number of customers waiting to be served

OR

11.a) A training process is considered as a two state markov chain. If it rains , it is considered to be in state 0. If it does not rain, the chain is in the state of 1. The transition probability of the markov chain is defined by P=$\begin{bmatrix} 0.6 & 0.4 \\ 0.2 & 0.8 \end{bmatrix}$.Find the probability of state 0 or 1 as 0.4 and 0.6 respectively.   [5m]

b) Which of the following matrices are regular?   [5m]

i) $\begin{bmatrix} 1/3 & 0 \\ 1/3 & 1 \end{bmatrix}$ ii) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ iii) $\begin{bmatrix} 1/2 & 1/4 & 1 \\ 0 & 1/2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: **Probability and Statistics**

Model Paper-3

Part A

1. Answer All the questions [25 marks]

a) Define Probability density function [2m]

b) write three properties of normal distribution [3m]

c) Write Spearman's Correlation coefficient for repeated data [2m]

d)If θ is the angle between two regression lines and SD of Y is twice the SD of X and r=0.25

Find $tan\theta$ [3m]

e)Define Critical region [2m]

f)Define i) point estimation and ii) interval estimation [3m]

g)write the properties of F- distribution [2m]

h)Find the values of $t_{0.05}$ when ϑ =16, $t_{-0.01}$ when ϑ =10, $t_{0.995}$ when ϑ =7 [3m]

i)Write about (M/M/1) : ($\infty/FIFO$) model [2m]

j) Justify your answer whether the matrix $\begin{bmatrix} 1 & 0 \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$ is stochastic or not [3m]

Part B

 Answer All the questions [50 marks]

2 a) If F(x) is the distribution function of x is given by $F(X) = \begin{cases} 0 & if\ x \leq 1 \\ k(x-1)^4 & if\ 1 < x \leq 3 \\ 1 & if\ x > 3 \end{cases}$ [10m]

 Determine i) f(x) ii) k iii)mean

 b) Average number of accidents on any day on a national highway is 1.8 .Determine the probability that the number of accidents are i) atleast one ii) atmost one iii) exactly one

OR

3 a) If X is a continuous r.v and Y=aX+b prove that E(Y)=aE(X)+b and V(Y)=$a^2 V(X)$,where V stands for Variance [5m]

 b) In a normal distribution,7% of the items are under 35 and 89% are under 63.Determine the mean and variance of the distribution [5m]

4. Obtain the rank correlation coefficient for the following data [10m]

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	44	81	60	68	48	50	70

OR

5. A panel of two judges P and Q graded seven dramatic performances by independently awarding marks as follows:

Performance	1	2	3	4	5	6	7
Marks by P	46	42	44	40	43	41	45
Marks by Q	40	38	36	35	39	37	41

The eight performance, which judge Q would not attend, was awarded 37 marks by judge P. If judge Q had also been present, how many marks would be expected to have been awarded by him to the eighth performance. [10m]

6.A population consists of 5,10,14,18,13,24.Consider all possible samples of size 2 which can be drawn without replacement from the population. Find
i) The mean of the population   ii) Standard deviation of the population
iii) The mean of the sampling distribution of means
iv) Standard deviation of the sampling distribution of means [10m]

OR

7. a) A normal population has a mean of 0.1 and standard deviation of 2.1.Find the probability that the mean of a sample of size 900 will be negative. [5m]

   b) 20 people were attacked by a disease and only 18 survived .Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favor of the hypothesis that is more at 5% LOS. [5m]

8. a) A random sample of size 16 values from a normal population showed a mean of 53 and a sum of squares of deviations from the mean equals to 150. Can this sample be regarded as taken from the population having 56 as mean ? Obtain 95% confidence limits of the mean of the population .[7m]
 b) Write step procedure for difference of means of two independent samples [3m]

OR

9. a) Explain χ^2 test for independence of attributes. [5m]
b) The measurements of the output of two units have given the following results. Assuming that both
   Samples have been obtained from the normal distribution at 10% LOS.Test whether the two
   Populations have the same variance.

Unit –A	14.1	10.1	14.7	13.7	14.0
Unit -B	14.0	14.5	13.7	12.7	14.1

10.a) Assume that both arrival and service rate following Poisson distribution. The arrival rate and service
   rate are 25 and 25 customers /hour respectively ,at a single window in RTC reservation counter. Find
    i) ρ ii) L_s iii) L_q iv) W_q v) W_s [5m]
 b) In a colour T.V manufacturing plant, a loading unit takes exactly 10 min to load 2 T.V sets into a
   wagon and again comes back to the position to load another set of T.V. If the arrival rate is 2 T. V sets
   per 20 min. Calculate the average time of T.V sets in a stationary state [5m]
                                OR

11. A professor has three pet questions , one of which occurs on every test he gives . He never uses the
   same question twice in successive examinations. If he used the question no#1, he tosses a coin and
   uses the question no# 2,if head appears. If he uses the question no# 2, he tosses two coins and use
   the question no#3,if both are heads. If he uses the question no#3,he tosses three coins and use the
   question no#1, if all are heads. In long run which question does he use most often and with how
   much frequency is it used. [10m]

R 15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: **Probability and Statistics**

Model Paper-4

Part A

1. Answer All the questions [25 marks]

a. Define continuous and discrete random variable [2m]
b. Describe Distribution Function. [3m]
c. Write the formula for karlpearson's coefficient of correlation [2m]
d. Describe J.P.D.F and M.P.D.F [2m]
e. Write the Procedure for testing of hypothesis. [2m]
f. Write the properties of t-Distribution. [3m]
g. Define characteristics of Infinite Queue Model. [2m]
h. Describe the Service pattern in queuing system. [3m]
i. Define Markov chain? [2m]
j. what is a Transition Matrix? [3m]

Part B

Answer All the following [50 marks]

2. A continuous r.v has the p.d.f $f(x) = \{ke^{-|x|} - \infty \le x \le \infty$ [10m]
   Determine i)k   ii) mean   iii) variance
   ii) The average number of phone calls /minute coming into a switch board between 2pm and
   4pm is 2.5.Determine the probability the probability that one particular minute
   there will be   i) 4 or   fewer   ii) more than 6 calls

OR

3. (i) Out of 800 families with 5 children each, how many would you expect to have
   i) 3 boys ii) atleast one boy iii) either 2 girls or 2 boys [10m]
   (ii) A random variable x has the following probability function:

x	-3	-2	-1	0	1	2	3
P(x)	k	0.1	k	0.2	2k	0.4	2k

   Find i) k ii) mean   iii) variance iv)E(2x+3) v)V(3x+3)

4.The marks obtained by 10 students in two subjects are given below. [10m]
   Find the correlation coefficient

Subject 1	48	75	30	60	80	53	35	15	40	38
Subject 2	44	85	45	54	91	58	63	35	43	45

OR

5. Calculate the coefficient of correlation and lines of Regression for the following data:[10m]

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

6. a) The following are the average weekly losses of worker hours due to accidents in 10 industrial plant before and after a certain safety programme was put into operation:

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Test whether the safety programme is effective in reducing the number of accidents at 5%LOS   [10m]

OR

7. a) A random sample of 500 apples was taken from a large consignment and 60 were found to be bad.Obtain 95% confidence interval for the percentage number of bad apples in the consignment.   [8m]
 b) Explain about i) point estimation ii) interval estimation   [2m]

8. Ten specimens of copper wires drawn from a large lot have the following breaking strength(in kg) 518,572,570,568,572,578,572,569,548.Test whether the mean breaking strengths of the lot may be taken to be 518 kg weight   [10m]

OR

9.The following is the distribution of the daily number power failures reported in a city. Test the goodness of fit of Poisson distribution at 5%LOS   [10m]

No# of power failures	0	1	2	3	4	5	6	7	8	9
No# 0f days	9	43	64	62	42	36	22	14	6	2

10.a) Patients arrive at a clinic according to a Poisson distribution at the rate of 30 patients per hour. The waiting room does not accommodate more than 13 patients not including the one i.e, examine. Examination time per patient is exponential with mean rate 20 per hour.   [5m]
    (i) Find the effective arrival rate at the clinic
    (ii) What is the probability that an arriving patient will not wait
    (iii) What is the expected waiting until the patient is discharged from the clinic.
 b) State Kendal's notation.   [5m]

OR

11. a)The transition probability matrix is given by P=$\begin{bmatrix} 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \\ 0.7 & 0.2 & 0.1 \end{bmatrix}$ and

p_0=[0.4 0.4 0.2]
    Find the distribution after three transitions and Find the limiting probabilities[6m]

b) Find periodic and aperiodic states in each of the following transition probability matrices.

(a) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} \dfrac{1}{4} & \dfrac{3}{4} \\ \dfrac{1}{2} & \dfrac{1}{2} \end{bmatrix}$ [4m]

R15A0510

Computer Organization

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Computer Organization

MODEL PAPER-I

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1. a) Find (1001101-10101001) using 1's complement?
   b) What is Instruction Cycle?

   c) Write the advantages of RISC over CISC?

   d) Draw the circuit diagram and truth table for Full Adder?

   e) Draw the Hierarchy of memory? Why memory hierarchy is important in computer system?

   f) Differentiate between Synchronous and Asynchronous modes of data transfer?

   g)Explain the role of program counter in addressing modes?

   h)Explain load and store architecture in micro processor.

   i)Define the virtual memory organization and explain briefly.

   j).Differentiate SRAM and DRAM.

2. a) Discuss three representations of Signed integers with suitable examples.

b) Explain the components of the Computer system.

(OR)

3.a) Explain about Bus structure and Multiple Bus.

3.b) Explain about the error detection codes with parity checker circuit?

4. a) List and explain the steps involved in the execution of a complete instruction

4.b) What is Micro operation? Briefly explain the arithemetic micro operations?   (8M+8M)

(OR)

5.a) Explain different types of computer instruction formats.
5.b) Explain hardwired control unit and micro programmed control unit.
6. a) Explain the organization of registers.

6.b) Explain how microinstructions execution takes place.

(OR)

7 a) Explain all Addressing modes with numerical example

7 b) Discuss the Booth's multiplication algorithm with an example

8 a) Explain the issue involved with multiplication operation.

8 b) Design 4-bit adder/Subtractor and explain its function.

(OR)

9 a) what is a mapping function? What are the ways the cache can be mapped?

b) Explain in detail about arithmetic and instruction pipelines

10 a) what is multiprocessor system? Explain the advantages of multi processors over

uniprocessors

b) Explain the functions of typical input-output interface.(8M+8M)

(OR)

11 a) Define the Static RAM (SRAM).Explain the working of SRAM cell with a neat diagram

b) Define and discuss the types of replacement algorithms

Code No: R15A0510

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Computer Organisation

MODEL PAPER-II

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1.   **a)** What are 2's Compliment? Give its Significance?
     b) What is interrupt? Give the steps for handling interrupt?

     c) Compare RISC and CISC?

     d) Realize full adder using two half adders and logic gate?

     e) What is Auxiliary memory?

     f) What are different forms of parallelism?

     g) What are different forms of parallelism?

     h)Discuss in detail Instruction formats?

     i)Explain DMA operation ? with advantages

     j)Explain cache memory to reduce the execution time

2. a) Explain the functional architecture of the computer system.

b) Discuss the concept of compliments used to represent signed numbers.

(OR)

3.a) Write about register transfer Bus and Memory transfers**.**

3.b) Discuss and differentiate multi computers and multi processors.

4 a) What is instruction cycle? Briefly explain with the help of state diagram?

b) Briefly explain the arithmetic logic shift unit (8M+8M)

(OR)

5.a) Explain hardwired control unit and micro programmed control unit
5.b) Define Interrupt? Explain the various types of interrupts.
6 a) Explain the various addressing modes with examples.

6 b) Explain the basic organization of micro programmed control unit

(OR)

7 a) Explain data transfer, data manipulation and program control instructions

7 b) Explain about Stack Organization

8 a) Describe in detail about input-output-processor (IOP) organization

 b) Explain in detail about arithmetic and instruction pipeline

(OR)

9 a) Explain the instruction format of vector processor

9 b) List out the limitations of instruction pipeline.

10 a) Explain briefly about memory hierarchy

b) Define and discuss the types of replacement algorithms**.(8M+8M)**

(OR)

11 a) Define virtual memory. Explain the process of converting virtual address to physical addresses with a neat diagram

11 b) Explain the following secondary storage devices.

i).Magnetic Disc and ii) Magnetic tape

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Computer Organisation

MODEL PAPER-III

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1.   **a)** What is parity? Give its significance?
     b) What is one address, two address and three address instruction formats?

     c) What is Register Indirect Addressing mode? Give an example?

     d) Draw the circuit diagram and Truth table for half adder

     e) What is Cache memory? Mention its advantages

     f) What is the use of priority interrupt

     g) Discuss the usage of MAR and MDR in computer organization?

     h)Discuss about micro instruction sequence in fetch instruction cycle?

     i)Define asynchronous bus with read and write cycles

     j)Explain a privileged instruction in memory

PART-II

2. a) a) Define Data representation. Explain different data representations in detail.

   b) Write about bus structure.   . (8M+8M)

(OR)

3.a) Explain in detail about various arithmetic, logic and shift micro operations

3 b) Find 2's complement of the following

    i)   10010 ii) 111000 iii) 0101010 iv) 111111

         .

4 a) Explain hardwired control unit and micro programmed control unit?

b) Explain different types of computer instruction formats (8M+8M)

(OR)

5.a) Explain about Data Transfer and manipulation Instructions
5.b) Explain about DMA in detail.
6 a) Explain data transfer, data manipulation and program control instructions.

6 b) Explain about Stack Organization   **(8M+8M)**

(OR)

7 a) Differentiate between CISC and RISC

7 b) Explain BCD Adder

8 a) Define vector processing. Explain the characteristics of vector processing

 b) Explain the instruction format of vector processor.

(OR)

9 a) Explain the implementation of four stage pipelining.

9 b) Define pipelining? Explain the structure of pipeline with an example.

10 a) . Explain the following mapping functions

a).Associative Mapping and Direct Mapping

b) Set Associative mapping

(OR)

11 a) Discuss the different mapping techniques used in cache memories and their relative merits and demerits.

b) . Define the Dynamic RAM(DRAM).Explain the working of DRAM with neat diagram

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Computer Organisation

MODEL PAPER-IV

Time: 3 hours   **Max Marks: 75**

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-I

1. **a)** What Sign magnitude representation? Give an example?
   b) Draw the structure of basic computer system?

   c) What is addressing mode? List any four Addressing modes?

   d) Draw the diagram for 4 bit adder

   e) What is Virtual memory? Why it is significant?

   f) What is DMA? Write its Advantages?

   g) Define Random Access Memory and types of RAMs present

   h) List out major features of 8086 Microprocessor

   i) Explain the advantages of pipelining

   j) Explain conditional branch Instructions

PART-II

2 . Explain about the error detection codes with parity checker circuit?

(OR)

3. a)Explain various types of buses?
   b) Discuss the functions of system software?

4. Explain about Data Transfer and manipulation Instructions

(OR)

5. . Explain the instruction cycle with help of a flow chart

6. Explain all Addressing modes with numerical example

(OR)

7. Discuss about Computer arithmetic operations
   a) addition and subtraction
   b) Multiplication Algorithms
   c) Division Algorithms
   d) Floating-point Arithmetic Operations
8. Explain the instruction format of vector processor
(OR)
9. Explain the DMA transfer technique with the block diagram.
10. Write short notes on the following
a)Virtual memory
b)Hit ratio
c) Cache coherency
(OR)
11. Discuss the different mapping techniques used in cache memories and their relative merits and demerits

R15A0461

Digital Logic Design

Code No: R15A0461

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: **Digital Logic Design**

MODEL PAPER-I

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. Answer **ALL** the question in **Part-A**

3. Answer any **THREE** Questions from **Part-B**

PART-A

1.   a) What are the characteristics of 2's complementnumbers?

b) State the purpose of reducing the switching functions to minimalform.
c) Define half adder.

d) What are the basic operations in Boolean algebra?

e) How do you convert one type of flip-flop into another?

f) What are shift registers?

g) What is the basic architecture of a PLA?

h) Compare a decoder with a Demultiplexer.   (3M+3M+2M+3M+3M+2M+3M+3M)

PART-B

2.   a) The solution to the quadratic equation $x^2 - 11x + 22 = 0$ is x = 3 and x = 6. What is the base of numbers.

b) Using 10's complement, subtract

i) 72532_{10}- ii) 3250_{10}-72532_{10}.

What do you infer from the results. (8M+8M)

3. Using K-map method determine the prime implicant and obtain the possible minimal expression for the following function

F(A,B,C,D) = Σm(8,12,13) + d(1,2,4,6,7,11)   (16M)

4. a) Implement the following switching function using a Four input multiplexer

F(A, B, C, D) = Σm (0, 1, 2, 4, 6, 9, 10, 13, 14)

b) A Combinational circuit is defined by the following three Boolean functions

$F_1 = x'y'z' + xz$ $F_2 = xy'z' + x'y$ $F_3 = x'y'z + xy$

Design the circuit with a decoder and external gates.   (8M+8M)

5. a) Define the following terms related to flip-flops.

i) set-up time ii) hold time iii) propagation delay iv) preset and v) clear.
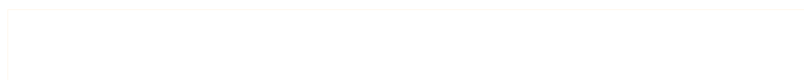
b) Discuss D-type edge- triggered flip-flop in detail?   (9M+7M)

6. Design a resister to perform left shift and right shift for the following data 10110101 ? (16M)

7. a) Implement the following Boolean function using PAL

i) $F_1(x, y, z) = \sum m (0, 1, 3, 6, 7)$ ii) $F_2(x, y, z) = \sum m (0, 2, 3$

b) Compare PLA with PROM?

Code No: R15A0461

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: **Digital Logic Design**

MODEL PAPER-II

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. Answer **ALL** the question in **Part-A**

3. Answer any **THREE** Questions from **Part-B**

PART-A

1. a) How are negative numbersrepresented?

b) What is a cell of a K-map?

c) Define full Subtractor.

d) Write the Boolean algebraic laws.

e) What is meant by race around condition in flip-flops?

f) What is the basic difference between a shift register and a counter?

g) Give the comparison between PROM, PLA, and PAL.

h) What is a standard SOP form?   (2M+3M+2M+3M+3M+2M+3M+3M)

PART-B

2. a) What is the advantage of 1's and 2's complement in computers. Represent +45 and -45 in sign-magnitude, sign-1's complement and sign-2's complement representation.

   b) Explain about Weighted and non-weighted codes   (8M+8M)

3. a) Prove that AND - OR network is equivalent to NAND-NAND network b) Define the following terms with respect to K-Map with an example.

   i) Prime implicant   ii) Redundant terms

   iii) Essential Prime implicant iv) Octet   (8M+8M)

   b) Implement Half adder using 5 NAND gates   (8M+8M)

5. a) Convert a T flip flop to D type flip flop.

6. a) Draw and explain 4-bit universal shift register.
   b) Explain different types of shift registers.
                                                                (8M+8M)

7. List the PLA programming table and draw the PLA structure for the BCD-to-Excess-3-code converter.   (16M)

Code No: R15A0461

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Digital Logic Design

MODEL PAPER-III

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. Answer **ALL** the question in **Part-A**

3. Answer any **THREE** Questions from **Part-B**

PART-A

1. a) What do you mean by end around carry? When does it come into picture?

b) What is the importance of Universal Gates?

c) Define Encoder.

d) What is a prime implicant in K-map?

e) Distinguish between synchronous and asynchronous latches?

f) What are the applications of shift registers?

g) Is it possible to share the product terms between different outputs in a PLA? If yes, how?

h) What is the advantage of SOP and POS forms of realization?

(2M+3M+2M+3M+3M+2M+3M+3M)

2. a) The binary numbers listed have a sign bit in the left most position and, if negative
   numbers are in 2's complement form. Perform the arithmetic operations indicated and
   verify the answers.

   i) 101011 + 111000   ii) 001110 + 110010   iii) 111001 – 001010 iv) 101011 – 100110

   b) Explain about Weighted and non-weighted codes   (8M+8M)

3. List out the Basic Theorems and Properties of Boolean Algebra. Justify with Proof.   (16M)

4. a) Implement the following functions on decoder logic

   Y_1= Σ(0,1,3,6,7), Y_2= Π(0,2,4,7), Y_3= Π(1,3,6,7)

   b) Realize a full sub tractor using MUX.   (8M+8M)

5. a) Determine how the circuit shown in Fig. 1 functions as a T-type flip-flop. What problem
   would there be when T= 1 and how could it be resolved.

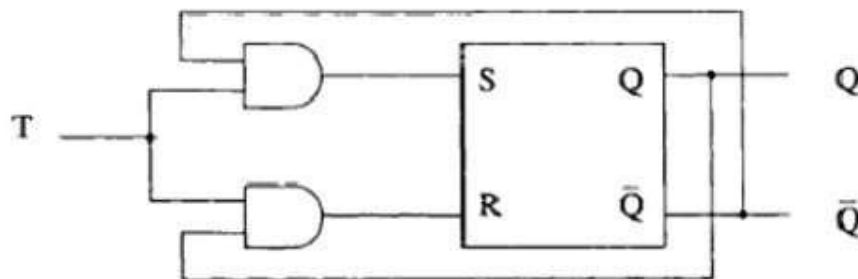Figure 1

   b) Convert a SR flip-flop to D type flip flop?   (8M+8M)

6. a) Draw the logic diagram for a 4-bit binary ripple down counter using positive edge triggered
   flip-flops.

b) Explain different types of shift registers. (8M+8M)

7. a) Draw and explain the block diagram of PLA.

b) Tabulate the PLA programmable table for the four Boolean functions given below:

$F_1(x,y,z) = \Sigma m\ (1,2,4,6)$

$F_2(x,y,z) = \Sigma m\ (0,1,6,7)$

$F_3(x,y,z) = \Sigma m\ (2,6)$

$F_4(x,y,z) = \Sigma m\ (1,2,3,5,7)$. (8M+8M)

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH II YEAR I-SEM

Subject: Digital Logic Design

MODEL PAPER-IV

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. Answer **ALL** the question in **Part-A**

3. Answer any **THREE** Questions from **Part-B**

PART-A

1. a) Why is the binary number system used in digital systems?

    b) State the Duality principle with example.
    c) Define Demultiplexer.

    d) What are the limitations of K-maps?

    e) What are the various methods used for triggering flip-flops?

    f) What are the advantages and disadvantages of ripple counters?

    g) How is the capacity of a PLA specified?

    h) How do you convert a decimal number into a number in any other system with base b?
                                            (2M+3M+3M+3M+3M+2M+3M+3M)

PART-B

2. a) Explain how 1's complement and 2's complement of a binary number is obtained? Illustrate by an example.

    b) What is gray code? What are the rules to construct gray code? Develop the 4 bit gray code for the decimal 0 to 15.   (8M+8M)

3. a) List the universal gates? Implement XOR & XNOR gates using universal gates?

    b) Implement the following functions in canonical Sop and Pos forms

    i) $f(A, B, C, D) = A'B + BC + CD' + ACD$

    ii) $f(A, B, C, D) = (A + B' + C)(A + D)(B' + C')(A + B + C)$

                                                (8M+8M)

4. a) Design an octal to binary encoder.

    b) Design a full subtractor and implement it using NAND gates. Explain its operation with the help of truth table?   (8M+8M)

5. a) Distinguish between combinational logic and sequential logic.
    b) How could:

    i) a JK flip-flop be used as a D-type?   ii) a JK flip-flop be used as a T-type?

        iii) a D-type flip-flop be used as a T-type?   (8M+8M)

6. a) Explain synchronous ripple counters. Compare their merits and demerits.

    b) Design a modulo -12 up synchronous counter using T- flip flops and draw circuit diagram.
                                                (8M+8M)

7. a) Realize the following Boolean function using PROM $f(x, y, z, w) = \Sigma m(0, 1, 3, 6, 8, 9, 15)$. b) Implement the following Boolean function using PLA

                                                (8M+8M)