MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Principles of Programming Languages
(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.

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PART-A (25 Marks)

1). a   Define imperative programming paradigm. Provide an example of a popular programming language that follows this paradigm. **[2M]**

   b   How do influences on language design impact the development of programming languages? Provide an example. **[3M]**

   c   What is a user-defined data type? Give an example of a user-defined data type and explain its purpose. **[2M]**

   d   Explain the concept of variable initialization. Why is it important in programming? **[3M]**

   e   Explain the concept of short-circuit evaluation in Boolean expressions. **[2M]**

   f   Explain the concept of the scope and lifetime of variables. **[3M]**

   g   Provide a language example for illustrating the implementation of abstract data types in C++. **[2M]**

   h   What is subprogram-level concurrency? Provide a brief explanation. **[3M]**

   i   Provide an overview of the basic elements of Prolog, a logic programming language. **[2M]**

   j   Provide a brief introduction to LISP, one of the functional programming languages **[3M]**

PART-B (50 MARKS)
SECTION-I

2   Discuss the programming paradigms of imperative, object-oriented, and functional programming. Provide examples of languages that represent each paradigm. **[10M]**

OR

3   Discuss the concept of parse trees and their role in understanding the structure of programming languages. Provide an example of a parse tree. **[10M]**

SECTION-II

4   Discuss the concept of strong typing in programming languages. Provide examples to illustrate the strong typing concept. **[10M]**

OR

5   Explore the design and implementation uses related to pointer data types. Provide examples to illustrate their practical applications. **[10M]**

SECTION-III

6   Explain the purpose and implementation of guarded commands. Provide examples to illustrate their use. **[10M]**

OR

7   Explore the concept of overloaded subprograms, covering the benefits and **[10M]**
     providing examples. Additionally, discuss the design issues related to functions
     with user-defined overloaded operators and coroutines.

SECTION-IV

8   Explore the concept of abstract data types in detail, covering abstractions,   **[10M]**
     encapsulation, and design issues. Provide examples to illustrate each point.

OR

9   Explain the basics of exception handling, including exceptions, exception   **[10M]**
     propagation, and the role of exception handlers in Ada, C++, and Java.

SECTION-V

10   Write a comprehensive introduction and overview of logic programming   **[10M]**
     languages. Discuss their key characteristics and applications, emphasizing the
     strengths of this programming paradigm.

OR

11   Discuss the applications of functional programming languages in various domains,   **[10M]**
     such as artificial intelligence, data analysis, and mathematical modeling.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Mathematical Foundation of Computer Science
(CSE)

Roll No										

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

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PART-A (25 Marks)

1). a   Write converse and contrapositive of the following conditional statement   **[2M]**
           "If a triangle is not isosceles then it is not equilateral".

   b   Using the statements R: Arjun is Happy H: Arjun is rich.   **[3M]**
        Write the following statement in symbolic form,
        i) Arjun is neither happy nor rich.
        ii) Arjun is poor or he is both rich and unhappy.

   c   Define a Group and Subgroup.   **[2M]**

   d   Let the relation $R = \{(1,2),(2,3),(3,3)\}$ on the set {1, 2, 3}. Find the transitive   **[3M]**
        closure of R.

   e   Define Sum rule and product rule.   **[2M]**
   f   How many permutations can be made with letters of the word ENGINEERING?   **[3M]**
   g   What is the generating function of the sequence 8,26,54,92...........   **[2M]**
   h   Determine the coefficient of x^{12} in $x^3(1-2x)^{10}$ **[3M]**
   i   Define a planar graph.   **[2M]**
   j   Draw the graph with the degree sequence 2,2,3,3,3. If possible   **[3M]**

PART-B (50 MARKS)
SECTION-I

2.a)   Is (p → q) → ((p → q) → q) a tautology?   **[4M]**
  b)   Verify that the following argument is valid by using the rule of inference.   **[6M]**
        If Clifton does not live in France, then he does not speak French.
        Clifton does not drive a Datsun.
        If Clifton lives in France, then he rides a bicycle.
        Either Clifton speaks French, or he drives a Datsun.
        Hence, Clifton rides a bicycle.

OR

3.a)   Obtain the principle conjunctive normal form of   **[5M]**
        (p→(q∧r)) ∧ (¬ p→(¬q∧¬ r)).
  b)   Using proof by contradiction method,prove P→¬S is a valid argument from the   **[5M]**
        premises P→(QVR), Q→¬ R, S→¬R, P.

SECTION-II

4.a) Let A= {1, 2, 3, 4, 6, 8, 12, 24}.Draw the Hasse diagram on set A under the partial ordering relation "divides". **[5M]**

b) Find all group homomorphisms from Z_4 into Z_{10} . **[5M]**

OR

5.a) Determine whether each of these functions is a bijection or not from R to R **[6M]**
i)$f(x) = -3x + 4$ ii)$f(x) = -3x^2 + 7$
iii)$f(x) = (x + 1)/(x + 2)$ iv)$f(x) = x^5 + 1$

b) Define a Semi group and Monoid. Give an example of a Monoid which is not a group. **[4M]**

SECTION-III

6.a) How many different arrangements of the word ELLIPSE are possible if **[4M]**
    i) There are no restrictions
    ii) The arrangement starts with S

b) State pigeonhole principle. Show that in a group of 367 people there must be atleast one pair with same birthday. **[6M]**

OR

7.a) In how many different ways can the letters of the word CORPORATION be arranged so that the vowels always come together. **[4M]**

b) In a survey of 100 students, it was found that 30 studied Mathematics, 54 studied Statistics, 25 studied Operations Research, 01 studied all the three subjects, 20 studied Mathematics and Statistics, 3 studied Mathematics and Operation Research and 15 studied Statistics and Operation Research. Find how many students studied none of these subjects and how many students studied only Mathematics? **[6M]**

SECTION-IV

8 Solve the recurrence relation $a_{n+2} + 3a_{n+1} + 2a_n = 3^n$ for n≥ 0, $a_0 = 0$, $a_1 = 1$ using characteristic root method. **[10M]**
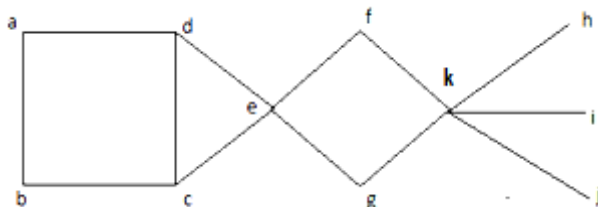
OR

9 Solve the recurrence relation $a_n + a_{n-1} - 8a_{n-2} - 12a_{n-3} = 0$ for n >= 3, given that $a_0 = 1$, $a_1 = 5$, $a_2 = 1$ **[10M]**

SECTION-V

10.a) Find the Hamiltonian circuit if exists of the following graph. **[5M]**
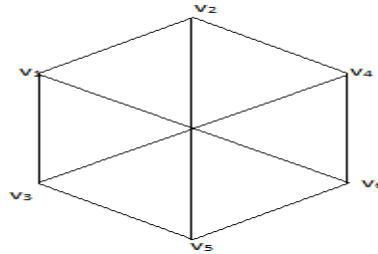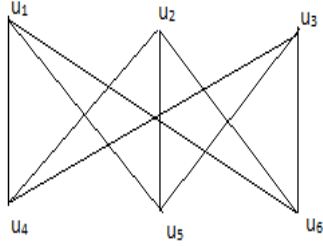

b) Draw the spanning tree for the following graph using BFS Algorithm. **[5M]**

11.a)   Show that the following graphs are isomorphic or not.   **[6M]**

b)   Write the chromatic number of complete graph, cycle graph, bipartite graph,   **[4M]**
regular graph.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Probability and Statistics
(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,
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PART-A (25 Marks)

1). a   A continuous random variable has the pdf **[2M]**
$$f(x) = \begin{cases} kx^2 & for\ \ 0 < x < 1 \\ 0, & otherwise. \end{cases}$$ Determine k.

  b   State and Prove Addition Theorem for two variables. **[3M]**

  c   Write the properties of Correlation Coefficient **[2M]**

  d   Calculate the regression coefficient **[3M]**

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

  e   Define Point and Interval Estimattion. **[2M]**

  f   *The* mean and standard deviation of a population are 11795 and 14054 respectively. If n=50, find 95% confidence interval for the mean. **[3M]**

  g   Explain One-tailed and Two-tailed tests. **[2M]**

  h   Among 900 people in a state 90 are found to be chapathi eaters. Construct 99% confidence interval for the true proportion. **[3M]**

  i   Find the value of xyz if $\begin{bmatrix} 0 & x & \frac{1}{3} \\ 0 & 0 & y \\ \frac{1}{3} & \frac{1}{4} & z \end{bmatrix}$ is a tpm. **[2M]**

  j   Define i) Transition Matrix ii) Regular Matrix iii) Ergodic chain. **[3M]**

PART-B (50 MARKS)
SECTION-I

2   A Random variable X has the following Probability function : **[10M]**

X	0	1	2	3	4	5	6	7
P(X)	0	K	$2K$	$2K$	$3K$	K^2	$2K^2$	$7K^2 + K$

(i) Determine K (ii) Evaluate $P(X < 6)$, $P(X \geq 6)$, $P(0 < X < 5)$ and

$P(0 \leq X \leq 4)$ (iii) $P(X \leq K) > 0.5$, find the minimum value of K and,

(iv) Determine the distribution function of X (v) Mean (vi) Variance.

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

3   A Continuous random variable has the p.d.f   **[10M]**

$$f(x) = \begin{cases} k(1-x^2) & \text{if } 0 \le x \le 1 \\ 0 & \text{, otherwise} \end{cases}$$

Determine

K   ii. Mean   iii. Variance

SECTION-II

4   Calculate the coefficient of Rank Correlation   **[10M]**

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

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

5   Find the regression line of x on y and y on x for the following data   **[10M]**

X	10	12	13	16	17	20	25
Y	10	22	24	27	29	33	37

SECTION-III

6   A population consists of five numbers 3,6,9,15,27 .Consider all possible samples   **[10M]**
of size two that can be drawn with replacement from this population. Find
   i)   The population Mean
   ii) The population standard deviation
   ii)The mean of the sampling distribution of means
   iv))The standard deviation of the sampling distribution of means

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

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

SECTION-IV

8   Pumpkins were grown under two experimental conditions. Two random samples   **[10M]**
of 11 and 9 pumpkins, show the sample standard deviations of their weights as
0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test
the hypothesis that the true variances are equal.

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

9   Two random samples gave the following results: **[10M]**

Sample	Size	Sample Mean	Sum of Squares of Deviation from the Mean
1	10	15	90
2	12	14	108

Test whether the samples came from the same population.

SECTION-V

10   An urn A contains 5 red, 3 white and 8 green marbles while urn B contains 3 red   **[10M]**
and 5 white marbles.
A fair die is tossed; if 3 or 6 appears a marble is chosen from B otherwise from A.
Determine the
probability that a) a red marble is chosen, b) a white marble is chosen , c) a green
marble is chosen.

11 Find the equilibrium vector $\begin{bmatrix} 0.5 & 0.2 & 0.3 \\ 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \end{bmatrix}$. **[10M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Electronic Devices and Circuits
(ECE & CSE)

Roll No										

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

Note: This question paper contains two parts A and B
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PART-A (25 Marks)

1)	a	Write Diode current equation	**[2M]**
	b	Write the effect of temperature on diode characteristics.	**[3M]**
	c	What are the Harmonic components in a Rectifier	**[2M]**
	d	What is the need of rectifier? List different types of rectifiers	**[3M]**
	e	Define alpha and beta of the transistor	**[2M]**
	f	Make use of the values of transistor has β=150, find the collector and base current if IE= 10mA	**[3M]**
	g	What is operating point	**[2M]**
	h	What is thermal runaway	**[3M]**
	i	Define pinch off voltage of a FET	**[2M]**
	j	Differentiate Enhancement and Depletion MOSFET	**[3M]**

PART-B (50 MARKS)
SECTION-I

2	Describe the principle of operation and characteristics of tunnel diode with the help of Energy Band diagrams	**[10M]**

OR

3	With suitable expressions explain transition and diffusion capacitance	**[10M]**

SECTION-II

4	A. With suitable wave forms explain bridge rectifier	**[6M]**
	B. Describe the working of a Zener Diode as a Voltage Regulator	**[4M]**

OR

5	Derive the equation for the efficiency of a half wave rectifier circuit	**[10M]**

SECTION-III

6	Draw the circuit diagram of an NPN junction transistor in CE configuration and describe its characteristics	**[10M]**

OR

7	Explain the construction and working of BJT.	**[10M]**

SECTION-IV

8   Explain the collector to base bias method along with circuit diagram and derive   **[10M]**
     the stability factor for it

OR

9   Draw and explain the circuit for bias compensation using diode   **[10M]**

SECTION-V

10   A. Explain how FET works as voltage variable resistor   **[6M]**
         B. Compare BJT and FET   **[4M]**

OR

11   Explain the constructional features of a depletion mode P-channel and   **[10M]**
     Enhancement mode MOSFET and explain its basic operation

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, January 2024
Digital Logic Design
(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,
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PART-A (25 Marks)

1). a   Convert $(125)_{10}$ to octal   **[2M]**

b   Construct AND gate using NAND gate   **[3M]**

c   What is Prime Implicants?   **[2M]**

d   Simplify A(B+C)+AB+ABC using Boolean's theorems   **[3M]**

e   Construct 2:1 multiplexer?   **[2M]**

f   Design a half adder logic circuit   **[3M]**

g   Differentiate between combinational and sequential circuits   **[2M]**

h   What is a ripple counter?   **[3M]**

i   List various types of semiconductor memories   **[2M]**

j   What is memory read and write operations?   **[3M]**

PART-B (50 MARKS)
SECTION-I

2   Explain the Binary codes with examples?   **[10M]**

OR

3   State De'Morgan theorems. Simplify the following Boolean expressions to   **[10M]**
minimum number of literals (i) x y z +x′ y+ x y z′ (ii) (x +y) (x + y′).

SECTION-II

4   Simplify the following Boolean function using K-map: **[10M]**
$F(A,B,C,D)= \sum m(1,3,7,11,15) + \sum d(0,2,5)$

OR

5   Simplify the expression Y= π (7, 9, 10, 11, 12, 13, 14, 15) using the k-map method   **[10M]**

SECTION-III

6   Explain the design procedure for multiplexers and draw the logic diagram of a 4-   **[10M]**
to-1 line multiplexer with logic gates

OR

7   Describe BCD to excess-3 Code Conversion with truth table and logic diagram   **[10M]**

SECTION-IV

8   Explain the working of the following   **[10M]**
i) S- R flip-flop ii) D flip-flop

OR

9   Design a counter with the following repeated binary sequence: 0, 1, 2, 3, 4, 5, 6 .   **[10M]**

SECTION-V

10   Realize the functions using PAL   **[10M]**
F1(A,B,C, D)= Σ(2, 12, 13)
F2(A,B,C,D)= Σ(7, 8, 9, 10, 11, 12, 13, 14, 15)

OR

11   Explain about RAM in detail.   **[10M]**

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Page **2** of **1**