KMM INSTITUTE OF POSTGRADUATE STUDIES::TIRUAPTI

MCA-101 / I - Semester / Pre-Final Examination / DMS

A

Time : 3hrs **Max.Marks:100**

PART – A

Answer any FIVE questions **5 X 5 = 25**

1. What is a Preposition ? Write the difference between Declarative & Non-declarative statement?
2. What are Connectives? Show that $(P\rightarrow Q)\wedge(Q\rightarrow P)$ and $P\leftrightarrow Q$ are logically equal using Truth Table
3. Prove that $(3+\sqrt{5})^n+(3-\sqrt{5})^n$ is divisible by 2^n, n>=0
4. What is Mathematical Induction? Prove that $1^2 + 3^2 + 5^2 +\ldots\ldots+(2n-1)^2 = [n(2n-1)(2n+1)]/3$
5. What is Counting? Explain about sum rule Principle with an example?
6. (a) If a child can draw 2 faces and three kinds of Hats then how many cartoons can she produce?
   (b)How many three digit numbers can be formed by using 1,3,4,5,6,8,9 if digits are repeated?
7. State and prove Inclusion Exclusion Principle?
8. (a) If A={ a, b, c, d, e} B= (c, e, f, h, k, m} verify | A U B | = |A| + |B| - | A ∩ B|
   (b) A= { x/ x is a positive integer < 8} B= {x / x is a positive integer 2<=x<=5}
9. What is a Graph? Discuss about types of Graphs with an example?
10. Explain coloring of a graph with an example?

PART – B

Answer any ONE question from each unit **5 X 15 = 75**

UNIT-I

11. (a) Show that $P^{\vee}(Q\wedge R)$ and $(P^{\vee}Q)\wedge(P^{\vee}R)$ are logically equivalent using Truth table?
    (b)Show that $(P\cap Q)\rightarrow (P\cup Q)\equiv T$

(OR)

12. (a)Prove that the premises a->(b->c), d-> (b ∧ ~ c) and (a ∧ d) are Inconsistent
    (b) Using Indirect method of proof derive P →~ S from P→(Q V R) , Q→ ~ P , R→ ~ S , P

UNIT-II

13. What is Recursion? Explain the Algorithm for merge sort with an example.

(OR)

14. Write a program in Java and explain how to find HCF of two given numbers using Recursion

UNIT-III

15. (a)State and prove Pigeon hole Principle?
    (b)Find minimum number of integers to be selected from {1,2,3,4,5,6,7,8,9} so that
    (i) Sum of 2 integers is even (ii) Difference of 2 integers is odd

(OR)

16. Show that i) nPr = n!/(n−r)! ii) nCr = nPr/r! = n!/(n−r)!r!

UNIT-IV

17. What is a Recurrence Relation? How many types of Solution are there to solve the relation?
    (i) Find the solution for the recurrence relation $a_n= a_{n-1}+(n-1)$ where n>= 2 and $a_1=0$
    (ii)Solve the recurrence relation for Fibonacci sequence 1, 1, 2, 3, 5, 8, 13 **(OR)**

18. In a survey of 120 passengers an airline company found 52 enjoyed wine with their meal, 75 enjoyed mixed drinks and 62 enjoyed ice Tea.35 enjoyed any given pair of these beverages, and 20 passengers enjoyed all of them. (a) Find No. of Passengers who enjoyed only ice Tea? (b)Exactly 2 of the drinks (c) only one of the 3 drinks (d) Choose none of the drinks.

UNIT-V

19. (a) Prove that a graph is Bipartite if and only if it contains no od cycles?
(b)Prove that a simple graph with 'n ' vertices and 'k' components can have at-most [(n-k) *(n-k+1)] /2 edges

(OR)

20. Explain Floyd- Warshall's algorithm with an example?

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PART – A

Answer any FIVE questions **5 X 5 = 25**

1. Write the Contra positive, Converse, Inverse for the Statement
   "The Home Team Wins Whenever It Is Raining" P→Home Team Q→It is Raining
2. What is a Tautology? Show that $P \wedge (P \rightarrow Q) \rightarrow Q$ is a Tautology ?
3. Prove that 2+5+8+11+…….+(3n-1) = [n(3n+1)]/2 , n>=1
4. Write a recursive algorithm to find Maximum & Minimum numbers in an array?
5. State and prove Sum & Product Rule Principles with an example?
6. (a)Write the differences between Permutation & Combination?
   (b)If 1/6! +1/7! = x/8! then find the value of x?
7. (a)In how many ways can the letters of the word "MISSISSIPPI" be arranged?
   (b)In how many ways the same word can be arranged so that P's are together?
8. Out of 30 PC's owned by faculty members in certain university department, 20 runs Windows,8 has 21 Inches monitors,25 has CD-ROM drives,20 has at least 2 of these features, and 6 has all the three. How many faculties have PC's exactly with one features?
9. Define the following with an example? (a) Graph (b)Bi-parity graph (c)Trail (d)Cyclic graph
10. How many ways can a graph can be represented? Give an example for each?

PART – B

Answer any ONE question from Each Unit **5 X 15 = 75**

UNIT-I

11. Define Propositional Logic? Explain(a)Conjunction (b)Disjunction (c)Bi-Conditional
    (d) Tautology (e) Contradiction using Truth Table?

(OR)

12. (a)Show that (a) $\sim(P \rightarrow Q) \equiv (P \wedge \sim Q)$ and (b)$\sim(P \vee (\sim P \wedge Q)) \equiv (\sim P \wedge \sim Q)$ are equivalent using rules of Inference?
    (b)What is an Existential Quantifier? Give an example?

UNIT-II

13. (a)What is a Recursion Algorithm? Write an Algorithm to find GCD to given numbers?
    (b)How may number of six digits can be formed form the digits (3, 4, 5, 6, 7, 8) and how many of them are not divisible by 5? **(OR)**
14. (a)Show that n^3+2n is a multiple 0f 3 using Mathematical Induction.
    (b)Show that 3^n+7^n-2 is divisible by 8, where n>=1 using Mathematical Induction.

UNIT-III

15. (a)State and Prove Binomial Coefficient Theorem?
    (b)In how many ways a committee of 6 men and 4 women be formed out of 15 Men & 8 women?
    (c)A box contains 6 White Balls & 5 Red Balls. In how many ways 4 Balls can be drawn from the box if they can be of any color? **(OR)**
16. (a)If $n_{c8}=n_{c2}$ then find n_{c2}
    (b)How many word with or without meaning each of 2 vowels and 3 Consonants can be Formed from the letters of the word " DAUGHTER"?

UNIT-IV

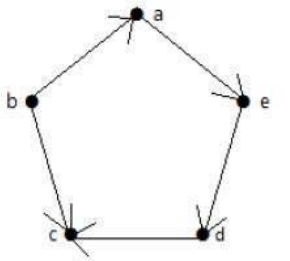
17. (a)What is a Recurrence Relation? Solve S(k) +3S(k-1)-4S(k-2)=0, where S(0)=3 and S(1)=-2
    (b)Solve S(k)+6S(k-1)+12S(k-2)+8S(k-3)=0

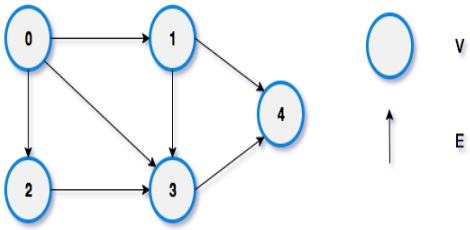
(OR)

18. Prove theorem of Permutation?

UNIT-V

19. (a)What is In-degree & Out-degree of a Graph Give an Example ?
    (b) Construct In-degree & Out-degree for the given graph?





(OR)

20. Explain Dijkster's Shortest path algorithm with an example?