K19P 1381

Reg. No. : .....

Name : .....

I Semester Master of Computer Application (M.C.A.) Degree
(Reg./Supple./Imp.) Examination, November - 2019
(2014 Admission Onwards)
MCA1C01 : DISCRETE MATHEMATICS

Time : 3 Hours **Max. Marks : 80**

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SECTION - A

Answer any **ten** questions. Each question carries **three** marks. **(10×3=30)**

1. Construct the truth table for the compound proposition.
   $(p \to q) \leftrightarrow (\neg p \to \neg q)$.
2. State De Morgan's law for logic.
3. Negate and simplify the compound statement $(pVq) \to r$
4. Explain bijection functions with example.
5. Write a note on computer representation of sets.
6. Draw the venn diagram for.
   $(A-B) \cup (B-C) \cup (A-C)$
7. Explain transitive relations with example.
8. Explain transitive closure with example.
9. State the Pigeonhole principle.
10. Compute the number of ways in which 3 boys and 2 girls are to be seated such that no two boys and no two girls sit together.
11. How many edges are there in a graph with 10 vertices each of degree 6?
12. Write a note on Euler and Hamilton paths.

SECTION - B

Answer **all** questions. Each question carries **ten** marks. (4+6)

13. a) i) Check whether $(\neg p \wedge (p \to q)) \to \neg q)$ is a tautology?

P.T.O.

ii) What are the contra positive, the converse and the inverse of the conditional statement "If you work hard then you will be rewarded".

(OR)

b) Obtain the PDNF and PCNF of $(P \wedge Q) V (\neg P \wedge R)$ **(10)**

14. a) i) Show that $(A \cap B) \times (C \cap D) = (A \times C) \cap (B \times D)$

ii) What is the Cartesian product AXBXC, where A={0,1}, B={1,2} and C={0,1,2}? **(5+5)**

(OR)

b) i) Define an even function. Let f(x) and g(x) be even function. Prove that is fog(x) is also even. **(5+5)**

ii) Determine whether the function $f(x)=x^2$ from the set of integers to the set of integers is one-to-one.

15. a) Define binary relation and state its properties. State the applications of n-ary relations. **(10)**

(OR)

b) i) Explain Warshall's algorithm with suitable example. **(6+4)**

ii) Explain the different ways of representing relations with example

16. a) i) Define recurrence relation. Define a sequence recursively for all integers $K \geq 2$ **(7+3)**

- $C_k = C_{k-1} + k. C_{k-2} + 1\ C_{0=1}$, $C_1=2$. Find C_2, C_3, C_4 and C_5
- $C_k = C_{k-1} + C_{k-2} + 2k+1$, $C_{0=1}$, $C_{1=2}$. Find C_2, C_3, C_4 and C_5

ii) How many permutations of the letters ABCDEFGH contain the string ABCD

(OR)

b) i) Each user on a computer system has a password ,which is six to eight characters long where each character is an upper case letter or digit. Each password must contain at least one digit. How many possible passwords are there? Use counting principle to solve this. **(6+4)**

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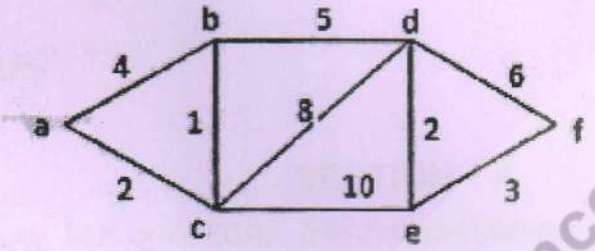
ii) Using Pigeonhole principle show that among any n+1 positive integers not exceeding 2n there must be an integer that divides one of the other integer

17. a) i) Using Dijkstra's algorithm, find the shortest path for the following **(7+3)**



ii) Deline Tree and list its properties

(OR)

b) i) Explain Depth-first search to find spanning tree for the graph with example **(6+4)**

ii) Explain connected graph and a disconnected graph with example.

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