OMEGA PG COLLEGE MBA&MCA

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PaperCode–PCC101

Course:DISCRETE MATHEMATICS

Important Questions:

UNIT-1

1. (a). What do you mean by composition of functions? Let the functions from R→ R defined as f (x) = x + 3, g(x) = x -4 and h(x) = 5x. Find f o (g o h) (x), (f o g)o h(x)
   (b). Let f: Z → Z defined as f(a)= a+1 for a belongs to Z. Find whether f is bijection or not ?
2. Prove the following set of identities
   a. A – (B ∩ C) = (A – B) ∪ A – C)
   b. (A ∪ B)∩ C = (A∩ C) ∪ (B ∩ C)
3. Define equivalence relation with the help of suitable example. Prove that the relation R: Z×Z ={(a, b)/(a-b)mod3=0} is an equivalence relation.
4. Define Partial Order Relation. Prove that Every partial order relation need not be a total order relation with an example problem.
5. State and Prove Cantor' s Schroder-Bernstein theorem
6. Using Principle of mathematical induction show that 1+2+3+.....+n = n(n+1)/2 for all n belongs to N.

UNIT-2

7. Explain Principle of inclusion and exclusion with generalization theorem.
8. Find the number of integers from 1 to 1000 inclusive and divisible by none of 5, 6 & 8.
9. How many integers from 1 to 10^6 inclusive are neither perfect squares, perfect cubes, nor perfect fourth powers.
10. a). Explain the Pigeon hole principle and its applications
    b). Show that at least two people must have their birthday in the same month if 13 people are assembled in a room.
11. a). Find the number of ways in which the letters of the word ARRANGEMENT can be arranged so that two R' s and two A' s do not occur together
    b). How many different committees can be formed consisting of 4 men and 3 women out of 7 men and 5 women
12. How many integral solutions are there of x1+x2+x3+x4+=20, if 1< =x1<=6, 1 < = x2 < = 7, 1< = x3 < = 8, 1 < = x 4 < = 9?

UNIT-3

13. Give truth tables for (i) ¬p (ii) p ∨ ¬q (iii) ¬p ∨ q (iv) p → ¬q (v) p ↔ q
14. Write the converse inverse and contra positive definitions and give those for the following logical implications.
    a. If x and y are numbers such that x = y , then $x^2 = y^2$
    b. If a quadrilateral is a square then it is a rectangle
15. (a) Prove that : (p ↔ q) ∧ (q ↔r) ⇒ (p ↔r) is a tautology.
    (b) Show that : ~ (p → q) ⇔ p ^ (~ q).

16. (a) $[\sim r \rightarrow (p \rightarrow q)] \Leftrightarrow [(p \wedge \sim q) \rightarrow r]$ prove this logical equivalence without using truth table
    (b) Show that $r \wedge (p \vee q)$ is a valid conclusion from the premises $p \vee q$, $q \rightarrow r$, $p \rightarrow m$ and $\sim m$.
17. (a) Prove that if n=ab where a & b are positive integers, then $a \leq \sqrt{n}$ or $b \leq \sqrt{n}$
    (b) Explain necessity and sufficiency and give simultaneously necessity and sufficiency example.
18. (a) Show that $R \rightarrow S$ can be derived from the premises $P \rightarrow (Q \rightarrow S)$, $\sim R \vee P$ and Q
    (b) Prove that if 3n+2 is odd then n is odd by proof technique contradiction method

UNIT-4

19. Define Algebraic structure, binary operation on a set , different types of algebraic structures.
20. Write briefly about Semi groups, Monoids and Groups; Define free and cyclic groups.Problems based on those.
21. Prove that (Z, *)is an abelian group where Z is the set of all integers and the Binary operation is defined as $a*b=ab/2 \forall a, b \in G$
22. Define Ring, and give properties of Rings. Define homomorphism of a Ring.
23. State and prove Lagranges theorem.
24. Define homomorphism, kernel of a homomorphism, and prove the properties of a homomorphism

UNIT-5

25. Explain about Breadth first search and Depth first search with examples
26. State and prove Grinberg’s theorem
27. Explain about Kruskal’s and Prim’s algorithm for finding minimal spanning tree
28. Explain about Isomorphic graphs with examples
29. WritebrieflyaboutIsomorphism,EulerianandHamiltonianandwalksGraphs?
30. WriteaboutBi-ConnectedComponentandArticulationPoints?