D 53554 (Pages : 3) Name.....

Reg. No.....

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, JANUARY 2014

(UG—CCSS)

Complementary Course

CA IC02—DISCRETE MATHEMATICS

Time : Three Hours Maximum : 30 Weightage

Part A (Objective Type Questions)

Answer **all** *questions.*

1. Find the value of $p(n, 0)$:

   (a) 1. (b) n.

   (c) 0. (d) $n!$.

2. What is the order of the recurrence relation $a_r - 6a_{r-1} + 8a_{r-2} + a_{r-3} = 0, r23$.

   (a) 0. (b) 3.

   (c) 2. (d) 1.

3. The equivalent statement of $(P \to Q) \wedge (Q \to P)$ is :

   (a) $P \rightleftharpoons Q$. (b) $P \wedge Q$.

   (c) $P \vee Q$. (d) $\sim P \vee \sim Q$.

4. $\frac{p(n, r)}{c(n, r)}$ is :

   (a) $n!$. (b) $r!$

   (c) $(n - r)!$ (d) 1.

5. The negation of $\forall x, p(x)$ is _____.

6. The value of $\frac{n!}{(n-3)!}$ is _____.

7. Value of $c(n, 1)$ is _____.

8. If $p = T$ and $q = F$ then $\sim P \to Q$ is _____.

9. Every group is abelian. True or False.

Turn over

10. $p(n, r) = p(r, n)$. True or False.

11. Every field is an integral domain. True or False.

12. Does $p(n, r)$ exist for $n < r$?

(12 × ¼ = 3 weightag

Part B (Short Answer Questions)

Answer **all** *questions.*

13. Evaluate $p(n, r)$ and $c(n, r)$ for $n = 6$ and $r = 4$.

14. Define skew field.

15. Write the truth table for $(P \vee Q) \rightarrow (P \wedge Q)$.

16. Write the following statement in symbolic form.

"If either Jerry takes calculus or Ken takes sociology, then Lassy will take English".

17. Define zero divisor of a ring.

18. Show that binary operator * defined on Q^+ by $a * b = \frac{ab}{2}$ is a group.

19. Solve the recurrence relation $a_r = a_{r-1} + a_{r-2}$.

20. If $c(n, 9) = c(n, 8)$. Find $c(n, 17)$.

21. Find the number of ways to point 12 offices so that 3 of them will be given, 2 of them pink, 2 them Yellow and the remaining are white.

(9 × 1 = 9 weightag

Part C (Short Essay Questions)

Answer any **five** *questions.*

22. Solve the recurrence relation

$$a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r \quad ; r \geq 2.$$

23. Show that

$$c(n, r) + c(n, r-1) = c(n+1, r).$$

24. Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 2 & 5 & 3 & 1 \end{pmatrix}$ and

$\tau = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 5 & 4 & 2 & 1 \end{pmatrix}$. Show that $\sigma\tau \neq \tau\sigma$.

25. Find the value of n such that $p(n, 5) = 42\ p(n, 3)$.

26. Show that every finite integral domain is a field.

27. Show that identity element and inverse element are unique in a group.

28. If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$. Find x.

(5 × 2 = 10 weightage)

Part D (Essay Questions)

Answer any **two** *questions.*

29. If R is a ring with additive identity 0, then for any $a, b \leftarrow G$. We have

(a) $0 \cdot a = a \cdot 0 = 0$.

(b) $a(-b) = -(a)\,b = -(ab)$.

(c) $(-a)(-b) = ab$.

30. Write the truth table for $\sim(p \wedge Q) \sim p \vee \sim Q$. And verify them.

31. Find the sum of $1^2 + 2^2 + \ldots + r^2$.

(2 × 4 = 8 weightage)