

DECEMBER 2014

**P/ID 17451/RCA
PCAA**

Time : Three hours

Maximum : 75 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

1. (a) Define conditional and Bioconditional statements with an example.

Or

- (b) Construct the truth table for $(P \rightarrow Q) \wedge (Q \rightarrow P)$.

2. (a) Find the g.c.d of 1080 and 336 using Euclidean algorithm.

Or

- (b) Prove that a Subset $S \neq \emptyset$ of G is a sub group of $(G, *)$ iff for any paris of elements $a, b, ts, a * b^{-1} \in S$.

3. (a) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position correct to three decimal places.

Or

- (b) Find the real root of $3x - \cos x - 1 = 0$ by Newton's Raphson method. (Correct to 4 decimal places).
4. (a) Solve the following equations using Gauss elimination method $2x + y + z = 10$;
 $3x + 2y + 3z = 18$; $x + 4y + 9z = 16$.

Or

- (b) Apply factorisation method to solve the equations $2x + 3y + z = 9$; $x + 2y + 3z = 6$;
 $3x + y + 2z = 8$.
5. (a) Use Simpson's $\frac{1}{3}$ rd rule to find $\int_0^6 \frac{dx}{1+x^2}$
with $h = 1$.

Or

- (b) Use the Romberg's method to compute $I = \int_0^1 \frac{1}{1+x} dx$. Correct to three decimal places.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

6. (a) Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q, Q \rightarrow R$, and $\neg M$.
- (b) Define tautology and contradictions.
7. Prove that every finite group of order n is isomorphic to a permutation group of degree n .
8. Solve for a positive root of $x - \cos x = 0$ by Regula – Falsi method. Correct to four decimal places.
9. Find the positive root of $f(x) = 2x^3 - 3x - 6 = 0$ by Newton – Raphson method. Correct to five decimal places.
10. Solve $x + y + z + w = 2; \quad 2x - y + 2z - w = -5;$
 $3x + 2y + 3z + 4w = 7; \quad x - 2y - 3z + 2w = 5$ by Gauss elimination method.
11. Apply Gauss – seidal iteration method to solve the equations $8x - y + z - 18 = 0; \quad 2x + 5y - 2z - 3 = 0$
 $x + y - 3z + 6 = 0$.

12. Evaluate $\int_0^6 \frac{dx}{1+x}$ by using

(a) Trapezoidal rule.

(b) Simpson's 3/8 rule.

13. Evaluate $\int_1^2 \frac{2x}{1+x^4} dx$ using a three term Gaussian quadrature.
