

12035

21112

3 Hours / 100 Marks

Seat No.

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- Instructions :** (1) All Questions are *compulsory*.
(2) Figures to the right indicate full marks.
(3) Assume suitable data, if necessary.
(4) Use of Non-Programmable Electronic Pocket Calculator is permissible.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN :

20

- (a) Evaluate $\int \sqrt{x} (1 + x) dx$
- (b) Evaluate $\int \frac{dx}{\sqrt{3 - x - x^2}}$
- (c) Evaluate $\int \cos^2 x dx$
- (d) Evaluate $\int e^{e^x} \cdot e^x \cdot dx$
- (e) Evaluate $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$
- (f) Form the differential equation from $y = \cos (x + q)$.
- (g) A bag contains 3 red, 4 green and 2 blue balls. Two balls are drawn at random. Find the probability that getting one red and one green.
- (h) A card is drawn from a pack of 52 cards. Find the probability that a card is a diamond or a face card.
- (i) A die is tossed in a air once. Find the probability that getting odd numbers.
- (j) Solve differential equation $\frac{dy}{dx} = e^{(x-y)} \cdot x^2$
- (k) Find the area enclosed by the curves $y = x^3$, x -axis and ordinates $x = 1$ & $x = 3$.

P.T.O.

2. Attempt any FOUR :**16**

- (a) Evaluate $\int \frac{2x^2 + 5 dx}{(x-1)(x+2)(x+3)}$
- (b) Evaluate $\int \cos^3 x \cdot \sin^2 x dx$
- (c) Evaluate $\int_0^1 x^3 \tan^{-1} x dx$
- (d) Evaluate $\int_0^a \frac{\sqrt{x}}{\sqrt{a-x} + \sqrt{x}} dx$
- (e) Find the area enclosed by the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in First quadrant only.
- (f) If slope of the curve is $(x - 5)$, find its equation if it passes through pt(2, 1).

3. Attempt any FOUR :**16**

- (a) Evaluate $\int_0^{\pi/4} \log(1 + \tan \theta) d\theta$
- (b) Evaluate $\int \frac{dx}{5 + 4 \cos x}$
- (c) Find the volume of the solid generated by revolving the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$, about the x -axis.
- (d) Find the C.G. of the area enclosed by $y = x^2 - 2x$ and x -axis.
- (e) The particle starts from rest, its acceleration any time t is given by $(2t + 5) \text{ m/s}^2$, find the distance travelled in 5 seconds.
- (f) Solve $(1 + e^{x/y})dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$.

4. Attempt any FOUR :**16**

- (a) Solve $\frac{dy}{dx} = \cos(x - y)$
- (b) Solve $ydx = x \cdot dy + \sqrt{x \cdot y} dx$
- (c) Solve $\frac{dy}{dx} + \frac{y}{x} = y^3$
- (d) Solve by Gauss elimination method $x + y + z = 6$, $3x - y + 3z = 10$, $5x + 5y + 4z = 3$.
- (e) Solve by Jacobi's Method
 $20x + y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$ (three iterations only).
- (f) Solve by Gauss Seidal Method
 $10x + y + z = 12$, $x + 10y + z = 12$, $x + y + 10z = 12$ (three iterations only).

5. Attempt any FOUR :**16**

- (a) A particle is moving in a st. line according to the law of motion $x = 2 \cos 2t + 3 \sin 2t - 3$. Prove that it executes S.H.M. Find its centre and period.
- (b) The velocity of a particle is given by $v = t^2 - 6t + 7$, find displacement covered in 3 seconds.
- (c) Find the root of the equation $x^2 - 6x + 3 = 0$ using Bisection method (three iterations only).
- (d) Using Newton's Raphson Method find the approximate root of $x^3 - 3x - 5 = 0$ (three iterations only).
- (e) Solve $\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$.
- (f) Solve $(x^2 + 6xy - y^2)dx + (3x^2 - 2xy + y^2)dy = 0$.

P.T.O.

6. Attempt any FOUR :**16**

- (a) Using Regula falsi method find the root of $x^3 - x - 1 = 0$ upto three iteration.
- (b) Two cards are drawn in succession from a pack of 52 cards. Find the probability that first is King and second is Queen, if the card is
- (i) replaced (ii) not replaced
- (c) A problem is given to three students. 'A', 'B' and 'C' whose chance of solving it are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ respectively. If the attempt to solve a problem independently find the probability that
- (i) the problem is solved by each of them
- (ii) the problem is solved by at least one of them
- (iii) the problem is not solved by them
- (d) If 2% of the electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs
- (i) 3 bulbs will be defective
- (ii) at the most 2 bulbs will be defective
- (e) Assuming that 2 in 10 industrial accidents are due to fatigue. Find probability that exactly 2 out of 8 accidents will be due to fatigue by using Poisson distribution.
- (f) The mean intelligence level of a group of students is 90 with standard deviation 20. Assuming that intelligence level is normally distributed. Find the percentage of students with intelligence level over 100.
- (Given area between $z = 0$ to $z = 0.5$ is 0.1915)
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