

22206

23124

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Solve any FIVE of the following:** **10**
- a) If $f(x) = x^2 + 7x + 10$ find $f(0) + f(2)$
 - b) State whether the function $f(x) = \frac{2^x + 2^{-x}}{2}$ is odd or even.
 - c) Find $\frac{dy}{dx}$ if $y = x^{10} + 10^x + e^x + 10^{10}$
 - d) Evaluate : $\int (x^a + a^x + e^x + a^e) dx$
 - e) Evaluate : $\int \log x dx$
 - f) Find the area under the curve $y = x^2$, from $x = 0$ to $x = 3$ with X-axis.
 - g) An unbiased coin is tossed 5 times. Find the probability of getting two tails.

P.T.O.

2. Solve any THREE of the following:**12**

- a) If $x^2 + y^2 = xy$ then find $\frac{dy}{dx}$.
- b) If $x = a(\cos t + t \sin t)$ and $y = a(\sin t - t \cos t)$ then find $\frac{dy}{dx}$.
- c) Find the radius of curvature for the curve $y = 2\sin x - \sin 2x$ at $x = \frac{\pi}{2}$.
- d) A manufacturer can sell x items at price of rupees $(330 - x)$ each. The cost of producing x items in rupees is $x^2 + 10x + 12$. How many items must be sold so that his profit is maximum?

3. Solve any THREE of the following:**12**

- a) Find the equation of tangent and normal to the curve $y = \frac{6}{x}$ at $(2, 8)$.
- b) Differentiate $(\tan x)^x$ w.r.t x .
- c) If $y = \cos^{-1} \left(\frac{2x}{1 + x^2} \right)$ then find $\frac{dy}{dx}$.
- d) Evaluate $\int \frac{e^x (x + 1)}{\cos^2(x e^x)} dx$.

4. Solve any THREE of the following:**12**

- a) Evaluate $\int \frac{1}{4 - 5 \cos x} dx$.
- b) Evaluate $\int \frac{1}{\sqrt{13 - 6x - x^2}} dx$.
- c) Evaluate $\int \cot^{-1} x dx$.
- d) Evaluate $\int \frac{\log x}{x(2 + \log x)(3 + \log x)} dx$.
- e) Evaluate $\int_0^a \frac{\sqrt{x}}{\sqrt{a-x} + \sqrt{x}} dx$.

5. Solve any TWO of the following:**12**

- a) Find area between the parabola $y^2 = 4x$ and the straight line $y = 2x + 3$.
- b) Attempt the following:
- i) Form a differential equation by eliminating arbitrary constant if $y = A e^{2x} + B e^{-2x}$
- ii) Solve : $\frac{dy}{dx} = e^{2x+y} + x^2 e^y$
- c) A velocity of a particle is given by $v = t^2 - 6t + 7$. Find the distance covered in 5 seconds.

6. Solve any TWO of the following:**12**

- a) Attempt the following:
- i) The probability that a student who is freshman will graduate is 0.4. Determine the probability that out of 5 students no one will be graduate.
- ii) If 30% of the electric bulbs manufactured by company are defective. Find the probability that out of 4 bulbs 1 will be defective.
- b) In a certain factory producing cycle's tyres, there is a small chance of 1 in 500 tyres to be defective. The tyres are supplied in lots of 10. Find the approximate number of lots in a consignment of 10000 lots in which
- i) No defective tyre
- ii) Two defective tyres
- c) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal. Find
- i) How many students' score between 12 and 15?
- ii) How many students' score above 18?

[Given : $A(0.8) = 0.2881$, $A(0.4) = 0.1554$, $A(1.6) = 0.4452$.]
