

22206

12223

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 answer with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Test whether the function is even or odd if $f(x) = 3x^4 - 2x^2 + \cos x$.
 - b) If $f(x) = x^2 + 6x + 10$ find $f(2) + f(-2)$.
 - c) Find $\frac{dy}{dx}$ if $y = \log_{10}x + 3^x$
 - d) Evaluate $\int e^{2x} dx$
 - e) Evaluate $\int \sin^2 x \cdot \cos x dx$
 - f) Find the area bounded by the curve $y = x^3$, X-axis and co-ordinates $x = 1$, $x = 3$.
 - g) If the coin is tossed 5 times. Find the probability of getting head.

P.T.O.

2. Attempt any THREE of the following: 12

- a) Find $\frac{dy}{dx}$ if $x^2 + y^2 = 4xy$.
- b) If $x = a(2\theta - \sin 2\theta)$ and $y = a(1 - \cos 2\theta)$.
Find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$.
- c) A bullet is fired into a mud tank and penetrates $(120t - 3600t^2)$ meters in 't' seconds after impact. Calculate maximum depth of penetration.
- d) A beam is bent in the form of the curve $y = 2\sin x - \sin 2x$.
Find the radius of curvature at $x = \frac{\pi}{2}$.

3. Attempt any THREE of the following: 12

- a) Find the equation of tangent and normal to the curve $2x^2 - xy + 3y^2 = 18$ at (3, 1).
- b) Find $\frac{dy}{dx}$ if $y = (\sin x)^{\cos x}$.
- c) If $y = \sin^2(e^{3x})$ find $\frac{dy}{dx}$.
- d) Evaluate $\int \frac{(\tan^{-1}x)^3}{1+x^2} dx$

4. Attempt any THREE of the following: 12

- a) Evaluate $\int \frac{dx}{3 + 2 \sin x}$
- b) Evaluate $\int \frac{dx}{x^2 + 3x + 2}$
- c) Evaluate $\int \tan^{-1}x dx$
- d) Evaluate $\int x \cdot \log(1+x) dx$
- e) Evaluate $\int_0^4 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}} dx$

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

- a) Find the area bounded by parabola $y^2 = 4x$ and $x^2 = 4y$.
- b) Attempt the following:
- Form the differential equation by eliminating the arbitrary constants if $y = A\cos 3x + B\sin 3x$.
 - Solve $\sec^2 x \cdot \tan y \, dx + \sec^2 y \cdot \tan x \, dy = 0$
if $y = \frac{\pi}{4}$, when $x = \frac{\pi}{4}$.
- c) The velocity of a particle is given by $V = t^2 - 6t + 7$.
Find distance covered in 3 seconds.

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

- a) Attempt the following:
- Assuming that 2 in 10 industrial accidents are due to fatigue. Find the probability that exactly 2 out of 8 accidents will be due to fatigue.
 - If 3% of the electric bulbs manufacture by a company are defective. Find the probability that in a sample of 100 bulbs. Exactly 5 bulbs are defective (Given $e^{-3} = 0.0497$).
- b) The number of road accidents met with by taxi drivers follow poisson distribution with mean 2 out of 5000 taxi in the city, find the number of drivers.
- Who does not meet an accident.
 - Who met with an accidents more than 3 items.
(Given $e^{-2} = 0.1353$).
- c) In a sample of 1000 cases, the mean of certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal find
- How many students score between 12 and 15?
 - How many students above 18?
- Given $A(0.8) = 0.2881$,
 $A(0.4) = 0.1554$
 $A(1.6) = 0.4452$
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