22206

12223

3 Hours / 70 Marks   Seat No.

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 $\dfrac{dy}{dx}$ if $y = \log_{10} x + 3^x$

d) Evaluate $\int e^{2x}\ dx$

e) Evaluate $\int \sin^2 x.\ \cos x\ dx$

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.

Marks

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

a) Find $\frac{dy}{dx}$ if $x^2 + y^2 = 4xy$.

b) If $x = a(2\theta - \sin2\theta)$ and $y = a(1 - \cos2\theta)$.

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 $y = 2\sin x - \sin2x$.

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 $\int x.\log(1+x) \, dx$

e) Evaluate $\int_0^4 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}} \, dx$

Marks

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:

  i) Form the differential equation by eliminating the arbitrary constants if $y = A\cos 3x + B\sin 3x$.

  ii) Solve $\sec^2 x.\tan y \, dx + \sec^2 y.\tan x \, dy = 0$
  if $y = \dfrac{\pi}{4}$, when $x = \dfrac{\pi}{4}$.

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:

  i) 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.

  ii) 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.

  i) Who does not meet an accident.

  ii) 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

  i) How many students score between 12 and 15?

  ii) 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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