17301

Instructions –   (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   **Attempt any <u>TEN</u> of the following:**   20

a) Find the inclination of the tangent to the curve $y = e^{2x}$ at $(1, -3)$.

b) Find the point on the curve $y = 2x^2 - 6x$ where the tangent is parallel to the x - axis.

c) Evaluate $\int \sqrt{1 + \sin 2x} \cdot dx$

d) Evaluate $\int \dfrac{e^x}{e^{2x} - 16} \, dx$

e) Evaluate $\int \dfrac{\cos x - \sin x}{\cos x + \sin x} \, dx$

Marks

f) Evaluate $\int \log x \cdot dx$

g) Evaluate $\int\limits_{\pi/6}^{\pi/4} \cot^2 x \, dx$

h) Find the area enclosed by $y = 2x + x^2$ (above the x-axis) and $x = 1$ and $x = 3$.

i) Find the order and degree of the following equation

$$\frac{d^2 y}{dx^2} = \sqrt{1 + \frac{dy}{dx}} .$$

j) If the coin is tossed three times then find the probability of getting exactly two tails

k) Verify that $y = \cos x$ is a solution of $\frac{d^2 y}{dx^2} + y = 0$.

l) Two cards are drawn at random from a well shuffed pack of 52 cards. Find the probability that the two cards drawn are a king and a queen of the same unit.

2.   Attempt any FOUR of the following: **16**

a) Find the equation of the tangent and normal to the curve $4x^2 + 9y^2 = 40$ at $(1, \, 2)$.

b) Find the maximum and minimum value of $x^3 = 18x^2 + 96x$

c) Find the radius of curvature for the curve $y = 2\sin x - \sin 2x$ at $x = \pi/2$

Marks

d) Evaluate $\int \dfrac{1 + \tan^2 x}{1 - \tan^2 x}\, dx$

e) Evaluate $\int \dfrac{(x-1)\, e^x}{x^2 \cdot \sin^2\left(e^{x/x}\right)}\, dx$

f) Evaluate $\int \dfrac{\left(1 + \sqrt{x}\right)^2}{\sqrt{x}}\, dx$

3. **Attempt any <u>FOUR</u> of the following:**   16

a) Evaluate $\int \dfrac{dx}{4\cos^2 x + 9\sin^2 x}$

b) Evaluate $\int \sin\left(\log x\right)\, dx$

c) Evaluate $\int \dfrac{\log x}{x\,(2 + \log x)\,(3 + \log x)}\, dx$

d) Evaluate $\displaystyle\int_{0}^{1} x\cdot\tan^{-1} x\cdot dx$

e) Evaluate $\displaystyle\int_{0}^{\pi} \dfrac{1}{5 + 4\cos x}\cdot dx$

f) Obtain the differential equation if $y = A\cdot\cos\left(\log x\right) + B\cdot\sin\left(\log x\right)$

Marks

4. **Attempt any FOUR of the following:** **16**

a) Evaluate $\int_0^{\pi/2} \dfrac{dx}{1+\tan x}$.

b) Evaluate $\int_2^5 \dfrac{\sqrt{x}}{\sqrt{7-x}+\sqrt{x}} \, dx$

c) Evaluate $\int_0^1 x^2 \sqrt{1-x} \, dx$

d) Prove that area of circle $x^2 + y^2 = a^2$ is πa^2 sq. units.

e) Find the area between the parabola $y = 4x - x^2$ and the x-axis.

f) Find the area bounded by $y^2 = 2x$ and $x - y = 4$.

5. **Attempt any FOUR of the following:** **16**

a) Solve $\dfrac{dy}{dx} = e^{3x-2y} + x^2 \cdot e^{-2y}$

b) Solve $\dfrac{dy}{dx} = \cos(x+y)$

c) Solve $(x^3 + y^3) \dfrac{dy}{dx} = x^2 y$

d) Solve $(4x^3 y^2 + y \cdot \cos xy) \, dx + (2x^4 y + x \cdot \cos xy) \, dy = 0$

e) Solve $(1 + x^2) \dfrac{dy}{dx} + y = e^{\tan^{-1} x}$

f) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction. (Given $e^2 = 7.4$)

Marks

6.   **Attempt any <u>FOUR</u> of the following:**   **16**

a)   If $P(A) = 3/5, P(B) = 1/5, P(B/A) = 2/3$ find $P(A/B)$ and
$P(A \cup B)$

b)   If two dice are rolled simultaneously then find the probability
that total is 6 or 10.

c)   If 2% of the electric bulbs manufactured by a company are
defective. Find the probability that in a sample of 100 bulbs

   i)   3 are defective

   ii)   at least two are defective

d)   The probability that a man aged 65 will live to 75 is 0.65.
What is the probability that out of 10 men which are now
65, 7 will live to 75?

e)   A problem is given to three students A, B, C whose chances
of solving it are ½, ¾ and ¼ respectively. What is the change
that problem is solved.

f)   A metal wire 36 cm long is bent to form a rectangle. Find
its dimensions. When its area is maximum.

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3 Hours / 100 Marks