**17349**

**21415**

3 Hours/100 Marks

Seat No. | | | | | | | | |

***Instructions :*** *(1)* ***All*** *questions are* ***compulsory****.*
*(2) Figures to the* ***right*** *indicate* ***full*** *marks.*
*(3)* ***Use*** *of non-programmable Electronic Pocket Calculator is* ***permissible****.*
*(4) Mobile Phone, Pager and any other Electronic Communication devices are* ***not permissible*** *in Examination Hall.*

**MARKS**

1. Attempt **any ten** : **20**

a) Find slopes of tangent and normal to the curve $x^2 + y^2 = 25$ at (–3, 4). **2**

b) Divide 80 into two parts such that their product is maximum. **2**

c) Evaluate $\int \frac{dx}{(x+1)(x+3)}$. **2**

d) Evaluate $\int (x+1)^2 dx$ . **2**

e) Evaluate $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$. **2**

f) Evaluate $\int_2^4 \frac{dx}{2x+3}$ **2**

g) Find order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1+\frac{dy}{dx}}$. **2**

h) Solve $(1 + x^2)dy - (1 + y^2)dx = 0$ . **2**

i) From a pack of 52 cards one is drawn at random. Find the probability of getting a King. **2**

j) Two unbiased coins are tossed. What is the probability of getting a head and a tail ? **2**

k) If two unbiased dice are rolled, what is the probability that sum is equal to 9 ? **2**

l) Find area under the curve $y = x^3$ from x = 1 to x = 3. **2**

**P.T.O.**

**MARKS**

2. Attempt **any four** : **16**

a) Find equation of tangent to the curve $x = \frac{1}{t}$ , $y = t - \frac{1}{t}$ when $t = 2$. **4**

b) The equation of tangent at the point (2, 3) on the curve $y = ax^3 + b$ is $y = 4x - 5$. Find a and b. **4**

c) A metal wire 100 cm long is bent to form a rectangle. Find its dimensions when its area is maximum. **4**

d) Show that the radius of curvature at any point on the circle $x^2 + y^2 = 16$ is 4. **4**

e) Evaluate $\int \frac{dx}{x(1+\log x)\,(2+\log x)}$. **4**

f) Evaluate $\int \frac{xdx}{(1+\cos 2x)}$. **4**

3. Attempt **any four** : **16**

a) Evaluate $\int \sec^3 x \, dx$. **4**

b) Evaluate $\int_0^{\pi/2} \frac{\cos x}{4 - \sin^2 x} \, dx$. **4**

c) Evaluate $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$. **4**

d) Evaluate $\int_0^{\pi/2} \log(\tan x)\, dx$. **4**

e) Find area of the circle $x^2 + y^2 = 25$ using definite integration. **4**

f) Find by integration area between the curves $y = x$ and $y = x^2$. **4**

4. Attempt **any four** : **16**

a) Evaluate $\int_0^{\pi/2} \frac{dx}{1+\sqrt[n]{\cot x}}$ . **4**

b) Evaluate $\int_1^4 \frac{\sqrt[3]{g-x}}{\sqrt[3]{g-x}+\sqrt[3]{x+4}} \, dx$. **4**

**MARKS**

c) Evaluate $\int_0^1 x^3 \tan^{-1} x \, dx$. **4**

d) Evaluate $\int_0^{\pi/2} \log(\sin x)\, dx$. **4**

e) Evaluate $\int_{-1}^{1} \frac{x + x^2}{1 + x^2} dx$. **4**

f) Evaluate $\int_0^1 \frac{dx}{x^2 - x + 1}$. **4**

5. Attempt **any four** : **16**

a) Form the differential equation whose solution is $y = e^{m \tan^{-1} x}$. **4**

b) Solve xy log = y dx + $(1 + x^2)$dy = 0. **4**

c) Solve $(4x + y^2)\frac{dy}{dx} = 1$. **4**

d) Solve $\frac{dy}{dx} = \frac{x^2 + y^2}{xy}$, given y = 2 when x = 1. **4**

e) Solve $(x^2 + 6xy - y^2)dx + (3x^2 - 2xy + y^2)dy = 0$. **4**

f) Solve $(1 + x^2)\frac{dy}{dx} + y = e^{\tan^{-1} x}$. **4**

6. Attempt **any four** : **16**

a) A box contains 7 red, 5 white and 8 green balls identical in all respect except colour. One ball is drawn at random, find the probability that it is not white. **4**

b) A problem of mathematics is given to three students A, B, C whose chances of solving it are $\frac{1}{3}, \frac{3}{4}$ and $\frac{1}{4}$ resp.

What is the probability that

1) The problem will be solved ?

2) The problem will be solved by each of them ? **4**

**MARKS**

c) Given $P(A) = \frac{1}{2}$, $P(B') = P(A \cup B) = \frac{2}{3}$. Find $P(A' \cap B')$. **4**

d) 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. **4**

e) If a random variable has Poisson's distribution P(2) = P(3), find P(5). **4**

f) The mean weight of 500 students at a certain college is 50 kg and S.D. is 6 kg. Assuming the weights are normally distributed find the no. of students weighing between 40 kg and 50 kg A (1.67) = 0.4525. **4**

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