17930

23124

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Figures to the right indicate full marks.

(3) Assume suitable data, if necessary.

Marks

1. Attempt any TEN : **20**

(a) At what point of the curve $y = e^x$ the slope is 1 ?

(b) Find radius of curvature of $xy = 12$ at (3, 4).

(c) If $f'(x) = 7 + 6x - 3x^2$ and $f(-1) = 0$ find $f(x)$.

(d) Evaluate : $\int \tan^{-1}\left[\frac{\cos x}{1+\sin x}\right] dx$.

(e) Evaluate : $\int \frac{dx}{1-\sin x}$

(f) Evaluate : $\int_0^1 x \cdot \log x \cdot dx$.

(g) Form the differential equation for $xy = a^2$.

(h) Evaluate : $\int \frac{3x-2}{3x-1}\, dx$.

(i) A card is drawn from a pack of 52 cards. Find the probability that it is 3 or 4.

(j) An unbiased coin is tossed 7 times. Find the probability of getting three heads.

(k) Find degree & order of differential equation $\frac{d^2y}{dx^2} = \sqrt{1 + \frac{dy}{dx}}$.

(l) Form a differential equation for $x^2 + y^2 = r^2$.

2. Attempt any FOUR : **16**

(a) Evaluate $\int 3 \sin 4x \cdot \cos 3x \cdot dx$.

(b) Find equation of tangent & normal to the curve $x^2 + 3xy + y^2 = 5$ at point (1, 1).

(c) Find the radius of curvature for $y = \log (\sin x)$ at $x = \frac{\pi}{2}$.

(d) $\int \frac{\sin(e^x) \cdot e^x}{\cos^2 (e^x)} dx$.

(e) Find the maximum and minimum value of function $f(x) = 2x^3 - 9x^2 + 12x + 5$.

(f) Evaluate : $\int \frac{dx}{a^2 \cdot \sin^2 x + b^2 \cdot \cos^2 x}$.

3. Attempt any FOUR : **16**

(a) Evaluate : $\int_0^{\frac{\pi}{4}} \log (1 + \tan x) dx$.

(b) Evaluate : $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \cot x}$.

(c) Find area bounded by $y^2 = 6x$ & $x^2 = 6y$.

(d) Find area of one loop of $y = \sin 2x$ from $x = 0$ to $x = \frac{\pi}{2}$.

(e) Evaluate : $\int \tan^{-1} \sqrt{x} \cdot dx$.

4. Attempt any FOUR : **16**

(a) Find by integration the area of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

(b) Evaluate : $\int_0^1 x\,(1-x)^{\frac{3}{2}}\,dx$.

(c) Solve : $y \cdot \cos^2 x \cdot \frac{dy}{dx} = \tan x + 2$ if $y = 2$ when $x = \frac{\pi}{4}$.

(d) Solve : $\frac{dy}{dx}=\frac{4x-3y}{3x-2y}$

(e) Find area enclosed by the parabola $y^2 = 8x$ & line $y = 2x$.

5. Attempt any FOUR : **16**

(a) Solve the differential equation $(x^2 + 1)\,dy - (y^2 + 1)\,dx = 0$.

(b) Solve : $\frac{dy}{dx} = x^3 \cdot y^3 - xy$.

(c) From 20 tickets marked 1 to 20, one ticket is drawn. Find probability that it is marked with multiple of 3 or 5.

(d) Two dices are rolled. Find the probability that sum of the outcome number is perfect square.

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

6. Attempt any FOUR : **16**

(a) If $P(A) = \frac{2}{3}$, $P(B') = \frac{3}{4}$ & $P\left(\frac{A}{B}\right)=\frac{4}{5}$, find $P(A \cap B)$ & $P\left(\frac{B}{A}\right)$.

(b) Evaluate : $\int \frac{x+1}{x(x^2-4)} \cdot dx$.

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(c) Five men in a company of 20 are graduates. If 3 men are picked up out of 20 at random what is probability that –

(i) they are all graduates ?

(ii) at least one is a graduate ?

(d) A metal wire 36 cm long is bent to form rectangle. Find its dimensions when its area is maximum.

(e) Solve : $\cos^2 x \frac{dy}{dx} + y = \tan x$.

(f) An unbiased coin is tossed 6 times. Find the probability of getting :

(i) two heads

(ii) at least 4 heads