21314

17349

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.*

(4) ***Use*** *of Non-programmable Electronic Pocket Calculator is* ***permissible****.*

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

MARKS

1. Attempt **any ten** of the following : **20**

a) Find slope of tangent to the curve $y = x^3$ at $x = 4$.

b) Find radius of curvature for $y = x^3 + 3x^2 + 2$ at point (1, 6).

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

d) Evaluate $\int \frac{1}{4x^2 - 9} dx$.

e) Evaluate $\int \frac{3x + 5}{x + 3} dx$.

f) Evaluate $\int_2^3 \frac{dx}{3x - 4}$.

g) Evaluate $\int_0^{\pi/2} \cos^2 x . \sin x \, dx$.

h) If P (1) = P (2), find P (4).

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

MARKS

j) Verify that y = logx is solution of differential equation : $x\frac{d^2y}{dx^2}+\frac{dy}{dx}=0$.

k) Form the differential equation by eliminating arbitrary constant from $y = ax^2$.

l) If $P(A)=2/3$, $P(B')=3/4$ and $P(A/B)=4/5$. Find $P(A\cap B)$.

m) Two cards are drawn from well shuffled pack of 52 cards. What is probability that one is King and other is Queen ?

n) Two fair coins are tossed. Write the probability distribution of the number of heads appear.

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

a) Find the slope of tangent and normal to the curve $y = x^2 - 6x + 3$ at the point (6, 3).

b) Find the equation of tangent and normal to the curve $y = 2(2 - x)$ at the point (2, 0).

c) Divide 20 in two parts such that product of one and the cube of other is maximum.

d) Find radius of curvature at any point of the curve $x=a(\theta+\sin\theta)$, $y=a(1-\cos\theta)$. Hence show that it is 4a at $\theta=0$.

e) Find maximum and minimum values of $x^3 - 6x^2 + 9x - 2$.

f) Evaluate $\int\frac{1+\tan x}{x+\log(\sec x)}\,dx$.

3. Attempt **any four** of the following : **16**

a) Evaluate $\int\frac{e^x(x+1)}{\cos^2(xe^x)}\,dx$.

b) Evaluate $\int\sin^{-1}x\,dx$.

c) Evaluate $\int\frac{dx}{5-3\sin x}$.

d) Evaluate $\int x.\log x\,dx$.

Marks

e) Evaluate $\int \frac{dx}{x^3 - 4x}$.

f) Evaluate $\int_0^{\pi} \frac{dx}{5 + 4\cos x}$.

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

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

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

c) Evaluate $\int_0^1 xe^x\, dx$.

d) Evaluate $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x}\, dx$.

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

f) Find area between $y = x^2$ and line $y = x$.

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

a) Obtain the area between the line $y = 8x$, x axis and ordinates at $x = 2$ and $x = 6$.

b) Solve $(2xy + y - \tan y)\, dx + (x^2 - x\tan^2 y + \sec^2 y)\, dy = 0$.

c) Find particular solution of $\frac{dy}{dx} = e^{x-y} + xe^{-y}$ at $y = 1$ when $x = 0$.

d) Solve : $\left(x\frac{dy}{dx} - y\right) e^{\pi/x} = x^2 \cos x$.

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

f) Solve $\frac{dy}{dx} + y \cot x = \cos x$.

MARKS

6. Attempt **any four** of the following : **16**

a) Solve $\left(x^2+1\right)\frac{dy}{dx}+2xy=2x$.

b) An urn contains 10 black and 10 white balls. Find the probability of drawing two balls of the same colour.

c) The probability that A can solve a problem is $2/3$ and that of B can solve it is $1/3$. If both try independently, what is probability that the problem is solved ?

d) If 30% of the bulbs produced are defective, find the probability that out of 4 bulbs selected

i) one is defective

ii) at most two are defective.

e) If 5% of items manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 items

i) None is defective

ii) Five items are defective. (Given $e^{-5} = 0.007$).

f) The mean weight of 500 students at a certain college is 50 Kg and the standard deviation is 6 Kg. Assuming that the weights are normally distributed, find number of students weighing

i) between 40 and 50 Kg

ii) more than 60 Kg

Given that A (1.6667) = 0.4525.