17349

14115

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

Instructions *: (1)* ***All*** *questions are* ***compulsory****.*
(2) Answer ***each*** *next main Question on* ***a new*** *page.*
(3) Illustrate your answers with ***neat*** *sketches* ***wherever*** *necessary.*
(4) ***Assume*** *suitable data, if* ***necessary****.*
(5) ***Use*** *of Non-programmable Electronic Pocket Calculator is* ***permissible****.*
(6) Mobile Phone, Pager and any other Electronic Communication devices are ***not permissible*** *in Examination Hall.*

MARKS

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

a) Evaluate $\int (e^x + x^e + e^e)dx$.

b) Evaluate $\int \frac{1}{25 - 9x^2}\, dx$.

c) Evaluate $\int \left(\frac{1}{\sqrt{1-x^2}} - \cos x \right) dx$.

d) Evaluate $\int \sin^2 \frac{x}{2}\, dx$.

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

f) Find the point on the curve $y = x^2 - 6x + 8$, where the tangent is parallel to x-axis.

g) Find the area bounded by $y = 4x - x^2$ meeting the x-axis and the ordinates $x = 1$, $x = 3$.

h) Find order and degree of differential equation $\frac{d^2y}{dx^2} + \sqrt{1 + \frac{dy}{dx}} = 0$.

P.T.O.

MARKS

i) Form the differential equation whose solution is $y = ax^2$.

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

k) Find the probability of getting 9 with two dice.

l) A cubic die is thrown 4 times, what is the probability of obtaining at least one six ?

m) Find K if $\int_0^1 (3x^2 + 2x + k)\, dx = 0$.

n) If a random variable has a Poisson distribution such that P(2) = P(3). Find P(5).

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

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

b) Evaluate $\int \frac{\cos x}{(2+\sin x)(3+\sin x)}\, dx$.

c) Evaluate $\int \frac{1}{5+4\cos x}\, dx$.

d) Evaluate $\int_1^3 \frac{\sqrt{x}}{\sqrt{4-x}+\sqrt{x}}\, dx$.

e) Evaluate $\int_0^{\pi/4} \log(1+\tan x)\, dx$.

f) Find the area bounded by the curve $y^2 = 4x$ & x^2 4y.

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

a) Evaluate $\int \frac{e^x(x-1)}{x^2 \cos^2\left(\frac{e^x}{x}\right)}\, dx$

b) Evaluate $\int \frac{x}{(x^2+4)(x^2+9)}\, dx$.

MARKS

c) Evaluate $\int \frac{1}{\sin x \log(\tan x/2)}\, dx$.

d) Evaluate $\int_0^1 x \sin^{-1} x\, dx$.

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

f) Find the area of the circle $x^2 + y^2 = 16$ using integration.

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

a) Solve $\frac{dy}{dx} = e^{x-y} \cdot x^2$.

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

c) Solve $y^3 (\sec^2 x dx + (3y^2 \tan x - \sec^2 y)\, dy = 0$.

d) Determine a & b such that slope of curve $2y^3 = ax^2 + b$ at $(1, -1)$ is same as the slope of $x + y = 0$.

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

f) An alternating current is given by $I = 50 \sin(100 \pi t + 0.4)$. Find value of t for which I is maximum and find this maximum value of I.

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

a) Evaluate $\int_0^7 \frac{\sqrt[3]{x}}{\sqrt[3]{x} + \sqrt[3]{7 - x}}\, dx$.

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

c) Find the radius of curvature for the curve $x = a\cos^3\theta$, $y = a\sin^3\theta$ at $\theta = \pi/4$.

MARKS

d) Solve $\frac{dy}{dx} = \sin(x+y) + 10s\,(x+y)$.

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

f) Solve $\left(1+e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)dx = 0$.

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

a) An unbiased coin is tossed 5 times. Find the probability of getting a) 3 heads b) at least 4 heads.

b) If 2% of the electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs i) 3 bulbs are defective ii) At the most two bulbs will defective.

c) In a sample of 1000 case, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution is to be normal, find

a) How many students score between 12 & 15

b) How many students score above 18. Freq. to 0.8 = 0.2881 Freq. to 0.4 = 0.1554, Freq. to 1.6 = 0.4452.

d) If the probability of bad reaction from a certain injection is 0.001, determine the change that out of 2000 individuals more than 2 will get a bad reaction.

e) A card is drawn from a pack of 52 cards, find the probability that a card is a diamond or face card.

f) A problem of Mathematics is given to three students A, B and C whose chance of solving it are $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}$ respectively. What is the probability that

a) The problem will be solved

b) The problem is solved by at least one of them

c) The problem is not solved by any of them ?

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