17349

21718

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. Solve any TEN of the following: **20**

a) Evaluate $\int \sqrt{1+\cos 2x}\, dx$

b) Evaluate $\int \frac{dx}{x(x+1)}$

c) Evaluate $\int_1^e \log x \,.\, dx$

d) Evaluate $\int \sec^2(\log x) \,.\, \frac{1}{x}\, dx$

e) Evaluate $\int \left(x^m + m^x + m^m \right) dx$

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

P.T.O.

Marks

g) Find order and degree of the differential equation.

$$\sqrt{\frac{d^2y}{dx^2}} - \frac{dy}{dx} - xy^2 = 0$$

h) Solve $y\,dx = (1 + x^2)\,dy$

i) Find the area under the curve $y = x^2$ from $x = 0$ to $x = 3$ with X axis.

j) Form the differential equation of the curve $y = ax^2$

k) Two coins are tossed simultaneously. Find the probability of getting at least one head.

l) Three cards are drawn from well shuffled pack of cards. Find the probability that all of them are king.

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

a) Find the maximum and minimum value of $x^3 - 9x^2 + 24x$

b) Show that the radius of curvature at any point on the curve.

$y = a \log(\sec x/a)$ where a is constant is a sec (x/a)

c) Find 'a' and 'b' such that the slope of the curve $2y^3 = ax^2 + b$ same as the slope of the curve: $x + y = 0$

d) Find the equation of tangent to the curve $y = x^3 - x^2 - 1$ at the point where $x = 2$.

e) Evaluate $\int \frac{\sec^2 x \quad dx}{(1 + \tan x)(3 + \tan x)}$

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

3. Solve any FOUR of the following: **16**

a) Evaluate $\int \frac{dx}{4 - 5\cos x}$

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

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

Marks

d) Evaluate $\int_0^{\pi/2} \cos x \sqrt{\sin x}\ dx$

e) Find area of the circle $x^2 + y^2 = 16$ using definite Integration.

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

4. Solve any <u>FOUR</u> of the following: **16**

a) Evaluate $\int_1^5 \frac{\sqrt[3]{9-x}}{\sqrt[3]{9-x} + \sqrt[3]{x+3}}\ dx$

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

c) Evaluate $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt{\cot x}}\ dx$

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

e) Evaluate $\int_0^2 \frac{dx}{x^2 - 2x + 2}$

f) Evaluate $\int_0^{\pi/2} \sin 5x \,.\, \cos 3x\ dx$

5. Solve any <u>FOUR</u> of the following: **16**

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

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

c) Solve $xy\ dy = (x^2 + y^2)\ dx$

d) Solve $(3x^2 + 6xy^2)\ dx + (6x^2 y + 4y^2)\ dy = 0$

Marks

e) Solve $x \cdot \log x \frac{dy}{dx} + y = 2\log x$

f) Show that $y = A \sin mx + B\cos mx$ is a solution of differential equation $\frac{d^2y}{dx^2} + m^2 y = 0$

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

a) I.Q's are normally distributed with mean 100 and standard deviation 15. Find the probability that a randomly selected person has

(i) An I.Q. more than 130

(ii) An I.Q. between 85 and 115

[z = 2 Area = 0.4772, z = 1 Area = 0.3413]

b) If 20% of the bolts produced by a machine are defective, determine the probability that out of 4 bolts drawn

(i) one is defective

(ii) at the most two are defective

c) The number of road accidents met with by taxi drivers follow poisson distribution with mean 2. Out of 5000 taxis in the city find the number of drivers who met with an accident more than 3 times. Given ($e^{-2} = 0.1353$)

d) A card is drawn from a pack of 52 cards. Find the probability that a card is a diamond or a face card.

e) An urn contains 10 red, 5 white and 5 black balls. Two balls are drawn at random. Find the probability that they are not of the same colour.

f) Given $P(A) = \frac{1}{2}$, $P(B') = P(A \cup B) = \frac{2}{3}$ find $P(A' \cap B')$
