17301

11819

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) Figures to the right indicate full marks.

(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) Find the gradient of the curve $xy = 6$ at pt (1, 6)

b) Divide 50 into two parts such that product is maximum

c) Evaluate $\int \frac{x}{x+1}\,dx$

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

e) Evaluate $\int x.\sin x\,dx$

f) Evaluate $\int_2^4 \frac{1}{2x+3}\,dx$

g) Find area between the line $y = 2x$, x-axis and ordinates $x = 0$ and $x = 2$

h) Find order and degree of $\frac{d^2y}{dx^2} = \sqrt[3]{1+\frac{dy}{dx}}$

i) Form a differential eq^n if $y = ax^2 + b$

P.T.O.

Marks

j) A fair dice is rolled. What is probability that no. appear on the dice is greater than 2.

k) If two cards drawn from a pack of 52 cards. What is probability that both are king.

l) An unbiased coin is tossed 6 times. Find probability of getting 2 Heads.

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

a) Find eq^{n} of tgt and normal to the curve $y = x(2 - x)$ at pt. (2, 0)

b) Show that radius of curvature of the curve $x^2 + y^2 = 25$ at (3, 4) is 5 units.

c) Find maximum and minimum values of $y = x^3 - 9x^2 + 24x$

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

e) Evaluate $\int \frac{3\tan^{-1}x}{1+x^2}\,dx$

f) Evaluate $\int \frac{1}{4\sin^2 x + 5\cos^2 x}\,dx$

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

a) Evaluate $\int_0^{\pi/2} \frac{dx}{3 + 4\cos x}$

b) Evaluate $\int_0^{\pi/2} \frac{dx}{1 + \sqrt{\cot x}}$

c) Find area enclosed by parabolas $y^2 = 9x$ and $x^2 = 9y$

d) Solve : $y^2\,dx - (xy - x^2)\,dy = 0$

e) Solve : $\frac{dy}{dx} = \left(\frac{y}{x}\right) + \tan\left(\frac{y}{x}\right)$

f) Solve : $\frac{dy}{dx} + 2\tan x \cdot y = 2\sin x$

Marks

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

a) Evaluate $\int_2^5 \frac{\sqrt{7-x}}{\sqrt{x}+\sqrt{7-x}}\,dx$

b) Evaluate $\int_5^{10} \frac{1}{(x-1)(x-2)}\,dx$

c) Using integration find area of the loop $y^2 = x^2(1-x)$

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

e) Solve : $\left(3x^2+6xy^2\right)dx + \left(6x^2y+4y^2\right)dy$

f) Verify that $y.\sec^2 x = \sec x + c$ is solution of differential eq^n

$\frac{dy}{dx} + 2y.\tan x = \sin x$. Also find its particular sol^n

when $x = 0$ and $y = 0$

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

a) The probability of solving problem by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. What is probability that problem is solved.

b) The probability that a machine manufactured by a company will be defective $\frac{1}{10}$. If 5 such machines are manufactured find probability that.

(i) Exactly two will be defective.

(ii) At least two will be defective.

c) Fit a Poisson's distribution for the following observations

xi	0	1	2	3	4
fi	21	18	7	3	1

d) Evaluate $\int x^2 \tan^{-1} x\ dx$

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

f) Solve : $(x+1)\frac{dy}{dx} - y = e^x\left(x+1\right)^2$

Marks

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

a) If $P(A) = \frac{1}{2}$, $P(B') = \frac{2}{3}$. Find

$P(A' \cap B')$ and $P\left(\frac{A}{B}\right)$

b) If 5% of electric bulbs manufactured by a company are defective. Use Poisson's distribution to find probability that in a sample of 100 bulbs.

(i) None is defective

(ii) Five are defective

c) In a certain examination 500 students appeared. Mean score is 68 and standard deviation is 8. Assuming data normally distributed. Find no of students scoring

(i) less than 50 and

(ii) more than 60

where A(2.25) = 0.4878

A(1) = 0.3413

d) A bullet is fired into a mud bank and penetrates $(120t - 3600t^2)$ meters in t seconds after impact. Calculate maximum depth of penetration.

e) Find equation of tangent to the curve $y = 9x^2 - 12x + 7$ which is parallel to x-axis

f) Find area bounded by parabola

$y = 4x - x^2$ and x-axis.