INDIA Maths.

Marks 80
Time 3 hrs

Section – I

Q.1. Attempt any six of the following: **(12)**

i)Draw Venn diagram for the truth of the following statements:

a) If a quadrilateral is a Rhombus, then it is a parallelogram.
b) Some rectangles are not squares

ii) Solve the equation:

$$\left\{3\begin{bmatrix}1 & 2 & 0\\ 0 & -1 & 3\end{bmatrix}-\begin{bmatrix}1 & 5 & -2\\ -3 & -4 & 4\end{bmatrix}\right\}\begin{bmatrix}1\\2\\1\end{bmatrix}=\begin{bmatrix}x\\y\end{bmatrix}$$

iii)Examine the continuity of

$f(x)=\frac{sin3x}{x}$ for $x < 0$

$=4x + 3$ for $x \geq 0$ at $x = 0$

iv)Find $\frac{dy}{dx}$ if $y = \cos\left[sec^{-1}\ \frac{1}{x}\right]$

(v)Find the value of x for $f(x) = x^3 - 6x^2 - 15x + 12$ is decreasing

(vi) $\int \frac{1}{1+e^x}\ dx$

(vii) Find the cofactors of the elements of the matrix

$$A=\begin{bmatrix}-1 & 2\\ -3 & 4\end{bmatrix}$$

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(viii)Evaluate $\int \frac{1}{9x^2 - 49}\, dx$

Q2.A) Attempt any two of the following: **(06)**

i)Find K if f(x) = $\frac{27^x - 3^x}{K^x - 1}$ for x ≠ 0

= 2 for x= 0

is continuous at x = 0

ii)Examine whether the following statement pattern is tautology, contradiction or contingency

$(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$

iii) If x = $\frac{7}{1+t^3}$ y= $\frac{7t}{1+t^3}$ show $\frac{dy}{dx} = \frac{2t^3-1}{3t^2}$

(B) Attempt any two: **(08)**

i)Find A^{-1} if A=$\begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix}$

ii)Find the area of the region bounded by the parabola y^2=4x and the line x=4

iii)The consumption expenditure Ec of a person with income x is given by Ec=0.0006 x^2 + 0.003x. Find MPC, MPS, APC and APS when the income x=200

Q.3.A)Attempt any two: **(06)**

i)Discuss the continuity of

f(x) = $\frac{x^3 - 27}{\sqrt{x^2 + 7} - 4}$ for x ≠ 0

=72 for x = 3

at x = 3

Contd.. on Page 3/-

ii)Find $\frac{dy}{dx}$ if $y = \sqrt{\frac{x-a}{x+a}}\,(x^2+a)$

iii)Using the truth table show that

$$(p \wedge \sim q) \vee \sim (q \rightarrow p) \equiv \sim (p \leftrightarrow q)$$

(B)Attempt any two of the following: (08)

i)Evaluate $\int \frac{dx}{2sinx-cosx+3}$

ii)The total cost function of a firm

$c=x^2+75x+1600$ for an output x. Find the output (x) for which average cost is minimum is CA=CM at this output.

iii)Evaluate $\int_{\frac{\pi}{5}}^{\frac{3\pi}{10}} \frac{sinx}{sinx+cosx}\,dx$

Section II

Q.4)Attempt any six of the following: (12)

i)The rate of premium on a policy of Rs.50,000 is Rs.56 per thousand per annum. A rebate of 75 paise per thousand is allowed,when the premiums are paid annually. Find the net amount of premium payable if the policy holder pays annually.

ii)An annuity immediate is paid for certain number of years at 12% p.a. Its present value is Rs.5000 and the accumulated value is Rs.10,000/- Find the amount of each annuity payment.

iii)A house is sold at 25% profit. The amount of brokerage at $\frac{3}{4}$ % comes to Rs.5,250/- Find the cost of the house.

iv)Find the (Age-SDR) for the following data:

Age Group (in yrs)	Population(in 000s)	No. of Deaths
0-10	11	240
10-20	12	150
20-60	9	125
60 and above	2	90

Contd.. on Pg 4/-

v) The regression equation Y on x is $y=\frac{2}{9}x$ and the regression equation X on Y is $x=\frac{y}{2}+\frac{7}{6}$ Find a) correlation coefficient between x and y.

vi)Identify the regression equation of X on Y and Y on X from the following equations:

2x+3y=6 and 5x+7y-12=0

vii)If x has poisson distribution with parameter m=1 find $p(x \leq 1)$
(given e^{-1}=0.3679)

viii)Three fair coins are tossed simultaneously. If X denotes the number of Head. Find the probability distribution of X.

Q.5.A)Attempt any two of the following: **(06)**

i)The salaries of three persons A,B and C together amount to Rs.21,000/- Their savings are 20%, 30% and 40% of their salaries. If their expenditures are in the rates 8:14:3. Find their respective salaries.

ii)Solve the minimal assignment problem and hence find the minimum value.

	I	II	III	IV
A	2	10	9	7
B	13	2	12	2
C	3	4	6	1
D	4	15	4	9

iii)Calculate e_0^0 from the data:

Age	0	1
lx	1000	900
Tx	-	12300

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(B) Attempt any two: **(08)**

i)Find Karlpearsons coefficient of correlation of the following data:

X	3	2	1	5	4
Y	8	4	10	2	6

ii)Solve the following using graphical method

Minimize $z=3x + 5y$

Subject to $2x + 3y \geq 12$

$-x + y \leq 3$,

$x \leq 4, y \geq 3, x \geq 0, y \geq 0$

iii)The data gives the height in cm(x) and weight y in kg for 20 adult males. Prepare a bivariate frequency table taking class intervals 150-154, 155-159..... for X and 60-64, 65-69, ----- for Y. Also find marginal distribution of X and Y and conditional distribution of X when Y lies in the interval 60-64.

(151,70), (162,64), (163,73), (150, 61), (154,65), (163,72), (166,73), (157,65), (168,73), (153,72), (153,64), (160,72), (156,65), (155,71), (156,71), (166,74), (162, 64), (163,65), (159,65), (163,72)

Q.6A)Attempt any two of the following: **(06)**

i)

Age Group (in yrs)	Population	Number of deaths
0-25	40,000	350
20-65	65,000	650
65 and above	15,000	- x

Find x if CDR=13.4 per thousand

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ii)The manager of a company wants to find a measure which he can use to fix the monthly wages of persons applying for a job in production department. As an experiment project he collects the data of 7 persons from the department referring to years of service and their monthly income.

Years of service	11	7	9	5	8	6	10
Income (in thousands)	10	8	6	5	9	7	11

Find the regression equation of income on years of service.

iii)Solve the following in equation:

$\frac{2}{|x+3|} \geq 1$ and represent it on real line.

(B)Attempt any two: **(08)**

i)Find the probability of guessing correctly at the most three out of seven answers in a True or False objective test.

ii)A person bought a television set paying Rs.20,000/- in cash and promised to pay Rs.1000/- at the end of every month for the next 2 years. If the money is worth 12% p.a. converted monthly. What is the cash price of the television set?

Given $(1.01)^{-24} = 0.7884$

iii)There are four jobs to be completed each job must go through machines M_1, M_2. M_3 in the order M_1-M_2-M_3

Jobs	**A**	**B**	**C**	**D**
M_1	5	8	7	3
M_2	6	7	2	5
M_3	7	8	10	9

Determine the optimal sequence and idle time of M_3