17217

15116

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

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Figures to the right indicate full marks.

(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) Define: Parametric function, periodic function.

b) Find $\frac{dy}{dx}$ if $y = e^{\log x}$

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

d) Define: Combined arithmetic mean.

e) Find mode of the following data :

12, 19, 31, 21, 13, 19, 22, 31, 13, 17, 20, 24, 31, 18, 13

f) Define Quartile deviation, Inter-quartile range.

g) State merits and demerits of Quartile deviation.

h) The variance and the coefficient of variation of a distribution are 121 and 45% respectively. Find the mean.

Marks

i) Define:

Perfect positive correlation,

Perfect negative correlation.

j) Define: Spearman's Rank correlation coefficient.

k) Find correlation coefficient if $byx = 0.64$ and $bxy = 0.4$

l) Comment on the following result:

"For a bivariate distribution $byx = 2.4$ and $bxy = -0.4$"

2. Attempt any <u>FOUR</u> of the following: **16**

a) If $f(x) = 3x^4 + x^2 + 5 - 3\cos x + 2\sin^2 x$, show that $f(x)$ is an even function.

b) Evaluate $\lim_{x \to 0} \left(\frac{3+2x}{3-5x}\right)^{1/x}$

c) Evaluate $\lim_{x \to -2} \frac{x^3+8}{x^2+3x+2}$

d) Find $\frac{dy}{dx}$ if $y = \log x + 2^x + \cos 3x$

e) Differentiate $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ wrt. x

f) Find $\frac{dy}{dx}$ if $y = x^x$

3. Attempt any <u>FOUR</u> of the following: **16**

a) Find $\frac{dy}{dx}$ if $x = a(t + \sin t)$, $y = a(1 - \cos t)$

b) Find $\frac{dy}{dx}$ if $y = \log(\sec x + \tan x)$

c) If $x^3 + y^3 = 3axy$, find $\frac{dy}{dx}$.

Marks

d) If $y = \sin^{-1}(\cos x)$, find $\frac{dy}{dx}$.

e) Draw a scatter diagram and interpret the result for the following data:

Advertisement cost (Thousand Rs.)	39, 65, 62, 90, 82, 75, 25, 98, 36, 78
Sales (Lakhs Rs.)	47, 53, 58, 86, 62, 68, 60, 91, 51, 84

f) Define regression coefficient of X on Y and Y on X.

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

a) Evaluate $\int x^2 e^{2x}\, dx$

b) Evaluate $\int \frac{dx}{1-\sin x}$

c) Evaluate $\int (\tan x + \cot x)^2\, dx$

d) Following are the marks secured by 40 students in a class. Arrange the data into frequency distribution table showing class-limits, tally marks, frequencies, class-marks and percentage frequency.

21, 67, 35, 50, 53, 60, 29, 34, 07, 32,
76, 24, 54, 15, 44, 05, 00, 18, 65, 50,
45, 31, 09, 39, 57, 71, 68, 90, 40, 89,
57, 85, 91, 43, 51, 39, 62, 85, 10, 72,

e) Calculate P_{55} and D_3 from the following data:

C.I.	0-15	15-30	30-45	45-60	60-75	75-90
fi	8	26	30	45	11	10

f) The mean of two samples of sizes 500 and 600 were 186 and 175 respectively. The corresponding S.D. was 9 and 10 respectively. Obtain the combined S.D. of two samples.

Marks

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

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

b) Evaluate $\int_1^2 (x^2 - 2x + 10)\, dx$

c) Find median by Graphical method:

Wages in Rs.	1-3	3-5	5-7	7-9	9-11	11-13
No. of workers	2	6	10	12	9	5

d) Find arithmetic mean of the following data:

C.I.	0-10	10-20	20-30	30-40	40-50	50-60
fi	4	10	30	6	7	3

e) The annual salaries of a group of workers are given in the following table. Given that mean salary is 63.6. Find the missing frequency.

Salary (Hundred of Rs.)	45	50	55	60	65	70	75	80
No. of workers	3	5	-	7	9	7	4	7

f) Find mode of the following using formula.

Size	0-10	10-20	20-30	30-40	40-50	50-60
fi	10	15	30	25	25	20

(Use Analytical method)

Marks

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

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

b) For factory A and B we observe the following data:

	Factory A	Factory B
No. of employees	100	200
Average wage / employees (Rs.)	120	200
S.D. of wage / employee (Rs.)	4	5

In which factory there is greater variation in distribution of wages per employee?

c) Define standard deviation and coefficient of standard deviation and hence find S. D. of 49, 63, 46, 59, 65

d) Find mean deviation from mean for the data given below:

X :	3	4	5	6	7	8
Y :	4	9	10	8	6	3

e) Find Rank correlation coefficient :

X :	70	65	71	62	58	69	78	64
Y :	91	76	65	83	90	64	55	48

f) Find equations of line of regression X on Y and Y on X from the below data:

X :	2	4	6	8	12	14
Y :	4	2	5	10	11	12