17217

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) Assume suitable data, if ***necessary****.*
(6) Use of Non-programmable Electronic Pocket Calculator is ***permissible****.*
(7) 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) If $f(x) = 3x^2 - 5x + 7$, show that $f(-1) = 3f(1)$.

b) Evaluate $\lim_{x \to 2} \left(\frac{x^2 - 4}{x - 2} \right)$.

c) Differentiate $(\log_{10} x + \log_a a)$ w.r. to x.

d) If $y = \frac{e^x + 1}{e^x - 1}$, find $\frac{dy}{dx}$.

e) If $y = \log(4 - 3x)$ find $\frac{dy}{dx}$.

f) Evaluate $\int \frac{dx}{9x^2 - 16}$.

g) Evaluate $\int \frac{2x + 3}{2x - 1} dx$.

h) Evaluate $\int \cos^2 x \, dx$.

i) Find the mean of the following :

xi	2	3	4	5	6
fi	25	15	10	5	4

Marks

j) Find median of the following data :

800, 725, 750, 900, 925, 910, 1000, 790, 870, 920.

k) Find the variance of the following :

49, 63, 46, 59, 65, 52, 60, 54.

l) Define Quartile Deviation.

2. Attempt **any four** of the following : **16**

a) If $f(x) = 16^x - \log_2 x$, find $f\left(\frac{1}{4}\right)$ and $f\left(\frac{1}{2}\right)$.

b) Evaluate $\lim_{x \to 0} \left(\frac{6^x - 2^x - 3^x + 1}{x^2} \right)$.

c) Evaluate $\lim_{x \to 0} \left[\frac{\log(5+x) - \log(5-x)}{x} \right]$.

d) If $x = a(\cos\theta + \theta\sin\theta)$,

$y = a(\sin\theta - \theta\cos\theta)$ find $\frac{dy}{dx}$.

e) Differentiate $\tan^{-1}\left(\frac{5x}{1-6x^2}\right)$ w.r. to x.

f) If $x^y = e^{x-y}$, then prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.

3. Attempt **any four** of the following : **16**

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

b) Find maximum and minimum values of $x^3 - 12x - 5$.

c) Differentiate $(\sin x)^{\log x}$ w.r.to x.

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

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

f) Evaluate $\int \frac{e^x}{e^{2x} - 1} dx$.

Marks

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

a) Evaluate $\int_0^{\pi/2} \frac{\cos x}{4-\sin^2 x}\,dx$.

b) Evaluate $\int_0^{\pi/2} \frac{\tan x}{1+\tan x}\,dx$.

c) Draw histogram and find mode.

CI	45 – 59	60 – 74	75 – 89	90 – 104	105 – 119	120 – 134	135 – 149	150 – 164
fi	43	99	152	178	160	40	25	10

d) Draw Ogive and find median.

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
fi	5	8	27	14	6

e) Calculate median from the following :

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
fi	6	11	22	24	28	11	15

f) The two sets of observations are given below :

Set – I	Set – II
$\bar{x} = 82.5$	$\bar{x} = 48.75$
$\sigma = 7.3$	$\sigma = 8.35$

Which of the two sets is more consistent ?

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

a) The mean marks of 150 students in a class is 60. The mean marks of boys is 70. The mean marks of girls is 55. Find the numbers of boys and girls.

b) Find the mode of the following :

Marks	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35
No. of students	7	10	16	32	24	18	10

c) Find Q. D. and coefficient of Q.D. for the following data :

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Fi	6	5	8	15	7	6

d) Find combined S.D. of groups I and II taken together. Given that

Group	**Size**	**A.M.**	**S.D.**
I	100	66	6
II	200	63	4

Marks

e) Calculate coefficient of variation for the following data :

CI	15 –25	25 – 35	35 – 45	45 – 55	55 – 65
fi	10	40	82	36	14

f) Calculate mean deviation from median of the following :

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
fi	5	8	15	16	6

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

a) Calculate S.D. from the following :

CI	55 – 65	65 – 75	75 – 85	85 – 95	95 – 105	105 – 115	115 – 125
fi	10	12	15	20	14	7	2

b) Calculate coefficient of correlation for the data, $\eta = 11$, $\sum x = 117$, $\sum y = 260$, $\sum xy = 2827$, $\sum x^2 = 1313$, $\sum y^2 = 6570$.

c) Compute coefficient of correlation (Karl Pearson's method) for the following :

x	2	3	5	6	8	11
y	18	9	10	8	7	5

d) Calculate Spearman's rank correlation coefficient for the following data :

Rank of Math.	9	10	6	5	7	2	4	8	3
Rank of Chem.	1	2	3	4	5	6	7	8	9

e) Find the regression line of y on x for the following data :

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

f) The equations of two lines of regression obtained in an analysis are : $2x + 3y - 8 = 0$ and $x + 2y - 5 = 0$. Find $\bar{x}$ and $\bar{y}$.