17217

16172

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

Instructions :	(1) **All** questions are **compulsory**.
	(2) Illustrate your answers with neat sketches **wherever** necessary.
	(3) Figures to the **right** indicate **full** marks.
	(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. Attempt **any ten** of the following :   **20**

   a) If $f(x) = x^2 - 2x + 5$ and $t = y - 2$, find $y(t)$.

   b) If $f(x) = \log x$, prove that $f(m) + f(n) = f(m.n)$.

   c) Find $\dfrac{dy}{dx}$, if $y = \log[\tan(4 - 3x)$.

   d) Find $\dfrac{dy}{dx}$, if $x = a(\theta - \sin\theta)$, $y = a(1 - \cos\theta)$.

   e) Differentiate $\cos^{-1}(1 - 2\sin^2 x)$ w.r. to x.

   f) Evaluate $\displaystyle\int \dfrac{2+x}{2-x}\,dx$.

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

   h) Evaluate $\displaystyle\int \dfrac{\log x}{x}\,dx$.

   i) The score of a cricket player in test series was 3, 24, 0, 44, 44, 0, 90, 9, 87 and 11. Find the median runs of the player.

   j) Find the mean of the following :

x_i	4	7	10	13	16	19
f_i	7	10	25	20	25	30

   k) Find mean deviation of the following 12, 6, 7, 3, 15, 10, 18, 5.

   l) Find standard deviation of the following 1, 2, 3, 4, 5, 6, 7, 8, 9.

P.T.O.

Marks

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

   a) If $f(x) = \log\left(\dfrac{1+x}{1-x}\right)$, show that $f(a) + f(b) = f\left(\dfrac{a+b}{1+ab}\right)$.

   b) Evaluate $\lim\limits_{x \to 0}\left(\dfrac{3^x + 3^{-x} - 2}{x^2}\right)$.

   c) Evaluate $\lim\limits_{x \to 4}\left(\dfrac{\log x - \log 4}{x - 4}\right)$.

   d) Find $\dfrac{dy}{dx}$ if $y = \sin^{-1}\left(\dfrac{\cos x + \sin x}{\sqrt{2}}\right)$.

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

   f) Find $\dfrac{dy}{dx}$, if $y = \sin 2x \cos 2x \cos 4x$.

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

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

   b) Find the points on the curve $y = x^3 - 3x + 1$ at which the tangent is parallel to x – axis.

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

   d) Evaluate $\int \tan^{-1}\left(\sqrt{\dfrac{1 + \cos x}{1 - \cos x}}\right) dx$.

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

   f) Evaluate $\int \dfrac{e^x (x - 1)}{x^2 \cos^2\left(\dfrac{e^x}{x}\right)} dx$.

Marks

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

a) Evaluate $\int x . \sin^{-1} x \, dx$.

b) Evaluate $\int \dfrac{\sec^2 x}{(1 + \tan x)(2 + \tan x)} \, dx$.

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

d) Calculate median

Marks :	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45
No. of students :	5	6	15	10	5	4	2	2

e) Find mode of the following :

CI	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30
f_i	7	10	16	32	24	18

f) The mean marks of 100 students is 55. Two marks are wrongly recorded as 49 and 73 instead of 69 and 63. Find the correct mean marks of students.

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

a) Find median graphically from the following :

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
fi	6	11	22	24	28	11	15	13

b) Draw histogram and find mode.

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

c) Calculate standard deviation for the following distribution :

Marks below :	5	10	15	20	25
No. of students :	6	16	28	38	46

d) Calculate mean deviation for the following :

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

e) The two sets of observations are given below :

Set I	Set II
Mean = 34.5	Mean = 28.5
S.D. = 5	S.D. = 4.6

Which set is more consistent ?

f) Find the mean deviation for the following :

x_i	10	11	12	13	14
f_i	3	12	18	12	4

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

a) Find range, coefficient of range and quartile deviation for the following :

CI	40 – 44	45 – 49	50 – 54	55 – 59	60 – 64
f_i	5	18	42	27	7

b) Calculate the coefficient of correlation for the following data :

Year in service	11	7	9	5	8	6	11
Monthly Income in Rs.	7	5	3	2	6	4	9

c) Find Spearman's coefficient of rank correlation for the following data :

Student No.	1	2	3	4	5	6	7
Marks in Science	52	63	45	36	72	65	47
Marks in English	62	53	51	25	79	43	60

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

x	1	3	4	6	8	9	11	15
y	1	2	4	4	5	7	8	9

e) The following data regarding heights (y) and weights (x) of 100 college students are given

$\Sigma x = 15000$, $\Sigma x^2 = 2272500$, $\Sigma y = 6800$ $\Sigma y^2 = 463025$, $\Sigma xy = 1022250$.
Find correlation coefficient between x and y.

f) Let A and B be two series of numbers. The mean and S.D. of A are 100 and 8 and that of B are 103 and 4 respectively. The correlation coefficient between the series is 0.4. Find the regression equation of B on A and A on B.

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