



17217

21718

3 Hours / 100 Marks

Seat No.

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- 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 $f(x) = \sin x + \cos x$ find $f(x) - f(-x)$.

b) Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$.

c) Evaluate $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$.

d) Evaluate $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$.

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

f) Find $\frac{dy}{dx}$ if $y = \sin(2x + 1)$.

g) Find equation of tangent line to the curve $y = \sin x$ at $x = \pi$.

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

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

j) Evaluate $\int (\cos^2 x - \sin^2 x) \, dx$.

P.T.O.



- k) Find k if k is the mean of the following data :
16, 7, 29, k , 32, 8, 10.
- l) Find mode of the following data :
25, 15, 23, 27, 14, 25, 23, 25, 22, 25.
- m) Find coefficient of range of the following data :
40, 52, 47, 28, 45, 36, 47, 50.
- n) Calculate the 7th decile of the following :
28, 35, 46, 47, 60, 74.

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

16

- a) If $y = f(x) = \frac{x-5}{5x-1}$ show that $f(y) = x$.
- b) Evaluate $\lim_{x \rightarrow 3} \frac{\log x - \log 3}{x - 3}$.
- c) Differentiate $(\tan x)^{\cot x}$ w.r.t. x .
- d) If $y = \tan^{-1}\left(\frac{5x}{1-6x^2}\right)$ find $\frac{dy}{dx}$.
- e) If $x^2 + 3xy - y^2 = 11$ find $\frac{dy}{dx}$ at $(1, 2)$.
- f) Show that $(x/a) + (y/b) = 2$ is the tangent to the curve $(x/a)^n + (y/b)^n = 2$ at (a, b) .

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

16

- a) Divide 80 into two parts such that their product is maximum.
- b) Evaluate $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$.
- c) Evaluate $\int_0^{\pi/2} \cos^3 x dx$.
- d) Evaluate $\int \frac{\log[\tan(x/2)]}{\sin x} dx$.
- e) Evaluate $\int \tan^{-1} x dx$.
- f) Evaluate $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$.

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

16

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



- b) Arrange the following data into frequency distribution table showing classes 1 – 10, 11– 20, 21 – 30, ... etc., tally marks, frequency, class marks and percentage frequency.
70, 55, 51, 42, 57, 45, 60, 47, 63, 53, 33, 65, 39, 82, 55, 64, 50, 25, 65, 75, 30, 20, 58, 52, 36, 45, 42, 35, 40, 61, 53, 59, 49, 41, 15, 52, 46, 42, 08, 45, 39, 55, 65, 45, 63, 54, 48, 04, 35, 26, 18, 93.
- c) The mean wt. of 150 students in a class is 60 kg. The mean wt. of boys in a class is 70 kg and that of girls is 55 kg. Find the no. of boys and girls in a class.
- d) Draw a less than cumulative frequency curve (ogive curve) and find median graphically.

Weekly wages in Rs.	100 – 119	120 – 139	140 – 159	160 – 179	180 – 199	200 – 219	220 – 239
No. of workers	25	45	55	35	25	10	5

- e) Find median of the following data :

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

- f) Find mode from the following data :

C.I.	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40
freq.	3	5	9	15	20	16	10	2

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

16

- a) Find mean deviation from median of the following data :

Wt. in gms.	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45
No. of items	7	12	16	25	19	15	6

- b) Find S.D. and C.V. of the following frequency distribution :

C.I.	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85
f_i	3	7	9	23	15	8	6	4

- c) Find combined S.D. of groups A and B taken together given that :

Group	Size	A.M.	S.D.
A	100	66	6
B	200	63	4



d) Find variance of the following data :

C.I.	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
f_i	3	5	9	15	20	16	12

e) Which set is more consistent from the following data :

	Set-I	Set-II
\bar{x}	82.5	48.75
S.D.	7.3	8.35

f) The A.M. and S.D. of 100 items are found to be 40 and 10. At the time of calculation, two items are wrongly taken as 30 and 70 instead of 3 and 27. Find correct A.M. and S.D.

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

16

a) Calculate coefficient of correlation for the data :

$$n = 11, \Sigma x = 117, \Sigma y = 260, \Sigma xy = 2827, \Sigma x^2 = 1313, \Sigma y^2 = 6580.$$

b) Calculate coefficient of correlation using Karl Pearson's method for the following data :

Year of service	11	7	9	5	8	6	10
Monthly income in Rs.	7	5	3	2	6	4	8

c) Calculate Spearman's rank correlation coefficient :

Rank in Mathematics	3	8	9	2	7	10	4	6	1	5
Rank in Physics	5	9	10	1	8	7	3	4	2	6

d) Find correlation coefficient between x and y. Line of regression is $2x - 9y + 6 = 0$ and $x - 2y + 1 = 0$. Also find mean values of x and y.

e) Find regression equation of x on y from the following data :

x	30	35	40	45	50
y	48	44	40	36	32

f) Find equations of two lines of regression from the given data :

$$\bar{x} = 50, \bar{y} = 20, \sigma_x = 5, \sigma_y = 4 \text{ and } r = 0.8.$$