17217

15162

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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN : **20**

(a) If $f(x) = x^3 - x^2 + x - 1$, find $f(x) + f(-x)$.

(b) Evaluate $\lim_{x \to 2} \frac{x^{10} - 1024}{x^5 - 32}$

(c) Differentiate $\sin(m \cos^{-1}x)$ w.r.t. 'x'.

(d) Differentiate x^x w.r.t. 'x'.

(e) Find $\frac{dy}{dx}$ if $x = a^2t^3$ and $y = 3a^2t$.

(f) Evaluate : $\int \frac{dx}{x^2 + 9}$

(g) Evaluate : $\int \left[\frac{1}{1 + x^2} - \frac{\cos x}{\sin^2 x}\right] dx$

(h) Evaluate : $\int \frac{x^2}{1 + x^2} dx$

(i) Following are lives in hours of 15 pieces of the component of aircraft engine. Find the median of the data :
715, 724, 725, 710, 729, 745, 694, 699, 696, 712, 719, 734, 728, 716, 705

(j) The mean of 15 observations is 10 and the mean of 10 observation is 15. Find the mean of these combined 25 observations.

(k) Find the range and coefficient of range for the following data :

Marks :	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69
No. of students :	6	10	16	14	8	4

(l) Find the mean deviation about median of the digits :

3, 5, 1, 7, 2, 8, 9, 4, 6

(m) Find the variance of the following data :

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

2. Attempt any FOUR : **16**

(a) If $f(x) = \log\left(\frac{x-1}{x}\right)$, show that $f(y^2) = f(y) + f(-y)$.

(b) Evaluate : $\lim_{x \to 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$

(c) Evaluate : $\lim_{x \to 0} \frac{10^x - 2^x - 5^x + 1}{x^2}$

(d) Find $\frac{dy}{dx}$, if $y = (x+2)^{5/4} (2x-3)^{7/2} (3x-1)^{1/3}$

(e) If $\sin y = x \sin(a + y)$, show that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

(f) Find $\frac{dy}{dx}$, if $x^3 + y^3 = 3axy$.

3. Attempt any FOUR : **16**

(a) Find the equation of tangent and normal to the curve $x^2 + 3xy + y^2 = 5$ at (1, 1).

(b) Find the maximum and minimum value of

$x^3 - 9x^2 + 24x$

(c) Evaluate : $\int \frac{dx}{x \cos^2(\log x)}$

(d) Evaluate : $\int \frac{\sec^2 x}{3 \tan^2 x - 2 \tan x - 5} dx$

(e) Evaluate : $\int \frac{dx}{1 + \sin x + \cos x}$

(f) Evaluate : $\int x^2 e^{3x} dx$

4. Attempt any FOUR : **16**

(a) Evaluate : $\int \frac{x^2 + 1}{x(x^2 - 1)} \, dx$

(b) Evaluate : $\int_0^{\pi/2} \frac{1}{1 + \cot x} \, dx$

(c) The class marks of a certain distribution are
47, 52, 57, 62, 67, 72, 77, 82
Determine the class interval, in terms of class boundary and class limits.

(d) Find the average marks of a student from the following data :

Marks :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students :	3	9	15	8	5

(e) The crushing strength of 45 cement blocks are given below :

Crushing strength in kg./cm.	146-155	156-165	166-175	176-185	186-195	196-205
No. of blocks :	5	7	9	14	6	4

Find the mode.

(f) The table below, gives the frequency distribution of weekly wages (in ₹) of a number of workers.

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

Draw an ogive and hence determine mode.

5. Attempt any FOUR : **16**

(a) Find the mode graphically by drawing a Histogram for the following data :

Class :	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
$\mathbf{f_i}$ **:**	15	20	25	24	12	31	71	52

(b) Find the mean deviation from the mean of the following frequency distribution.

x_i **:**	10	11	12	13	14
$\mathbf{f_i}$ **:**	3	12	18	12	3

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(c) Calculate the S.D. of the following data :

Class interval :	0-10	10-20	20-30	30-40	40-50
Frequency	3	5	8	3	1

(d) Calculate the combined standard deviation for the following data :

Sample	**Number**	**Mean**	**S.D.**
A	50	54.4	8
B	100	50.3	7

(e) 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 two sets is more consistent ?

(f) Find the coefficient of variance for the following data :

Class Intervals :	0-30	30-60	60-90	90-120	120-150	150-180	180-210
Frequency :	9	17	43	82	81	44	24

6. Attempt any TWO : **16**

(a) Ten students got the following percentage of marks in Economics and Statistics :

Roll No. :	1	2	3	4	5	6	7	8	9	10
Marks in Economics :	78	36	98	25	75	82	90	62	65	39
Marks in Statistics :	84	51	91	60	68	62	86	58	53	47

Calculate the coefficient of correlation.

(b) 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

Estimate the value of y when $x = 10$.

(c) Three judges A, B, C gives the following ranks. Find which pair of judges has common approach.

A :	1	6	5	10	3	2	4	9	7	8
B :	3	5	8	4	7	10	2	1	6	9
C :	6	4	9	8	1	2	3	10	5	7