11920

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) = x^4 – 2x + 7 find f(0) + f(2).

(b)   Evaluate : $\lim\limits_{x \to 1} \dfrac{x^3 - 1}{(x - 1)}$

(c)   Find $\dfrac{dy}{dx}$ if y = (x + 1) (x + 2)

(d)   Find $\dfrac{dy}{dx}$ if y = $\sin^3 x$

(e)   Find $\dfrac{dy}{dx}$ if y = log (x^2 + 2x + 5)

(f)   Evaluate : $\displaystyle\int \dfrac{x}{x + 2}\, dx$

(g)   Evaluate : $\displaystyle\int x \cdot e^x \, dx$

(h) Evaluate : $\int\limits_{1}^{2} (x+3) \, dx$

(i) Find K if the mean of the following observation is 16. Observations are, 11, 9, 15, 17, K, 23, 27

(j) Find median & mode of 21, 24, 27, 27, 30, 32, 34, 35, 38, 48, 49.

(k) Calculate Quartile deviation if

$Q_1 = 40$ $Q_2 = 55$ $Q_3 = 68$

(l) Define :
   (i) Deciles
   (ii) Percentiles

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

(a) Evaluate $\lim\limits_{x \to 4} \dfrac{x^2 - 7x + 12}{x^2 - 16}$

(b) If $f(x) = \dfrac{2x-3}{3x-2} = y$ show that $f(y) = x$

(c) Evaluate $\lim\limits_{x \to 0} \dfrac{e^{2x} - e^{3x}}{x}$

(d) Find $\dfrac{dy}{dx}$ if $y = \sec x \cdot \tan x$

(e) Find $\dfrac{dy}{dx}$ if $y = \cos^{-1}(1 - 2\sin^2 x)$

(f) Find $\dfrac{dy}{dx}$ if $x^2 + y^2 = 25$

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

(a) Find slope of tangent to the curve $x = a\cos^3 t$, $y = a\sin^3 t$ at pt $(a, 0)$.

(b) Find the equation of normal to the curve $y = x^3 - 2x^2 + 4$ at $(2, 4)$.

(c) Divide 100 into two parts such that their product is maximum.

(d) Evaluate : $\int \dfrac{3x-2}{x^2 - 3x + 2} \, dx$

(e) Evaluate : $\int \sqrt{9x^2 - 16} \, dx$

(f) Evaluate : $\int \dfrac{\sin\sqrt{x}}{\sqrt{x}} \, dx$

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

(a) Evaluate : $\displaystyle\int_{2}^{7} \frac{\sqrt{x}}{\sqrt{x} + \sqrt{9-x}}\, dx$

(b) Evaluate : $\displaystyle\int_{1}^{3} (4x^3 - 3x^2 + 2x + 5)\, dx$

(c) Find mode (by formula) from the following data :

Marks	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40
No. of students	7	10	16	32	24	18	10	5

(d) Find median by graphically from the following grouped frequency distribution.

Profit ₹ lakh	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of companies	5	7	10	15	22	16	7	5	3

(e) Calculate the arithmetic mean of marks from the following data :

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of students	12	18	17	20	17	6

(f) The mean wt. of 150 student in a class is 60 kg. The mean wt. of the boys is 70 kg & the mean wt. of the girls is 55 kg. Find the no. of boys & no. of girls.

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

(a) Find median (By formula) of the following distribution :

Marks obtained	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students	5	8	27	14	06

(b) Calculate mean deviation about mean of the following distribution :

Marks	3	4	5	6	7	8
No. of students	1	3	7	5	2	2

(c) Calculate S.D. & variance of the following data :
25, 50, 30, 70, 42, 36, 48, 34, 60

(d) The two sets of observations are given below :

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

Which set is more consistent ?

    (e)   Calculate co-efficient of Q.D. for the following data :

C.I.	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
fi	3	5	9	15	18

    (f)   Calculate C.V. for the following data :

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
No. of students	6	5	8	15	7	6	3

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

    (a)   Calculate D_8 & P_{50} for the following data :

Marks	0 – 10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	6	11	22	24	28	11	15	13	12	8

    (b)   Calculate Karl Pearsons co-efficient of correlation for the data :

        $n = 10, \Sigma x = 360, \Sigma x^2 = 13176,$

        $\Sigma y = 310, \Sigma y^2 = 9772, \Sigma xy = 11257$

    (c)   Calculate Spearman's Rank correlation co-efficient for the following data :

x	51	53	73	46	50	60	47	36	60	65
y	49	72	74	44	58	66	50	30	55	71

    (d)   Find $\bar{x}$, $\bar{y}$ & r if the eqns of the lines of regression are $x - 10y + 17 = 0$ and $x - 5y + 7 = 0$.

    (e)   Given : $\bar{x} = 50.07$ S.D. of $x = 5.26$

                        $\bar{y} = 9.98$ S.D. of $y = 2.59$

                        $r = 0.898$

    Find the equations of the lines of regression.

    (f)   Calculate byx & bxy from the following data :

x	10	14	18	22	26	30
y	18	12	24	6	30	36

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