

Total No. of Questions : 8]

SEAT No. :

PD4361

[Total No. of Pages : 3

[6403]-160

T.E. (Mechanical & Mechanical S/w)
NUMERICAL AND STATISTICAL METHODS
(2019 Pattern) (Semester - V) (302041)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of scientific Calculator is allowed
- 5) Assume suitable data, if necessary.

Q1) a) Find the area under the curve on x-axis. The curve passes through the following points (1.0, 2.0), (1.50, 2.40), (2.0, 2.70), (2.50, 2.80), (3.0, 3.0), (3.50, 2.60), (4.0, 2.10). Use Simpson's 1/3rd Rule. [6]

b) Use the trapezoidal rule with n = 6 to estimate: [6]

$$\int_1^5 \sqrt{1+x^2} dx$$

c) Draw flowchart for Simpson 1/3 method to solve integration of any function. [6]

OR

Q2) a) Evaluate $I = \int_0^1 \int_0^1 e^{x+y} dx dy$ for 4 strips in x and y using Trapezoidal rule. [8]

b) Find Solution of an equation $1/(x+\sin x)$ using Simpson's 3/8 rule $x_1 = 1$ and $x_2 = 2$; Step value (h) = 0.25 [5]

c) Draw flowchart of Trapezoidal Method to evaluate Integration of a function. [5]

Q3) a) Find the polynomial passing through points (0,1), (1,3), (2,7), (3, 25), (4, 61), (5, 12) using Newton's interpolation formula and hence find y at $x = 1.5$. [8]

b) Fit a power equation $y = ax^b$ to the following data set. [10]

x	2.5	3.5	5	6	7.5	10	12.5	15
y	7	5.5	3.9	3.6	3.1	2.8	2.6	2.4

OR

P.T.O.

- Q4) a)** The velocity distribution of a fluid near a flat surface is given below. [10]

x	0.1	0.3	0.5	0.7	0.9
v	0.72	1.81	2.73	3.47	3.98

x is the distance from the surface (cm) and v is the velocity (cm/sec). Using Lagrange's interpolation method obtain the velocity at $x = 0.4$ and also find distance x when velocity will be 2 cm/sec.

- b) Find the least square polynomial approximation of quadratic curve to the data. [8]

x	-3	-2	-1	0	1	2	3
y	12	4	1	2	7	15	30

- Q5) a)** Calculate the first four moments of the following distribution about the mean. Also evaluate β_1 and β_2 . Identify type of curve. [8]

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

- b) The following are scores of two batsmen A and B in a series of innings:[8]

A	12	115	6	73	7	19	119	36	84	29
B	47	12	16	42	4	51	37	48	13	0

Who is the better scorer and who is more consistent? Justify your answer.

OR

- Q6) a)** Compute Karl Pearson's coefficient of correlation for the following heights in inches of fathers (x) and their sons (y): [9]

X	65	68	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

- b) Illustrate the following statistical diagrams with real life example [8]

- Scattered diagram
- Histogram
- Pie chart

- Q7) a)** Supposing that out of 12 test matches played between India and Pakistan during last 3 years, 6 are won by India, 4 are won by Pakistan and 2 have ended in a draw. If they agree to play a test series consisting of three matches, find the probability that India wins the test series on the basis of past performance. [8]

- b) In a distribution of 'NSM' marks exactly normal, 10% of students are under 40 and 5% are over 80. Find the mean and standard deviation of the distribution. [$A_1 = 0.4$, $Z_1 = 1.29$, $A_2 = 0.45$, $Z_2 = 1.65$] [9]

OR

- Q8) a)** A nationalized bank utilizes four teller windows to render fast service to the customers. On a particular day, 800 customers were observed. They were given service at the different windows as follows: **[9]**

Window Number	Expected Number of customers
1	150
2	250
3	170
4	230

Test whether the customers are uniformly distributed over the windows.
($\chi^2_{3,0.05} = 7.815$)

- b)** A can hit the target 1 out of 4 times, B can hit the target 2 out of 3 times and C can hit the target 3 out of 4 times. Find the probability of **[8]**
- at least two hit the target
 - At most two hit the target
 - No one hitting the target

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