

Total No. of Questions : 8]

SEAT No. :

P2317

[Total No. of Pages : 3

[58701-1020

**T.E. (Mechanical/Mechanical (Sandwich))**  
**NUMERICAL AND STATISTICAL METHODS**  
**(2019 Pattern) (Semester - I) (302041)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed.
- 4) Assume suitable data if necessary.

Q1) a) Evaluate formula.  $I = \int_0^{0.8} [\log_e(x+1) + \sin(2x)] dx$  by using Gauss-Quadrature two-point. [9]

b) Draw Flow Chart for Numerical integration using Simpsons 3/8 Method. [8]

OR

Q2) a) That table below gives the Velocity v of moving particle at time t seconds. [8]

t	0	2	4	6	8	10	12
v	4	6	16	34	60	94	136

Find the distance covered by particle in 12 seconds using Simpson's 1/3<sup>rd</sup> rule.

b) Find double integration of  $f(x,y) = 1/(x+y)$

For  $x = 2$  to  $3.2$  and  $y = 1$  to  $2.8$  taking no. of steps in both  $x$  and  $y$  as  $n_x = n_y = 3$ . Use Trapezoidal rule. [9]

P.T.O.

- Q3) a)** Draw Flow Chart for power equation  $y = ax^b$  [9]
- b) A set of  $x$  values and respective  $y$  values are given below. Using lagrange inverse interpolation method, find the value of  $x$  at  $y = 0.42$  [9]

x	10	20	30	40	50
y	0.1105	0.1985	0.2727	0.4101	0.5123

OR

- Q4) a)** The values of Nusselt numbers (Nu) and Reynold numbers (Re) found experimentally are given below. If the relation between Nu and Re is of the type  $Nu = a \cdot Re^b$ . Find the values of  $a$  and  $b$  for the given values of Nu and Re. [9]

2000	2400	2800	3200	3600	4000
13.0102	13.5091	14.0789	14.4192	15.1297	16.7535

- b) Draw a flowchart for Lagrange's inverse interpolation. [9]

- Q5) a)** Define & Explain with example. [8]

- i) Mean
- ii) Median
- iii) Mode
- iv) Standard Deviation

- b) Calculate the first four moments about the mean of the given distribution. Find  $\beta_1$  and  $\beta_2$  and comment on skewness and kurtosis. [9]

X	5	7	13	24	29	36	40	45	50
f	4	6	17	25	18	12	9	3	2

OR

- Q6)** a) Arithmetic mean and standard deviation of 30 items are 20 and 3 respectively out of these 30 items, item 22 and 15 are dropped. Find new A.M. and S.D. if item 22 is replaced by 8 and 15 is replaced by 17 [9]
- b) Define and explain the following terms : [8]
- Kurtosis
  - Skewness

- Q7)** a) On an average a box containing 10 articles is likely to have 2 defectives. If we consider a consignment of 100 boxes, how many of them are expected to have three or less defectives [9]

$$p = \text{Probability of box containing defective articles} = \frac{2}{10} = \frac{1}{5}$$

$$q = \text{Probability of non-defective items} = \frac{4}{5}$$

- b) What is probability distribution? [9]
- Explain following terms with illustrations :
- Marginal probability distribution
  - Joint probability distribution

OR

- Q8)** a) Describe Binomial poisson, normal distribution in details & solve problem. In a certain factory turning out razor blades, there is a small change of 1/500 for any blade to be defective. The blades are supplied in a pocket of 10. Use poisson distribution to calculate the approximate number of packets containing no defective and two defective blades, in a consignment of 10,000 packets. [9]
- b) Describe joint, conditional and marginal probability in details & solve problem A set of five similar coins is tossed 210 times and the result is [9]

No. of Heads	0	1	2	3	4	5
Frequency	2	5	20	60	100	23

Test the hypothesis that the data follow a binomial distribution.

