Total No. of Questions : 8]

P7656

[6180]-178

SEAT No. :

[Total No. of Pages : 3

T.E. (Mechanical Engg) (Mechanical s/w) NUMERICAL AND STATISTICAL METHODS (2019 Pattern) (Semester - I) (302041)

Time : 2¹/₂ Hours] Instructions to the candidates: [Max. Marks : 70

- 1) Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.7 or Q.No.8.
 - 2) Neat diagrams must be drawn wherever necessary.
 - 3) Use of drawing instruments, electronic pocket calculators are allowed.
 - 4) Figures to the right indicates full marks.
 - 5) Assume suitable data, if necessary.

dx

Q1) a) Find integration of e^x cos (x) - 2x in limits 0 to 1 by using 3-point Gauss Legendre formula.
[6]

b) Evaluate
$$\int_{0}^{6} \frac{1}{(1+x^2)}$$

[6]

by using the Trapezoidal rule. Take six intervals.

c) Draw a flow chart for Simpson's 1/3rd rule to evaluate integration of any function. [6]

OR

- **Q2**) a) Find integration of $\int_{0}^{\infty} xe^{x} dx$ by using 2-point Gauss Legendre formula.[5]
 - b) Draw a flow chart for Trapezoidal rule to evaluate integration of any function. [5]
 - c) The velocity 'v' (km/hr) of a vehicle which starts from rest, is given at fixed intervals of time 't' (min) as follows: [8]

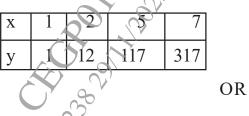
t (min)	2	4	6	8	10	12	14	16	18	20
V(km/hr)	10	18	25	29	32	20	(ÎV	05	02	00

Estimate approximately the distance covered in 20 minutes. Select appropriate method.

Q3) a) Find the least square polynomial approximation of quadratic curve to the data. [9]

X	0	1	2	3	4
у	-4	-1	4	11	20
					\sim

The following data gives the values of y corresponding to certain values b) of x, Find the value of x when y=167.59789 by applying Lagrange's method. [9]



Following is the table of square roots. Calculate the values of $\sqrt{151}$ by **Q4**) a) Newton's interpolation formula. [9]

X	150	152	154	156	C.
$Y=\sqrt{X}$	12.247	12.329	12.410	12.490	×

Fit a straight line to given data regarding x as the independent variable.[9] b)

X	1	2	3	4	5	6
у	1200	900	600	200	110	× 50

From the following data of marks obtained by 8 students in Numerical **Q5**) a) insfer Insfer and Statistical Methods (NSM) and Heat and Mass Transfer (HMT) **A**91 papers, compute rank coefficient of correlation.

NSM	15	20	28	12	40	60	20	80	
HMT	40	30)	50	30	20	10	30	60	0

[8]

Coefficient of variation i)

Discuss the following terms.

- ii) Central moments
- Standard deviation iii)
- Grouped and Ungrouped Data. iv)

b)

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Illustrate the following statistical diagrams with real life example [9] **Q6**) a)

- Scattered diagram i)
- ii) Histogram
- Pie chart iii)
- The competitors in a beauty contest are ranked by three judges in the b) following order. Use rank correlation coefficient to discuss which pair of judges has nearest approach to beauty. [9]

1 st judge	1	D	4	8	9	6	10	7	3	2
2 nd judge	4	8	7	6	5	9	10	3	2	1
3 rd judge	(0)	7	8	1	5	10	9	2	3	4

- The number of breakdowns of a computer in a week is a Poisson variable **Q7**) a) with $\lambda = np = 0.3$. What is the probability that the computer will operate:[8]
 - With no breakdown i)
 - At the most four breakdown. in
 - Xiii) At least five breakdowns.
 - iv) More than 5 breakdown.
 - Less than 4 breakdowns in a week. v)
 - In distribution of 'NSM' marks exactly normal, 7% of students are under b) 35 and 89% are under 63. Find the mean and standard deviation of the distribution.

$$[A_1=0.43, Z_1=1.48, A_2=0.39, Z_2=1.23]$$

OR

- Let $F: \mathbb{R}^4 \to \mathbb{R}^3$ be the linear mapping defined by [9] F(x, y, z, t) = (x y + z + t, x + 2z t, x + y + 3z 3t). Find a basis and **Q8**) a) the dimension of (a) the image of F, (b) the kernel of F.
 - Among 64 offsprings of a certain cross between guinea pigs 34 were b) red, 10 were black and 20 were black and 20 were white. According to a genetic model, these numbers should be in the ratio 9:3:4. Are the data consistent with the model at 5% level? [8]

Given $(x_2^2, 0.05 = 5.99)$