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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2141703 **Date:09/05/2019**

Subject Name: Numerical Techniques & Statistical Methods

Time:02:30 PM TO 05:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

MARKS

Q.1 **(a)** If X = 3.4327, find the absolute and relative errors if : **03**

(a) X is truncated to three decimal places.

(b) X is rounded off to three decimal places.

(b) Calculate mean and mode for the following data: **04**

Class	0-10	10-20	20-30	30-40	40-50
Frequency	10	14	19	17	13

(c) Use Fourth order Runge-Kutta method to find $y(0.2)$ with $h=0.1$, given that $\frac{dy}{dx}=2x+y, y(0)=1$ **07**

Q.2 **(a)** Using the power method, find the largest Eigen value for $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ **03**

(b) Apply Gauss – Seidel iteration method to solve : **04**

$20x+y-2z=17, \quad 3x+20y-z=-18, \quad 2x-3y+20z=25$

(c) Construct an Interpolating polynomial which takes the following values : **07**

x	0	1	2	3	4	5	6	7
y	1	2	4	7	11	16	22	29

OR

(c) Obtain Cubic spline for subinterval $0 \le x \le 1$ & $1 \le x \le 2$ from the following data: **07**

x	0	1	2	3
$f(x)$	1	2	33	244

Q.3 **(a)** Considering following tabular values, Determine the area bounded by the given curve and X-axis between $x=10$ to $x=16$ by Trapezoidal rule. **03**

x	10	11	12	13	14	15	16
y	1.02	0.94	0.89	0.79	0.71	0.62	0.55

(b) Using Newton's forward formula, find the value of $f(1.6)$ **04**

x	1	1.4	1.8	2.2
$f(x)$	3.49	4.82	5.96	6.5

(c) Use Euler's method to find $y(2)$ from the differential equation $\frac{dy}{dx}=x+2y, y(1)=1$ with $h=0.1$ **07**

OR

Q.3 **(a)** Using Simpson's 1/3 rule, evaluate $\int_0^1 \frac{1}{(1+x^2)}\,dx$ by taking 4 sub intervals. **03**

(b) Evaluate $\int_0^1 \exp(-x^2)\,dx$ using the Gaussian Integration formula with n = 3. **04**

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(c) Given that $2\frac{dy}{dx} = y^2 + x^2\ y^{(4)}$, $y(0)=1, y(0.1)=1.06, y(0.2)=1.12, y(0.3)=1.21$ Evaluate $y(0.4)$ by Milne's Predictor – Corrector method. **07**

Q.4 **(a)** There are two boxes A and B containing 4 white, 3 red and 3 white, 7 red balls respectively. A box is chosen at random and a ball is drawn from it, If the ball is white, find the probability that it is from box A. **03**

(b) An unbiased coin is tossed 6 times. Find the probability of getting (1) exactly 4 heads (2) at least 4 heads. **04**

(c) Eleven school boys were given a test in a Subject. They were given a month's further coaching and a second test of equal category was held at the end of it. Do the marks give evidence that the students have benefited by extra coaching? **07**

Boys	1	2	3	4	5	6	7	8	9	10	11
Marks 1st test	23	20	19	21	18	20	18	17	23	16	19
Marks 2nd test	24	19	22	18	20	22	20	20	23	20	17

(At 5% level of significance for n = 10 d. f. $t_T = 2.228$)

OR

Q.4 **(a)** Two people are selected at random from a group of seven men and five women. Find the Probability that both are men or both are women. **03**

(b) 100 Electric bulbs are found to be defective in a lot of 5000 bulbs. Find the probability that at the most 3 bulbs are defective in a box of 100 bulbs. **04**

(c) A dice is thrown 150 times and the following results are obtained. **07**

Number turned up	1	2	3	4	5	6
Frequency	19	23	28	17	32	31

Test the Hypothesis that the dice is unbiased at 5% level of significance.
(At 5% level of significance for n = 5 d. f. $\chi^2_T = 11.07$)

Q.5 **(a)** Find the standard deviation of a group of data points: **03**
101.8 , 103.2, 104.0, 102.5, 103.5

(b) Define Chi-square Test. State (a) conditions to apply test (b) application of test **04**

(c) Represent the following information in form of a network. Find average duration time or expected time of each activity and obtain the critical path. **07**

Activity	1 - 2	2- 3	2 - 4	3 - 5	4 - 5	4 - 6	5 - 7	5- 8	7- 9	8- 9	9- 10	6- 10
Optimistic time	4	1	8	3	2	3	3	4	4	2	4	4
Most Likely time	9	5	10	6	4	7	7	8	9	6	11	7
Pessimistic time	14	18	17	8	5	10	10	9	14	10	18	9

OR

Q.5 **(a)** Compute the Median from the data: **03**

Class	0-30	30-60	60-90	90-120	120-150	150-180
Frequency	8	13	22	27	18	7

(b) A bag Contains 5 white and 7 black balls. Find the expectation of a man who is allowed to draw two balls from the bag and who is to receive one rupee for each black ball and two rupees for each white ball. **04**

(c) Draw PERT – diagram after finding out expected time & find critical path. **07**

Activity	Sequence	Optimistic Time	Most Likely Time	Pessimistic Time
A	1-2	7	12	13
B	1-3	7	10	12
C	2-5	8	13	15
D	3-5	10	12	22
E	5-6	10	14	18

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