

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022****Subject Code:3130908****Date:11-07-2022****Subject Name:Applied Mathematics for Electrical Engineering****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1** (a) Use false position method to find the root of $f(x) = x^2 - x - 2 = 0$ in the range $1 < x < 3$, correct to three decimal places. **03**

- (b) Fit a straight line to the following data: **04**

x	6	7	7	8	8	9	9	10
y	5	5	4	5	4	3	4	3

- (c) The velocity v of a particle at distance s from point on its path is given by the following table: **07**

s (meter)	0	10	20	30	40	50	60
v (meter/second)	47	58	64	65	61	52	38

Find the time taken to travel 60 meter using Simpson's 1/3 rule.

- Q.2** (a) There are 3 statistician, 2 economists and 4 engineers. A committee of 4 is to be formed in such a way that there are 2 statisticians and 2 engineers. Find the probability. **03**

- (b) Find coefficient of variation for the following distribution. **04**

x_i	5	10	15	20	25
f_i	7	4	6	3	5

- (c) Discuss bisection method. Find a root of $x^3 - x - 11 = 0$ correct to four decimal places using bisection method. **07**

OR

- (c) Discuss Newton-Raphson method. Find a real root of $f(x) = x - 1.2 \sin x - 0.5 = 0$, correct to four decimal places, which lies between 1.5 and 2 by using Newton-Raphson method. **07**

- Q.3** (a) State Trapezoidal rule with $n=10$ and using it evaluate $\int_0^1 e^x dx$. **03**

- (b) Fit a second degree parabola $y = ax^2 + bx + c$ in least square sense for the following data: **04**

x	1	2	3	4	5
y	10	12	13	16	19

- (c) Compute the values of $f(x)$ at $x=0.02$ and $x=0.38$ using Newton's forward and backward interpolation formula respectively for: **07**

x	0.0	0.1	0.2	0.3	0.4
$f(x)$	1.0000	1.1052	1.2214	1.3499	1.4918

OR

- Q.3** (a) Evaluate the integral $\int_{-1}^1 \frac{dx}{1+x^2}$ by Gaussian integration two point formula. **03**
- (b) Find the third divided difference with arguments 2, 4, 9, 10 of the function $f(x) = x^3 - 2x$. **04**
- (c) Determine the interpolating polynomial of degree three using Lagrange's interpolation formula **07**

x	0	1	3	4
y	-12	0	12	24

- Q.4** (a) Define sample space, simple events and compound events. **03**
- (b) Is the function **04**
- $$f(x) = \begin{cases} 0, & x \leq 0 \\ 8xe^{-4x^2}, & x > 0 \end{cases} \text{ a probability distribution?}$$
- (c) Using Picard's method find a solution of $\frac{dy}{dx} = \frac{x^2}{y^2 + 1}$, $y(0) = 0$ upto second approximation. **07**

OR

- Q.4** (a) A person hits a target with rifle shot in 4 out of 5 times. Another person can hit the same target with the same rifle in 3 out of 4 times. Find the probability of the target being hit when both try or by at least one hits the target. **03**
- (b) An equipment will function only if three components A, B and C are all working. The probability of A's failure during one year is 5% that of B's failure is 15% and that of C's failure is 10%. What is the probability that the equipment will fail before the end of that year? **04**
- (c) Use fourth order Runge-Kutta method to find the value of y when $x=0.2$, given that $y' = x + y^2$, and $y=1$ when $x=0$. **07**

- Q.5** (a) Find the skewness when the second and third central moments are 16 and 42 respectively. **03**
- (b) The following distribution shows the selling of cars in a week by a dealer. **04**

No. of cars	0	1	2	3	4	5
Probability	0.2	0.25	0.35	.05	0.08	0.07

What is the average number of cars he sells?

- (c) Find the Karl Pearson's coefficient of skewness for: **07**

Class	50-55	55-60	60-65	65-70	70-75
Frequency	8	10	15	17	8

Also show that the distribution is platykurtic.

OR

- Q.5** (a) Find S.D. of the marks obtained by students: 65, 58, 67, 34, 48, 45, 70, 62, 60, 50. **03**
- (b) There are 5 black balls and 4 red balls. Find the number of ways in which 6 balls can be selected so that there are at least 2 red balls in that selection. **04**
- (c) Three machines A, B and C produce 50%, 30% and 20% of the total number of items. The production of defective item is 3%, 4%, 5% respectively on each machine. If an item selected at random and is found to be defective, find the probability that the item was produced by machine A. **07**
