Seat No.: ________ Enrolment No.___________

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3130908 **Date: 26/11/2019**

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.**

Marks

Q.1 **(a)** Find a real root of the equation $x^3 - x - 1 = 0$ by using Regula-falsi method correct to two decimal places. **03**

(b) State the formula for finding the q^{th}-root and find the square root of 8 using Newton Raphson method correct to two decimal places. **04**

(c) **Attempt the following.**

(i) Find the positive solution of $f(x) = e^{-x} - x$ by the secant method starting from $x_0 = 0, x_1 = 1.0$. **03**

(ii) Using method of least squares, find the best fitting straight line to the given following data. **04**

x	:	1	2	3	4	5
y	:	1	3	5	6	5

Q.2 **(a)** If $f(x) = \frac{1}{x}$, prepare the table for finite differences and hence find $[a,b]$ and $[a,b,c]$. **03**

(b) State Newton's forward formula and use it to find the approximate value of $f(1.6)$, if **04**

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

(c) **Attempt the following.**

(i) Using quadratic Lagrange interpolation, compute $\ln 9.2$ from $\ln 9.0 = 2.1972$, $\ln 9.5 = 2.2513$, $\ln 11 = 2.3979$ **03**

(ii) State Newton's Backward formula and use it to find the approximate value of $f(7.5)$, if **04**

x	3	4	5	6	7	8
$f(x)$	28	65	126	217	344	513

OR

(c) **Attempt the following.**

(i) Using the relation between the operators prove that, $(1+\Delta)(1-\nabla) = 1$. **03**

(ii) State Simpson's $3/8$ rule and hence evaluate $\int_0^3 \frac{1}{1+x} dx$ with $n = 6$. **04**

Q.3 **(a)** Use trapezoidal rule to estimate $\int_{0.5}^{1.3} e^{x^2} dx$ using a strip of width 0.2. **03**

(b) The velocity v of a particle at a distance s from a point on its linear path is given by the following data. **04**

Time (t)	0	5	10	15	20	25	30
Speed (v)	30	24	19	16	13	11	10

Estimate the time taken by the particle to travel the distance of 20m using Simpson's $1/3$ rule.

(c) **Attempt the following.**

(i) Using Euler's method, find $y(0.2)$ given that $\frac{dy}{dx} = y - \frac{2x}{y}; y(0) = 1$ taking $h = 0.1$. **03**

(ii) State the formula for Runge-Kutta method of fourth order and use it to calculate $y(0.2)$ given that $y' = x + y, y(0) = 1$ taking $h = 0.1$. **04**

OR

Q.3 **(a)** Define the following. **03**

1) Favorable Events
2) Random Variable
3) Probability Density function

(b) An urn contains 10 white and 3 black balls, while another urn contains 3 white and 5 black balls. Two balls are drawn from the first urn and put into the second urn and then a ball is drawn from the latter. What is the probability that it is a white ball? **04**

(c) **Attempt the following.**

(i) In producing screws, let A mean "screw too slim" and B "screw too small". Let $P(A) = 0.1$ and let the conditional probability that a slim screw is also too small be $P(B/A) = 0.2$. What is the probability that the screw that we pick randomly from a lot produced will be both too slim and too short? **03**

(ii) The joint probability density function of two random variables X and Y is given by **04**

$$f(x,y) = \begin{cases} k(x+2y) & ; \quad 0 < x < 1, 0 < y < 2 \\ 0 & ; \quad elsewhere \end{cases}$$

Find the marginal density function of X and Y.

Q.4 **(a)** Define the following. **03**

1) Mutually Exclusive Events
2) Probability
3) Compound Events

(b) State Bayes' theorem. In a bolt factory, three machines A,B and C manufacture 25% , 35% and 40% of the total product respectively. Of these outputs 5% , 4% and 2% respectively, are defective bolts. A bolt is picked up at random and found to be defective. What are the probabilities that it was manufactured by machines A,B and C? **04**

(c) **Attempt the following.**

(i) A person is known to hit the target in 3 out of 4 shots, where as another person is known to hit the target in 2 out of 3 shots. Find the probability of the target being hit at all when they both try. **03**

(ii) Out of five cars, two have tyre problems and one has brake problem and tow are in good running condition. Two cars are required for the journey. If two cars are selected among five at random and if X denotes the number with tyre problem, Y denotes with brake problem then find the marginal probability function of X and Y. **04**

OR

Q.4 (a) Evaluate $\int_0^1 \exp(-x^2)dx$ by using the Gaussian integration formula for $n=3$ **03**

(b) Using method of least squares, find the best fitting second degree curve to the following data. **04**

x	:	1	2	3	4
y	:	6	11	18	27

(c) Attempt the following.

(i) Solve the Ricatti equation $y' = x^2 + y^2$ using Taylor series method for the initial condition $y(0)=0$, where $0 \le x \le 0.2$ and $h = 0.2$. **03**

(ii) Find a positive root of the equation $x - \cos x = 0$ using bisection method correct to two places of decimals. **04**

Q.5 (a) Define Mean, Median and Mode for the ungrouped data. **03**

(b) Find the first four moments about mean $x = 5,10,8,13,4$ **04**

(c) Attempt the following.

(i) In a distribution of two different groups the variances are 15 and 27, whereas the third central moments are 32.4 and 67.56 respectively. Compare the skewness of two groups. **03**

(ii) Two automatic filling machines A and B are used to fill mixture of cement concrete in beam. A random sample of beam on each machine showed following results. **04**

A	32	28	47	63	71	39	10	60	96	14
B	19	31	48	53	67	90	10	62	40	80

Find standard deviation of each machine and also comment on the performance of the tow machines.

OR

Q.5 (a) The pH solution is measured eight times using the same instrument and the data obtained are as follows. **03**

7.15 , 7.20 , 7.18 , 7.19 , 7.21 , 7.20 , 7.16 , 7.18

Calculate the mean, variance and standard deviation.

(b) In environmental geology computer simulation was employed to estimate how far a block from a collapsing rock wall bounce down a soil slope.Based on the depth, location and angle of block soil impact marks left on the slope of the actual rock fall, the following 10 rebound lengths (meters) were estimated. Compute mean and standard deviation of the rebounds. **04**

10.2 , 9.5 , 8.3 , 9.7 , 9.5 , 11.1 , 7.8 , 8.8 , 9.5 , 10

(c) Attempt the following.

(i) Find the Co-efficient of Quartile Deviation for the following data: 6,8,10,4,20,18,16,14,12,10 **03**

(ii) State the formula for coefficient of Skewness based on central moments and finds it for the following frequency distribution. **04**

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

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Seat No.: ________ Enrolment No.___________

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:3130908 Date:09/03/2021

Subject Name:Applied Mathematics for Electrical Engineering

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Find a root of the equation $x^4 - x - 10 = 0$ using Bisection method. Perform only four iterations. **03**

(b) Use Newton's divided difference formula to find $f(x)$ from the following data: **04**

x	3	7	9	11
y	168	120	72	48

Hence evaluate y for $x = 6$.

(c) (i) Use Trapezoidal rule to evaluate $\int_0^1 x^2 dx$ considering five subintervals. **03**

(ii) Apply Runge-Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that **04**

$$\frac{dy}{dx} = y - \frac{2x}{y}, \quad y(0) = 1, \quad h = 0.2.$$

Q.2 **(a)** Find the mean, median and standard deviation for the following data: **03**

$$48, 43, 65, 57, 31, 60, 37, 48, 59, 78.$$

(b) If the probability density of a random variable is given by **04**

$$f(x) = \begin{cases} k(1 - x^2), & for\ 0 < x < 1 \\ 0, & elsewhere \end{cases},$$

find k. Also find the probabilities that a random variable having this probability density will take on a value (a) between 0.1 and 0.2 (b) greater than 0.5.

(c) (i) Find a root of the equation $xe^x - cos\,x = 0$ in the interval $(0, 1)$ using Newton-Raphson Method correct up to $\varepsilon_a < 1$ %. Take $x_0 = 0.5$. **03**

(ii) Find a real root of the equation $x^3 + x^2 - 100 = 0$ correct to two decimal places using Fixed Point Iteration method. **04**

Q.3 **(a)** Use Newton's backward interpolation formula to find the value of $f(175)$ from the following table: **03**

x	140	150	160	170	180
$f(x)$	3685	4845	6302	8076	10225

(b) If $y(1) = -3, y(3) = 9, y(4) = 30, y(6) = 132$, find the Lagrange's interpolation polynomial that takes the same values as y at the given point. **04**

(c) The following show the gain in reading speed of 8 students in a speed-reading program, and the number of weeks they have been in the program: **07**

No. of weeks	3	5	2	8	6	9	3	4
Speed gain	86	118	49	193	164	232	73	109

Fit a straight line by the method of least squares.

Q.4 **(a)** The population (in thousands) of a town is given below. Estimate the population for the year 1975 using interpolation. **03**

Year	1971	1981	1991	2001	2011
Population	46	66	81	93	101

(b) In usual notations, prove the following identities: **04**

$$(i)\ 1+\mu^2\delta^2=\left(1+\frac{1}{2}\delta^2\right)^2 \qquad (ii)\ \mu\delta=\frac{1}{2}\Delta E^{-1}+\frac{1}{2}\Delta.$$

(c) Fit a parabola $y=a+bx+cx^2$ to the following data: **07**

x	1	2	3	4	6
y	9.7468	24.4451	47.9318	78.4660	164.4186

Q.5 **(a)** Find the value of $y(0.4)$ from the following differential equation with the given initial condition by Euler's method: **03**

$$\frac{dy}{dx}=log(x+y),\quad y(0)=2,\quad h=0.1.$$

(b) Evaluate $\int_2^4 (x^2+2x)\,dx$ by using Gauss' quadrature formula with $n=3$. **04**

(c) (i) An assembly plant receives its voltage regulators from three different suppliers, 60 % from supplier B_1, 30 % from supplier B_2, and 10 % from supplier B_3.If 95 % of the voltage regulators from B_1, 80 % of those from B_2, and 65 % of those from B_3 perform according to specifications, what is the probability that any one voltage regulator received by the plant will perform according to specifications? Also, find the probability that a particular voltage regulator, known to perform according to specifications, came from supplier B_3. **03**

(ii) Find the missing frequencies f_1 and f_2 if the mean of the following frequency distribution of 100 families (f) is 30.4: **04**

x	$0-10$	$10-20$	$20-30$	$30-40$	$40-50$	$50-60$
f	10	f_1	25	30	f_2	10

Q.6 **(a)** Find, by Taylor's series method, the value of y at $x=0.1$ to five places of decimals from **03**

$$\frac{dy}{dx}=x^2y-1,\quad y(0)=1.$$

(b) Evaluate $\int_{0.2}^{1.4}(2+x\log x-\cos x)dx$ with $h=0.2$ by Simpson's one-third rule and Simpson's three-eighth rule. **04**

(c) (i) The probability that an integrated circuit chip will have defective etching is 0.12, the probability that it will have a crack defect is 0.29, and the probability that it has both defects is 0.07. What is the probability that a newly manufactured chip will have neither defect? **03**

(ii) A standard cell whose voltage is known to be 1.10 volts was used to test the accuracy of two volt meters A and B. Ten independent readings of the voltage of the cells were taken with the two volt meters as per the following data. Which of these two is more reliable? **04**

A	1.11	1.15	1.14	1.10	1.09	1.11	1.12	1.15	1.13	1.14
B	1.12	1.06	1.02	1.08	1.11	1.05	1.56	1.03	1.04	1.06

Q.7 **(a)** Find the mode for the following frequency distribution: **03**

Class	$0-6$	$6-12$	$12-18$	$18-24$	$24-30$
f	20	30	25	16	12

(b) Calculate the coefficient of skewness based on the Method of Moments from the following data: **04**

Class	$0-4$	$5-9$	$10-14$	$15-19$	$20-24$
Frequency	7	12	15	10	6

(c) (i) For a random variable X, if $E(3X-5)=16$ and $E(X^2)=58$, find the standard deviation of X. **03**

(ii) If the events A and B are independent, then show that the events A and B' are also independent. **04**

Q.8 **(a)** Calculate the mean and standard deviation from the following data: **03**

Value	90-99	80-89	70-79	60-69	50-59	40-49	30-39
Frequency	2	12	22	20	14	4	1

(b) Find the mean deviation from median for the following data: **04**

Marks	$0-10$	$10-20$	$20-30$	$30-40$	$40-50$
Students	8	11	15	9	7

(c) (i) Three students A, B and C are running in a race. A and B have the same probability of winning and each is twice as likely to win as C. Find the probability that B or C wins. **03**

(ii) The quantities of milk (in liters) produced by a dairy farm on ten consecutive days are shown below: **04**

$218.2, 199.7, 207.3, 185.4, 213.7, 184.7, 179.5, 194.4, 224.3, 203.5.$

Evaluate the mean and the first four central moments of the milk yield data (in litres) of dairy farm.

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Seat No.: ________ Enrolment No.___________

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2021

Subject Code:3130908 Date:17-02-2022

Subject Name:Applied Mathematics for Electrical Engineering

Time:10:30 AM TO 01:00 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.**

Q.1 **(a)** Construct the difference table for $f(x)=(x+2)^2$ for $x=1,2,3$ and find $\nabla^2 f(3)$. **03**

(b) Find a real root of the equation $x^3-4x-9=0$ using bisection method in four stages. **04**

(c) Explain Bay's rule for probability. Three boxes contained 10%, 20% and 30% red colors pens. A pen is selected at random whose color is red. Determine the probability that it came from 3rd box, 2nd box , 1st box. **07**

Q.2 **(a)** Prove that $(1+\Delta)(1-\nabla)=1$. **03**

(b) Using Picard's method solve $\dfrac{dy}{dx}=x-y^2$ with the initial condition $y(0)=1$ and compute $y(0.1)$. **04**

(c) Evaluate $\int_0^6 \dfrac{1}{1+x}dx$ for $n=6$ using Simpson's one third rule and Simpson's three eights rule. Also find an approximate value of $\log_e 2$. **07**

OR

(c) Using the Runge Kutta method of fourth order solve $\dfrac{dy}{dx}=xy+y^2$ with the initial condition $y(0)=1$. Compute $y(0.2)$ by taking $h=0.1$. **07**

Q.3 **(a)** Is $f(x)=\dfrac{x}{6}, x=0,1,2,3,4$ define probability distribution? Justify your answer. **03**

(b) Compute $f(9.2)$ from the following values using Newton's divided difference formula. **04**

x	8	9	9.5	11
$f(x)$	2.079442	2.197225	2.251292	2.397895

(c) Using the method of least squares, find the best fitting second degree curve to the given following data: **07**

x	1	2	3	4
y	6	11	18	27

OR

Q.3 **(a)** For the following distribution, find the value of k. **03**

x	1	2	3	4	5

$f(x)$	0.1	k	0.2	$3k$	0.3

(b) Using the Euler's method, find $y(0.2)$ given that $\frac{dy}{dx} = y - \frac{2x}{y}, y(0) = 1, h = 0.1$. **04**

(c) Find the root of the equation $x \sin x + \cos x = 0$ using Newton-Raphson method correct to three decimal places. **07**

Q.4 (a) Find the median of the following data: **03**

Marks	<20	21-30	31-40	41-50	51-60	61-70
No. of Students	5	15	20	6	6	8

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

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

(c) The joint probability density function of two continues randon variable X and Y is given by **07**

$$f(x, y) = cxy; 0 < x < 4, 1 < y < 5$$
$$= 0; \; otherwise$$

Find (a) value of constant c, (b) $P(X \geq 3, Y \leq 2)$,
(c) $P(1 < X < 2, 2 < Y < 3)$.

OR

Q.4 (a) Find the first four moments of the observation 1,3,5,7,8,9. **03**

(b) Using Langrange's interpolation formula, find $f(3)$ from the data given: **04**

x	1	5	7	6
$f(x)$	1.10	2.00	3.23	4.50

(c) Find a real root of the equation $x \log_{10} x = 1.2$ by using Regula- falsi method correct to four decimal places.(or four stages) **07**

Q.5 (a) If A and B are independent events, where $P(A) = \frac{1}{4}, P(B) = \frac{2}{3}$. Find $P(AUB)$. **03**

(b) Compute $\int_0^2 (1 + x)dx$ by a two point Gaussian quadrature formula. **04**

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

Marks	20	21	22	23	24	25	26	27	28
No. of students	7	12	25	10	8	6	8	3	1

OR

Q.5 (a) If A and B are mutually exclusive events and $P(A) = 0.30, P(B) = 0.45$, then find the probability of the events, **03**
(a) $P(A')$ (b) $P(A \cup B)$ (c) $P(A' \cap B')$.

(b) Evaluate the integration $\int_4^{5.2} \log_e x dx$ using Simpson's $\frac{3}{8}$ th rule.take $h = 0.2$. **04**

(c) Find the mean, median and mode for the following data: **07**

Class	50-53	53-56	56-59	59-62	62-65	65-68	68-71	71-74	74-77
Frequency	3	8	14	30	36	28	16	10	5

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Seat No.: ________ Enrolment No.___________

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2021

Subject Code:3130908 **Date:06/09/2021**

Subject Name:Applied Mathematics for Electrical Engineering

Time:10:30 AM TO 01:00 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)** Find a root of the equation $x^4 - x - 10 = 0$ correct to three decimal places, using the bisection method. **03**

(b) By Simpson's one-third rule, determine the area bounded by the given curve and X-axis between x = 25 to x =25.6 from the data given below. **04**

x	25	25.1	25.2	25.3	25.4	25.5	25.6
y	3.205	3.217	3.232	3.245	3.256	3.268	3.280

(c) Apply the method of least squares to determine the constants a and b such that $y = a\,e^{bx}$ fits the following data: **07**

X	0	0.5	1	1.5	2	2.5
Y	0.10	0.45	2.15	9.15	40.35	180.75

Q.2 **(a)** Define conditional probability. **03**

A bag contains 19 tickets numbered from 1 to 19. Two tickets are drawn successively without replacement. Find the probability that both tickets will show even number?

(b) The following are scores of two batsmen A and B in a series of innings: **04**

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 score getter?

Who is more consistent?

(c) Discuss Newton-Rapshon method to solve non-linear equation $f(x) = 0$ numerically. Also, derive the formula to find the cube root of a positive number N and hence compute $\sqrt[3]{65}$. **07**

OR

(c) Discuss the fixed point iteration method. And using it find the real root of $x^3 - 5x + 3 = 0$ starting with $x_0 = 0.5$ correct to four decimal places. **07**

Q.3 **(a)** Evaluate $\int_{0.5}^{1.3} e^{x^2}\,dx$ by using Simpson's one-third rule taking h = 0.1. **03**

(b) Explain the method of least squares in brief. Use it to derive normal equations to fit a straight line $y = ax + b$. **04**

(c) Newton's interpolation formulas to find y at $x = 0.11$ and $x = 0.27$ from the data given below. **07**

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

OR

Q.3 **(a)** Evaluate $\int_{0}^{1} e^{-x^2}\,dx$ by 3-point Gaussian quadrature formula. **03**

	(b)	Define Central difference operator in terms of δ. Establish the operator relations $D = \frac{1}{h}\log(1+\Delta)$	**04**
	(c)	Write Newton's Divided difference interpolation formula for unequal intervals. Determine the interpolating polynomial of degree three by using Lagrange's interpolation for the following data. Also find f(2)	**07**

x	-1	0	1	3
$f(x)$	2	1	0	-1

Q.4	**(a)**	(i) State Baye's theorem. (ii) Define Bernoulli's trials. (iii) Define independent events.	**03**
	(b)	Define probability density function. If the probability density function of a random variable is given by $f(x) = k\left(1-x^2\right),\ if \quad 0 \le x \le 1$ $\quad = 0 \qquad ,\ elsewhere$ Find the value of k and probability that X takes the value greater than 0.5	**04**
	(c)	What do you mean by predictor-corrector methods? State names of any three predictor-corrector methods. Apply Milne's predictor–corrector method to obtain $y(2)$ correct to three decimal places, if $y(x)$ is the solution of $\frac{dy}{dx} = \frac{1}{2}(x+y)$ where $y(0)$ = 2, $y(0.5)$ =2.636, $y(1)$ = 3.595, y (1.5)= 4.968	**07**

OR

Q.4	**(a)**	Discuss Binomial probability. The probability a man aged 60 will live to be 70 is 0.65. What is the probability that out of 10 men aged 60 now, at least 7 would live to be 70?	**03**
	(b)	Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the mean and variance of the number of kings.	**04**
	(c)	Apply second order Runge-Kutta method to find an approximate value of $y(0.2)$ given that $\frac{dy}{dx} = x - y^2$, $y(0)$ = 1 and h = 0.1.	**07**
Q.5	**(a)**	State any four known methods for finding skewness. Apply suitable method to compute the coefficient of skewness from the following figures: 25, 15, 23, 40, 27, 25, 23, 25, 20	**03**
	(b)	Let X has the probability density function $f(x) = \frac{1}{2\sqrt{3}} \quad for\ -\sqrt{3} < x < \sqrt{3}$ $\quad = 0 \qquad elsewhere$ Find the actual probability P{$\lvert X-\mu \rvert \ge \frac{3}{2}\sigma$} and compare it with the upper bound obtained by Chebyshev's inequality.	**04**
	(c)	Find kurtosis from the following data.	**07**

Class interval	0–10	10–20	20–30	30–40
Frequency	1	4	3	2

OR

Q.5	**(a)**	What do you mean by kurtosis? Illustrate the shape of three different curves on the basis of value of β_2.	**03**
	(b)	A bag contains 6 white and 9 black balls. Four balls are drawn at a time. Find the probability for the first draw to give four white balls and second	**04**

draw to give four black balls in each of the following case.

(i) with replacement and

(ii) without replacement

(c) Define r^{th} moment about mean for grouped data. From the following data, calculate moments about: (i) assumed mean and (ii) actual mean **07**

Variable	0–10	10–20	20–30	30–40
Frequency	1	3	4	2

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Seat No.: ________ Enrolment No.___________

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	8	9	9	10
y	5	5	4	5	4	3	4	3	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**

$$f(x) = \begin{cases} 0, x \le 0 \\ 8xe^{-4x^2}, x > 0 \end{cases}$$ 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**

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