Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2710210   **Date:16/05/2016**
Subject Name: Numerical Methods for Computer 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.**

Q.1 **(a)** Calculate $e^{0.5}$ until the absolute value of the approximate error estimate ε_a falls below a prespecified error criterion ε_s conforming to three significant figures. Actual value of $e^{0.5}$ is 1.648721. Compute the true and approximate percent relative errors.   **07**

(b) Explain Concept of Significant digits. Also Explain the difference between accuracy and precision. Given the solution of a problem as $x_a = 35.25$ with the relative error in the solution at most 2%. Find, to four decimal digits, the range of values within which the exact value of the solution must lie.   **07**

Q.2 **(a)** The velocity v of a falling parachutist is given by   **07**
$$v = \frac{gm}{c}\left(1 - e^{-\left(\frac{c}{m}\right)t}\right)$$
Where g = 9.8 m/s². Determine the drag coefficient c needed for a parachutist of mass m = 68.1 kg to have a velocity of 40 m/s after free falling for time t = 10 s. Initial value of c is between 14 and 15.

(b) Find the root of the equation $xe^x = \cos x$ using Secant method correct to four decimal places.   **07**

OR

(b) Solve $x^4 - 5x^3 + 20x^2 - 40x + 60=0$, given that all the roots of f(x) = 0 are complex by using Lin-Bairstow method.   **07**

Q.3 **(a)** Explain the ill condition of the linear system. Using Gauss Seidal method solve the following system of equations   **07**
2x + y + 6z = 9; 8x + 3y + 2z = 13; x + 5y + z = 7

(b) Find the cubic splines and evaluate y(1.5) and y'(3) for the given below data: **07**

x:	1	2	3	4
y:	1	2	5	11

OR

Q.3 **(a)** Explain the concept of least square. Fit a second degree parabola to the following data: **07**

x:	1989	1990	1991	1992	1993	1994	1995	1996	1997
y:	352	356	357	358	360	361	361	360	359

(b) Find the polynomial f(x) by using Lagrange's formula and hence find f(3) for   **07**

x:	0	1	2	5
f(x):	2	3	12	147

Q.4 **(a)** The velocity v of a particle at distance s from a point on its linear path is given by the following table: **07**

s(m):	0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0
v(m/sec):	16	19	21	22	20	17	13	11	9

Estimate the time taken by the particle to traverse the distance of 20 meters, using Simpson's 1/3rd rule.

(b) Apply Runge Kutta method to find Approximate value of y for x = 0.2, in steps **07**
of 0.1, if dy/dx = x + y^2, given that y = 1 where x = 0.

OR

Q.4 **(a)** Using Euler's method, solve numerically the equation dy/dx = x + y, y(0) = 1, **07**
for x = 0.0(0.2)(1.0). Compare numerical answer with exact values.

(b) Using Trapezoidal rule solve **07**

$$\int_{0.2}^{1.4} (sinx - log_e x + e^x)dx$$

Taking h = 0.1

Q.5 **(a)** The following tables shows the ages(x) and blood pressure(y) of 8 persons. **07**

x:	52	63	45	36	72	65	47	25
y:	62	53	51	25	79	43	60	33

Obtain the regression equation of y on x and find the expected blood pressure
of a person who is 49 years old.

(b) Ten competitors in a beauty contest are ranked by three judges in the following
order:

1st judge	1	6	5	10	3	2	4	9	7	8
2nd judge:	3	5	8	4	7	10	2	1	6	9
3rd judge:	6	4	9	8	1	2	3	10	5	7

Use the rank correlation coefficient to determine which pair of judges has the
nearest approach to common tastes in beauty.

OR

Q.5 **(a)** Calculate seasonal indices by the ratio to moving average method, from the **07**
following data:

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2012	68	62	61	63
2013	65	58	66	61
2014	68	63	63	67

(b) Calculate the first four moments about the mean from the following data: **07**

Marks:	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students:	8	12	20	30	15	10	5

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