

GUJARAT TECHNOLOGICAL UNIVERSITY**ME SEMESTER – I EXAMINATION – SUMMER 2017****Subject Code: 2710210****Date: 08/05/2017****Subject Name: Numerical Method for Computer Engineering****Time: 2.30 p.m. to 5.00 p.m.****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) How many terms needed of $e^{0.5}$ to 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 for all the terms. **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 $g = 9.8 \text{ m/s}^2$. Using **bisection** method determine the drag coefficient c needed for a parachutist of mass $m = 68.1 \text{ kg}$ to have a velocity of 40 m/s after free falling for time $t = 10 \text{ s}$.

Initial value of c is between 12 and 16. Correct answer up to $\epsilon_s = 0.5\%$.

(b) Find the root of the equation $\cos x - xe^x = 0$ using Secant method correct to three decimal places. **07**

OR

(b) Solve $x^4 - 8x^3 + 39x^2 - 62x + 50 = 0$, by using Lin-Bairstow method up to third iteration with initial value $p_0 = 0$ and $q_0 = 0$. **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	10	20	30	40	50	60
v(m/sec):	47	58	64	65	61	52	38

Estimate the time taken by the particle to traverse the distance of 60 meters, using Simpson's $1/3^{\text{rd}}$ rule.

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

OR

- Q.4** (a) Using Euler's method, solve numerically the equation $dy/dx = x + y$, $y(0) = 1$, for $x = 0.0(0.05)(0.2)$. Compare numerical answer with exact values. **07**

- (b) Using Simpson's $1/3^{\text{rd}}$ and Simpson's $3/8^{\text{th}}$ rule solve **07**

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

Taking $h = 0.2$

- Q.5** (a) The following tables shows the ages(x) and blood pressure(y) of 10 persons. **07**

x:	66	38	56	42	72	36	63	47	55	45
y:	145	124	147	125	160	118	149	128	150	124

Obtain the regression equation of y on x and find the expected blood pressure of a person who is 50 years old.

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

1 st judge	1	6	5	10	3	2	4	9	7	8
2 nd judge:	3	5	8	4	7	10	2	1	6	9
3 rd 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 following data: **07**

Year	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th 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
