

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. IST Semester–Remedial Examination – July- 2011****Subject code: 711507****Subject Name: Numerical Methods****Date: 12/07/2011****Time: 10:30 am – 01:00 pm****Total Marks: 60****Instructions:**

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

- Q.1 (a)** (i) Explain various type of errors in detail. **05**
(ii) Find the relative error if $2/3$ is approximated to 0.667.
- (b)** (i) If height of tower was estimated to be 47m, while actual height was 45m. **07**
Calculate relative error and % error.
(ii) Round-off no. 865250 and 37.46235 correct to four significant no.
calculate absolute error, relative error and percentage error.

- Q.2 (a)** (i) List and compare the methods for curve fitting. (ii) Draw flow chart for **06**
Sterling's method of interpolation.
- (b)** Using method of moments, fit the line having following data: **06**

X	1	2	3	4
Y	0.32	0.65	1.32	5.51

OR

- (b)** By method of least squares, find the curve $y=ax + bx^2$ that best fit the **06**
following data:

X	1	2	3	4	5
Y	1.9	5.3	9.1	14.2	18.9

- Q.3 (a)** Write a C++ program for Newton backward difference formula. **06**
- (b)** Using suitable interpolation formula, find the wind pressure p N/m² for basic **06**
wind speed 42 m/s. The basic wind speed of different zones are as follow.
Take value of K1, K2 and K3 as unity.

Zone	I	II	III	IV	V	VI
Vb (m/s)	55	50	47	44	39	33

OR

- Q.3 (a)** Write basic formulations of numerical integration for various rules and **06**
formula.
- (b)** Determine the minimum of strips, n, needed to evaluate by trapezium rule: **06**
 $\int \{ 3x^2 - 1.5\sin(2x) \} dx$ with limit 0 to $\pi/2$, such that the error is guaranteed
not to exceed ± 0.005 .

- Q.4 (a)** Using the finite difference method, compute the deflection at $L/4$ interval of **06**
a simply supported beam subjected to central point load. Take EI constant.
- (b)** Analyse a simply supported uniform square plate for uniformly distributed **06**
load by finite difference method. Take grid step $L/4$ in both directions.

OR

- Q.4 (a)** Derive basic formulation of plate analysis using finite difference method. **06**
- (b)** Calculate support reactions for a prismatic propped cantilever beam **06**
subjected to UDL throughout span, using finite difference method.

- Q.5 (a)** The distance x of a runner from fixed point is measured in m at intervals of half a second. The data obtained are **06**

t sec	0	0.5	1	1.5	2.0
x m	0	3.65	3.68	9.90	12.15

Use central difference method to approximate the runner velocity at time $t=0.5s$ & $t=1.25s$ and acceleration at $t=1.5s$.

- (b)** Determine the largest eigen value and corresponding eigenvector of the matrix **06**

$$\begin{vmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{vmatrix}$$

OR

- Q.5 (a)** Find all eigen values and corresponding eigen vectors of matrix: **06**

$$\begin{vmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{vmatrix}$$

- (b)** Write C++ program for any numerical interpolation formula, except asked above. **06**
