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Sixth Semester B.E. Degree Examination, June / July 2014
Numerical Methods

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Explain relative error, inherent error, round off error and truncation error, with an example. (10 Marks)

- b. Obtain a second degree polynomial approximation to $f(x) = (1+x)^{\frac{1}{2}}$, $x \in [0, 0.1]$ using the Taylor series expansion about $x = 0$. Use the expansion to approximate $f(0.05)$ and find a bound of the truncation error. (10 Marks)

- 2 a. Solve the system of equation by, i) Gauss elimination method, ii) Gauss-Jordan method.
 $x + 2y + z = 3$, $2x + 3y + 3z = 10$, $3x - y + 2z = 13$ (10 Marks)

- b. Solve the system of equation,
 $x + 5y + z = 14$, $2x + y + 3z = 13$, $3x + y + 4z = 17$
 By LU decomposition method. (10 Marks)

- 3 a. Use Lagrange's formula to fit a polynomial to the data:

x:	-1	0	2	3
y:	-8	3	1	12

and hence find $y(x=1)$. (06 Marks)

- b. Use Newton's divided difference formula. Find the values of $f(2)$, $f(8)$ and $f(15)$ given the following table: (06 Marks)

x:	4	5	7	10	11	13
f(x):	48	100	294	900	1210	2028

- c. Using cubic spline, find $y(0.5)$ and $y'(1)$ given $M_0 = M_2 = 0$ and the table: (08 Marks)

x:	0	1	2
y:	-5	-4	3

- 4 a. Find all eigen values of the matrix by Jacobi's method.

$$\begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$

(07 Marks)

- b. Find the numerialy largest eigen values of $A = \begin{pmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{pmatrix}$ and the corresponding eigen vector. (06 Marks)

- c. Using the householder's transformation, reduce the matrix $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ into a tridiagonal matrix. (07 Marks)

PART – B

- 5 a. Evaluate $I = \int_0^6 \frac{1}{1+x} dx$ using, i) Trapezoidal rule ii) Simpson's rule (both) iii) Weddle's rule. Check up direct integration. (10 Marks)

- b. Use Gauss three-point formula and evaluate, $I = \int_1^5 \frac{dz}{z}$. (10 Marks)

- 6 a. From the data given below, find the number of students whose weight is between 60 and 70. (10 Marks)

Weight in lbs:	0 – 40	40 – 60	60 – 80	80 – 100	100 – 120
No. of students:	250	120	100	70	50

- b. Fit a curve of the form $Y = ab^x$ to the data: (10 Marks)

x:	1	2	3	4	5	6
y:	151	100	61	50	20	8

- 7 a. A real root of the equation, $f(x) = x^3 - 5x + 1 = 0$ lies in the interval (0, 1) perform four iteration of the secant method and the Regula-Falsi method. (10 Marks)

- b. Use Newton – Raphson method to derive an iterative formula to find \sqrt{N} and hence find $\sqrt{12}$. (10 Marks)

- 8 a. Explain steepest descent method. (10 Marks)

- b. Explain Quasi-Newton method. (10 Marks)
