Numerical Methods VTU CBCS Question Paper Set 2018

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10AE661

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 trunction 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. Expalin Quasi-Newton method. **(10 Marks)**

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