Roll No. .....

Total No. of Questions : 5] [Total No. of Printed Pages : 3

EGS-141

B.E. 5th Sem. (CGPA) Mechanical Engineering (Zero Sem.), Examination-2019

NUMERICAL ANALYSIS

Paper– M- 501

Time : 3 hours] [Maximum marks : 60

Note : ***Attempt all questions. Attempt any two parts from each questions. All questions carry equal marks.***

1. (a) Explain algorithm with basic properties effectiveness and efficiency.

(b) Define the following with example:

(i) Round-off error

(ii) Truncation error

(iii) Absolute error

(iv) Relative error

(c) Given that, $u = \frac{4x^2y^3}{z^4}$ Δx, Δy and Δz denotes the errors in x, y and z respectively such that $x = y = z = 1$ and $\Delta x = \Delta y = \Delta z = 0.001$. Find the relative Maximum error in u.

2. (a) Find a real root of the the equation $x^2 + 4\sin x = 0$, correct to five place of decimal.

(b) Find a quadric factor of the polynomial $x^4 + 5x^3 + 3x^2 - 5x - 9 = 0$. Starting with $p_0 = 3$, $q_0 = -5$ using Bairstow's method.

(c) Find the approximation value for the real root of $x \log_{10} x = 1.2$ correct to five decimal places.

3. (a) Evaluate f(22) and f(42) from the following data:

x :	20	25	30	35	40	45
$f(x)$:	354	332	291	260	231	204

(b) Given $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$. Find y_{25} by using Bessel's formula. $x = y = z$

(c) Find an approximate value of the $\log_e 5$ by calculating to four decimal places by Simpson's 1/3rd rule.

$$\int_0^5 \frac{dx}{4x+5}$$ dividing the range into 10 equal parts.

4. (a) Use Picard's method to approximate y when $x = 0.1$, given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = \frac{y-x}{y+x}$.

(b) Given that $\frac{dy}{dx} = x^2 + y$, and $y = 1$ at $x = 0$. Find an approximate value of y at $x = 0.1$ by Euler's modified method.

(c) Using Runge-Kutta method of order 4, find y for $x = 0.1, 0.2, 0.3$, given that $y' = xy + y^2$, $y(0) = 1$. Continue the solution at $x = 0.4$ using Milne's method.

5. (a) Solve the Linear system by Gauss Jordan method

$10x + y + z = 12$, $2x + 10y + z = 13$ and

$x + y + 5z = 7$

(b) Solve by triangularization method

$3x + 2y + 7z = 4$, $2x + 3y + z = 5$, $3x + 4y + z = 7$

(c) Solve the equations by Gauss-Seidal method

$54x + y + z = 110$, $2x + 15y + 6z = 72$ and

$-x + 6y + 27z = 85$