

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD – 402 103
Winter Semester Examination –Dec– 2018

Course: M. Tech. Civil (Structural Engineering)

Semester – II

Subject with Subject Code : ELE-1 (Numerical Methods) (CVSE-E1B)

Date :- 01/01/2019.

Time : 3 Hrs

Marks : 60

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

- (Marks)**
- Q.1. a) What are errors in representing numbers. 04
b) Write the short note on inverse error analysis. 04
c) Explain mantissa and exponent. 04
- Q.2. a) Solve ,by Gauss Seidal method, the equations. 04
 $20x+y-2z = 17, 3x+20y-z = -18, 2x-3y+20z = 25.$
b) Solve by LU decomposition method, 04
 $x+5y+z = 14, 2x+y+3z = 13, 3x+y+4z = 17.$
c) Find a root of the equation $x^3-2x-5 = 0$ using secant method 04
correct to three decimal places.
- Q.3. a) Fit the curve of the form $y = ab^x$ 06
- | | | | | | | |
|---|-----|-----|----|----|----|---|
| X | 1 | 2 | 3 | 4 | 5 | 6 |
| Y | 151 | 100 | 61 | 50 | 20 | 8 |
- b) Find the missing term in the following table using Lagranges interpolation: 06
- | | | | | | |
|---|---|---|---|---|----|
| X | 0 | 1 | 2 | 3 | 4 |
| Y | 1 | 3 | 9 | - | 81 |
- Q.4. a) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2} dx$ taking the 06
number 10 intervals.

b) Evaluate the integral $\int_0^{0.5} \left(\frac{x}{\sin x} \right) dx$ using Romberg method, correct to 3 decimal places. 06

Q.5 a) Apply Runge-Kutta method to find approximate value of y for $x = 0.2$ in steps of 0.1, if $\frac{dy}{dx} = x + y^2$, given that $y = 1$ where $x = 0$. 06

b) Write a short note on the Newmark Beta method. 06

Q.6 a) Find the largest eigen value and the corresponding eigen vector of the matrix 06

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix} \text{ using power method.}$$

b) Solve $y'' - xy = 0$ given $y(0) = -1$, $y(1) = 2$ by finite difference method taking $n = 2$. 06