ACTIVITY CODE: 1903073021

B.Sc. 6th Semester (Honours) Examination, October 2020

Subject Name: *Electronics (H)*

Subject Code: 61716 Course Code: SH/ELC/603/DSE-3(TH)

Course Title: *Numerical Techniques*

Full Marks: 12 Time: 45 mins

General guidelines

1. Answer all the questions provided in the question paper.
2. The figures in the right hand side margin indicate marks.
3. You should submit the answer script as prescribed by the University guidelines within the stipulated time and way.

ACTIVITY CODE: 1903073021

B.Sc. 6th Semester (Honours) Examination, October 2020

Subject Name: *Electronics (H)*

Subject Code: 61716 Course Code: SH/ELC/603/DSE-3(TH)

Course Title: *Numerical Techniques*

Full Marks: 12 Time: 45 mins

(The figures in the right hand side margin indicate marks
Answer all the questions)

1. Answer *any two* of the following questions: 1×2=2
   (a) Write down Lagrange's interpolation formula for unequal interval.
   (b) Under what condition, Simpson's 3/8th rule can be applied and state the formula.
   (c) Mention two direct methods to solve a system of linear simultaneous equations.
   (d) What is the major drawback of Taylor's series method?
   (e) What is the use of Power method?
   (f) What do you mean by quadrature?

2. Answer *any one* of the following questions: 2×1=2
   (a) Which of the iterative methods for solving linear system of equation converge faster and why?
   (b) Write the procedure involved in Gauss-Jordan elimination method.
   (c) What are the errors in Trapezoidal and Simpson's rules of numerical integration?
   (d) State the advantages of Runge-Kutta method over Taylor series method.

(e) Write down the order of convergence and the condition for convergence of Newton-Raphson method.

(f) Prove that $\Delta = E - 1, \nabla = 1 - E^{-1}$.

3. Answer *any two* of the following questions: 4×2=8

(a) Prove that $\Delta = E\nabla = \nabla E = \delta E^{1/2}$. 4

(b) Using Trapezoidal rule, evaluate $\int_{-1}^{1} \frac{1}{1+x^2} dx$ by using eight equal intervals. 4

(c) Using Newton's method, find the real root of $x \log_{10} x = 1.2$ correct to 5 decimal places. 4

(d) Solve $y' = \frac{y-x}{y+x}$, *y(0) =1,* at *y=0.1,* by taking *h=0.02* by Euler's met hod. 4

(e) Using Runge-Kutta method of order 4, compute *y(0.2)* and *y(0.4)* from $10\frac{dy}{dx} = x^2 + y^2$, *y(0)*=1, taking *h=0.1*. 4

(f) Solve the following system of equations by Gauss-Seidal method:
$28x + 4y - z = 32, x + 3y + 10z = 24, 2x + 17y + 4z = 35.$
4

(g) Determine the dominant eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ with $(0\ 0\ 1)^T$ as the initial vector by Power method. 4

———————