U.G. 3rd Semester Examination - 2020

MATHEMATICS

[HONOURS]

Course Code : MATH-H-CC-T-07

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Symbols have their usual meanings.

1. Answer any **five** questions: 2×5=10

   a) Find the number of significant figures in V_A w.r.t V_T where V_A=0.05411, V_T=0.05418.

   b) Evaluate $\left(\frac{\Delta^2}{E}\right) x^3$.

   c) Why is Newton-Raphson method called the method of tangent.

   d) Explain the principle of numerical integration.

   e) Is it possible to find numerically least Eigen value for a matrix A by Power method? – Discuss.

   f) What do you mean by the Degree of precision of a quadrature formula.

[Turn over]

   g) What do you mean by the diagonally dominant for system of linear equations?

   h) Show that any divided difference of a constant is zero.

2. Answer any **two** questions: 5×2=10

   a) Establish Newton's forward interpolation formula. When is this formula used?

   b) By integrating Newton's forward interpolation formula, obtained the basic form of Simpson's $\frac{1}{3}$rd rule for numerical integration, stating error term. Also, obtain the composite form of this rule.

   c) Describe Newton -Raphson method for computing a simple real root of an equation $f(x)=0$. What are its advantages and disadvantages in comparison to the general fixed point iteration method?

   d) Describe the Gauss-elimination method for a system of 3 equations with 3 unknowns.

3. Answer any **two** questions: 10×2=20

   a) Establish Gauss-Jacobi iteration method for numerical solution of a system of n linear equations with n -unknowns. Deduce the

condition of convergence for Gauss-Jacobi iteration method.

b) Describe Newton's General interpolation formula with remainder. Hence, deduce Newton's backward interpolation formula from this method.

c) i) Explain the basic principle and establish the formula of Regula-Falsi method. Also state its advantages and disadvantages.

ii) Describe Power method for finding numerically largest eigen value of a square matrix.

State the condition of convergence.

d) Establish Lagrange's polynomial interpolation formula. If $x_1, x_2, \ldots\ldots, x_n$ be the interpolating points and $l_i(x)$ $(i = 0,1,2, \ldots., n)$ be the Lagrangian functions then show that $\sum_{i=o}^{n} l_i(x) = 1$.

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