U.G. 3rd Semester Examination - 2019

MATHEMATICS

[HONOURS]

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

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: $2\times5=10$

a) Find the numbers of significant figures in the approximate number 0.4785, given its relative error as 0.2×10^{-2}.

b) Find y_7, given $y_0=0, y_1=7, y_2=26, y_3=63, y_4=124$.

c) Prove that $\Delta.\nabla = \Delta - \nabla$.

d) Write down the advantages and disadvantages of Newton-Raphson method.

e) What do you mean "diagonally dominant" of the system of linear equations?

f) What is the degree of precision of Simson's $\frac{1}{3}$rd rule? Why?

g) Find the error in fixed point interation method.

h) Write down the geometric meaning of Newton-Raphson formula.

2. Answer any **two** questions: $5\times2=10$

a) Find the function f(x) as a polynominal in x by using the following table:

x	0	2	4	6	8	10
f(x)	−1	5	10	17	29	49

b) If $y_0, y_1, y_2, ..., y_6$ are the consecutive terms of a series, then show that

$$y_3 = 0.05(y_0 + y_6) - 0.3(y_1 + y_5) + 0.75(y_2 + y_4)$$

using Lagranges interpolation formula.

c) Established composite Trapezoidal rule and its error formula.

d) Find a real root of the equation $3x - \cos x - 1 = 0$ correct to four significant figures using modified Newton-Raphson method.

3. Answer any **two** questions: $10\times2=20$

a) i) Establish Differentiation formula based on Newton's forward interpolation formula.

ii) Find the missing term in the following table:

x	0	1	2	3	4
f(x)	1	3	9	...	8

5+5

b) i) Describe LU decomposition method.

ii) Use Runge-Kutta method of order 2 to calculate y(0.2) for the equation

$\frac{dy}{dx} = x + y^2$, y(0)=1. 6+4

c) i) Fit a second degree parabola to the following data taking x as independent variable:

x_i	1	2	3	4	5	6	7	8	9
y_i	2	6	7	8	10	11	11	10	9

ii) Establish fixed point iteration formula for solving algebraic and transcendental equation 5+5

d) i) Determine the largest eigen value and the corresponding eigen vector of the following matrix by power method

$$A=\begin{pmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{pmatrix}.$$

ii) Establish the modified Euler's formula for ordinary differential equation. 5+5
