

EE343

**Dual Degree-B. Sc. (Hons.) Mathematics-M.Sc. Mathematics
EXAMINATION, 2020**

(Fifth Semester)

(B Scheme) (Re-appear)

(B.Sc. (Hons.) M.Sc. (MATHEMATICS))

MAT415H

Numerical Analysis

Time : 2½ Hours]

[Maximum Marks : 75]

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) Find the missing values in the following data :

$$\begin{array}{cccccc} x & : & 45 & 50 & 55 & 60 & 65 \\ y & : & 30 & \dots & 2.0 & \dots & -2.4 \end{array}$$

- (b) Derive Newton's forward interpolation formula.

2. (a) Using Lagrange's formula, express the function $\frac{3x^2 + x + 1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions.
- (b) Derive Newton's divided difference formula.

3. (a) Find $f(22)$ from the following data, using Gauss's forward formula :

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

- (b) Apply Bessel's formula to obtain y_{25} , given $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$.

4. (a) Derive Poisson distribution as a limiting case of binomial distribution.

- (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the means and S.D. of the distribution.

5. (a) Given that :

x	:	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	:	7.989	8.403	8.781	9.129	9.451	9.750	10.031

find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.6$.

- (b) Find $f'(10)$ from the following data :

x	:	3	5	11	27	34
$f(x)$:	-13	23	899	17315	35606

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

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

- (b) Using Jacobi's method, find all the eigen values and the eigen vectors of the matrix :

$$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$

7. Using modified Euler's method, find an approximative value of y when $x = 0.3$,

given that $\frac{dy}{dx} = x + y$ and $y = 1$, when $x = 0$.

8. Given $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$, find y for $x = 0.1, 0.2, 0.3$ by Runge-Kutta method.

Continue the solution at $x = 0.4$ using Milne's method.