Roll No. ..... Exam Code : D-22

Subject Code—58373

B. Sc. EXAMINATION

(Main/Reappear) (Batch 2018 Onwards)

(Third Semester)

MATHEMATICS

CML-307

Course–VI

Numerical Analysis

Time : 3 *Hours* *Maximum Marks* : 80

Note : The question paper contains nine questions in all, two questions in each Section. Q. No. **1** is compulsory distributed in seven parts. Attempt *Five* questions in all, selecting *one* question from each Section. All questions carry equal marks.

(Compulsory Question)

1. Write short notes on the following :

   (a) Define forward difference operator. 2

   (b) Write Newton's forward interpolation formula. 2

   (c) Write Trapezoidal rule. 2

   (d) What is the degree of a polynomial which is approximated with 7 points ? 3

   (e) Write the iterative formula for Regula-Falsi method. 3

   (f) Name *two* formulas for unequal intervals interpolation. 2

   (g) In which part of table values approximated by Bessel's formula ? 2

Section I

2. (a) Find the missing values in the following table : 8

x	45	50	55	60	65
y	3	–	2	–	–2.4

(b) From the following table, estimate the number of students who obtained marks between 40 and 45 : 8

Marks	No. of Students
30–40	31
40–50	42
50–60	51
60–70	35
70–80	31

3. (a) Write a note on interpolation for equal intervals. 8

(b) Use Langrange's formula to find the form of $f(x)$, given that : 8

x	0	2	3	6
$f(x)$	648	704	729	792

Section II

4. (a) Use Gauss's forward formula to evaluate y_{30}, given that :

$$y_{21} = 18.4708,\ y_{25} = 17.8144,$$

$$y_{29} = 17.1070,\ y_{33} = 16.3432$$

and $y_{37} = 15.5164$. 8

(b) Apply Bessel's formula to obtain y_{25}, given :

$y_{20} = 2854$, $y_{24} = 3162$,

$y_{28} = 3544$, $y_{32} = 3992$. 8

5. (a) Interpolate by means Bessel's formula, the population of a town for the year 1974, given that : 8

Year	Population (in 1000s)
1939	12
1949	15
1959	20
1969	27
1979	39
1989	52

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule, taking $h = 0.25$. 8

Section III

6. (a) Solve the system of equations $x+y+z=6$, $3x+3y+4z=20$, $2x+y+3z=13$. Using the Gauss-Siedel method. 8

(b) Write a short note on speed of convergence. 8

7. (a) Explain relaxation method. 8

(b) Solve by triangularization method :

$$2x-y=1,$$
$$-x+2y-z=0,$$
$$-y+2z-w=0,$$
$$z+2w=1.$$ 8

Section IV

8. Solve the IVP $y'=t+y\ y(0)=1$ by fourth order Runge-Kutta method with $h=0.1$ to get $y=1$. 16

9. Given $y' = 1 + y^2$, where $y = 0$, when $x = 0, y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$. Compute $y(0.8)$ by Milne-Simpson's multistep method. **16**