

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD

B. TECH. 3<sup>RD</sup> SEMESTER (UNDER CBCS)

NUMERICAL METHODS (ME-211C)

Time: 3 Hours

Max. Marks:75

- Note: 1. It is compulsory to answer the questions of Part -1.  
2. Answer any four questions from Part -2 in detail.  
3. Different parts of the same question are to be attempted adjacent to each other.  
4. Assume suitable standard data wherever required, if not given.

**PART -1**

- Q1 (a) Why Secant method is used (1.5)  
(b) What are the limitations of Gauss elimination method over Jordan method? (1.5)  
(c) Define Interpolation. (1.5)  
(d) Write Weddle rule formula. (1.5)  
(e) What do you mean by Least square method? (1.5)  
(f) What are the applications of numerical methods in industries? (1.5)  
(g) What do you mean by 5-point standard formula? (1.5)  
(h) Why corrector is used in Milne's method. (1.5)  
(i) Define error and accuracy. (1.5)  
(j) What do you mean by difference operators. (1.5)

**PART -2**

- Q2 a) Using the Regula Falsi method, compute the real root of the equation (7)  
 $xe^x=2$ , in (0.8,0.9) correct to four decimal places.  
b) Solve by Jacobi iteration method, correct to three decimal places (8)  
 $10x+y-z=11.19$   
 $x+10y+z=28.08$   
 $-x+y+10z=35.61$

- Q3 Define interpolation and Estimate the value of  $f(22)$  and  $f(42)$  from the following available data: (15)
- |       |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|
| X:    | 20  | 25  | 30  | 35  | 40  | 45  |
| F(X): | 354 | 332 | 291 | 260 | 231 | 204 |

- Q4 A jet fighter's position on an aircraft carrier's runway was timed during landing.

t, (sec.)	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y, (m)	7.989	8.403	8.781	9.129	9.451	9.750	10.031

(15)

Where y is the distance from the end of carrier. Estimate velocity  $dy/dt$  and acceleration  $d^2y/d^2t$  at (i)  $t = 1.1$ , (ii)  $t = 1.6$  using numerical differentiation.

- Q5 Given  $y' = xy + y^2$ ,  $y(0) = 1$ , find  $y(0.1)$  by Euler's method,  $y(0.2)$  by Euler's modified method,  $y(0.3)$  by Runga Kutta Method order 4<sup>th</sup> and  $y(0.4)$  by Adam's (15)  
method.  
Q6 Solve the Laplace equations using 5 point standard and Diagonal formula (15)  
Q7. What is crank Nicolson method? Derive the equation. (15)