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**BT-4 / M-14**  
**COMPUTATIONAL TECHNIQUES**  
**Paper-MAT-204-E**

Time allowed : 3 hours] [Maximum marks : 100

Note : Attempt any five questions in all, selecting at least one question from each unit.

**Unit-I**

1. (a) Find the number of men getting wages between Rs. 10 and 15 from the following data : 10

Wages	0–10	10–20	20–30	30–40
Frequency	9	30	35	42

- (b) Find the population of a town for the year 1974, given that: 10

Year :	1939	1949	1959	1969	1979	1989
population (in thousands)	12	15	20	27	39	52

2. (a) Find  $f'(10)$  from the following data : 10

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

- (b) Calculate the value of  $\int_0^{7/2} \sin x dx$  by Simpson's 1/3 rule using 11 ordinates. 10

**Unit-II**

3. (a) Find the difference equation from the following : 10

- (i)  $y = ax^2 - bx$   
(ii)  $y_n = a2^n + b(-2)^n$

- (b) Solve  $y_{n+2} - 2 \cos \alpha y_{n+1} + y_n = \cos \alpha n$  10

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4. (a) Apply Gauss-Jordan method to solve the equations,  
 $x + y + z = 9 ; 2x - 3y + 4z = 13 ; 3x + 4y + 5z = 40$  10
- (b) Solve the system of equations,  
 $x + 2y + 3z = 5 ; 2x + 8y + 22z = 6 ; 3x + 22y + 82z = -10$ ,  
by using Cholesky method. 10

**Unit-III**

5. (a) Find the root of the equation  $xe^x = \cos x$  using Regula-Falsi method correct to four decimal places. 10
- (b) Use Newton's method to find the smallest root of the equation  $e^x \sin x = 1$  correct to four decimal places. 10
6. (a) Apply Gauss – Seidal iteration method to solve the equations,  
 $20x + y - 2z = 17; 3x + 20y - z = -18; 2x - 3y + 20z = 25$  10
- (b) Solve the equations,  
 $10x - 2y - 3z = 205; -2x + 10y - 2z = 154;$   
 $-2x - y + 10z = 120$ ,  
by Relaxation method. 10

**Unit-IV**

7. (a) Given  $\frac{dy}{dx} + \frac{y-x}{y+x}$  with initial condition  $y=1$  at  $x=0$ ,  
find  $y$  for  $x=0.1$  by Euler's method. 10
- (b) Apply Runge-Kutta method to find approximate value of  
 $y$  for  $x=0.2$  in steps of 0.1, if  $\frac{dy}{dx} = x + y^2$ , and  $y=1$  for  
 $x=0$ . 10

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8. (a) Given  $\frac{dy}{dx} = x - y^2$ , and  $y(0) = 1$ ,

$$y(0.1) = .9117, y(0.2) = .8494,$$

$y(0.3) = .8061$ , find  $y(0.4)$  by Adam's method. 10

- (b) Fit a parabola  $y = a + bx + cx^2$  to the following data :

x: 1 2 3 4 5 6 7 8 9

y: 2 6 7 8 10 11 11 10 9 10

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