

**Computer Oriented Numerical and Statistical Methods****Paper: MCA-I05**

Time: Three Hours

Maximum Marks: 80

**Note:-** Attempt **FIVE** questions in all Question No.1 is compulsory and attempt **FOUR** more questions by selecting **ONE** question from each unit.

1. (a) Discuss the importance of Floating Point numbers.
- (b) Define the convergence.
- (c) Discuss the direct and indirect methods.
- (d) Discuss Numerical differentiation with suitable examples.
- (e) Write the normal equations of a straight line.
- (f) State the Null and Alternative hypothesis.
- (g) Explain the difference between interpolation and intrapolation.
- (h) Write the mixed models of Time Series. 8\*3=24

**UNIT-I**

- 2 (a) Locate and correct the error in the following rates:-

X	F(x)
3.60	0.112046
3.61	0.120204
3.62	0.128350
3.63	0.136462
3.64	0.144600
3.65	0.152702
3.66	0.160788
3.67	0.168857
3.68	0.176908

- (b) Discuss the various sources of errors.
3. (a) The equation  $x^6 - x^4 - x^3 - 1 = 0$  has one real root between (1.4, 1.5). Find the root to four decimal places by False –Positive Method.
- (b) Solve  $x^3 - 8x^2 + 17x - 10 = 0$  by Graeffe's root squaring method by considering only three iterations.

**UNIT-II**

- 4 Solve the following system of equation by Gauss-Seidal Iterative Method
 
$$\begin{aligned} 6x + 15y + 2z &= 72 \\ x + y + 54z &= 110 \\ 27x + 6y - z &= 85 \end{aligned}$$
- (b) State the superiority of Runge-Kutta method over Taylor's series method.
- 5 (a) Use the following data for finding  $d/dx[F(x)]$  at  $x=10$ 

x	:	3	5	11	27	34
F(x)	:	-13	23	899	17315	35606
- (b) Calculate an approximate value of  $\int_0^{\pi/2} \sin x dx$  by using
  - (i) Trapezoidal rule
  - (ii) Simpson's rule using II ordinates.

Find the error in both cases. On the basis of this which rule is better than the other?

### UNIT-III

- 6 (a) The points (7,3), (8,1), (9,1), (10,6) satisfy the function  $y=F(x)$ . Use Lagrange's interpolation formula to find  $y$  at  $x = 9.5$  and also find the interpolating polynomial.
- (b) Find the value of  $x$  for  $y=30$  by successive approximation for the following data:
- |        |   |    |    |    |    |
|--------|---|----|----|----|----|
| $x$    | : | 10 | 12 | 14 | 16 |
| $F(x)$ | : | 25 | 32 | 40 | 50 |
- 7 (a) Find the value of  $a, b, c$  so that  $y=a+bx+cx^2$  is a best fit to the data :
- |     |   |   |   |   |    |    |
|-----|---|---|---|---|----|----|
| $x$ | : | 0 | 1 | 2 | 3  | 4  |
| $y$ | : | 1 | 0 | 3 | 10 | 27 |
- (b) What do you know about Chebyshev polynomials? Discuss it and also explain its kinds and the relationship between them.

### UNIT-IV

- 8 Define a time series. Mention its importance and components with illustrations and describe a method of smoothing of time series.
9. Write short notes on the following:-
- (i) ANOVA
  - (ii) Test of Significance.