

AS-1505

B.C.A. (Part—I) Semester—II Examination

NUMERICAL METHODS

Paper—2-ST-4

Time : Three Hours]

[Maximum Marks : 60

Note :—(1) **ALL** questions are compulsory.

(2) All questions carry equal marks.

1. (a) Explain Scatter diagram in detail. 4
- (b) Derive the normal equation for fitting of straight lines. 4
- (c) Fit the second order polynomial to the data given below :

x	:	0	1	2	3	4	5	
y	:	2.1	7.7	13.6	27.2	40.9	61.1	4

OR

2. (a) Explain what is Regression. 4
- (b) Fit a straight line to the following set of data :

x	:	1	2	3	4	5	
y	:	3	4	5	6	8	4

- (c) What do you mean by multiple linear regression ? Explain. 4

3. (a) Fit the power equation $y = ax^b$ to the data given below :

x	:	10	20	30	40	50	60	70	80	
y	:	1.06	1.33	1.52	1.68	1.81	1.91	2.01	2.11	4

- (b) What do you mean by transcendental equation ? State the method to solve transcendental equation. 4
- (c) Explain the principle of linear least square. 4

OR

4. (a) Fit the power model $y = ae^{bx}$ to the following data :

x	:	1	2	3	4	5	6	
y	:	151	100	61	50	20	8	4

- (b) Explain how will you reduce $y = ax^b$ to linear form. 4

- (c) Explain what is non-linear aggression. 4

5. (a) Explain with example interpolation and extrapolation. 4

- (b) Using Lagrange's interpolation formula compute $f(5)$ from the given data :

x	:	2	4	7	9	
f(x)	:	10	26	65	101	4

- (c) What do you mean by divided difference ? Why it is called as divided difference ? 4

OR

6. (a) State Newton's forward interpolation formula. 4

- (b) Using Lagrange's interpolation formula estimate u_4 given that $u_2 = -12$, $u_3 = -3$, $u_5 = 75$, $u_6 = 156$:

x	:	2	3	5	6	
u_x	:	-12	-3	75	156	4

- (c) Explain what do you mean by interpolation. 4

7. (a) Explain the concept of spline interpolation. 4

- (b) Using Lagrange's inverse interpolation formula to compute x when $y = 85$. Given :

x	:	2	5	8	14	
y	:	94.8	87.9	81.3	68.7	4

- (c) Explain the procedure to solve cubic spline. 4

OR

8. (a) Explain the concept of Chebyshev's interpolation polynomial. 4
 (b) Compute the value of x for $y = 1.686479$ from the following table :

x	:	0.48	0.52	0.61	0.63	
y	:	1.616074	1.682028	1.840431	1.877610	8

9. (a) Obtain Simpson's 3/8 rule by using general quadrature formula. 4
 (b) Estimate the given integral by

$$\int_1^3 \frac{dx}{x}, \quad h = 2, 4, 8$$

- (i) Trapezoidal rule
 (ii) Simpson's 3/8 rule. 8

OR

10. (a) Obtain Trapezoidal rule for numerical integration. 4
 (b) Compute the integral

$$\int_0^{\pi/2} \sqrt{\sin x} \, dx$$

- by applying Simpson's 1/3 and 3/8 rule for $h = 4$ and $h = 6$. 8

