

B.C.A. (Part-I) Semester-II Examination
NUMERICAL METHODS
Paper—2ST4

Time : Three Hours]

[Maximum Marks : 60

Note :—(1) ALL questions are compulsory.
 (2) All questions carry equal marks.

1. (a) Explain curve fitting. 4
- (b) Derive the normal equation for fitting second degree parabola. 4
- (c) Fit the straight line $Y = AX + B$ by the method of least squares to the following data :

X :	6	8	10	12	14	16	18	20	22	24	
Y :	3.8	3.7	4.0	3.9	4.3	4.2	4.2	4.4	4.5	4.5	4

OR

2. (a) Explain regression. 4
- (b) For regression equations $8X - 10Y + 66 = 0$, $40X - 18Y = 214$, find mean value of X and Y. 4
- (c) Show regression coefficients are independent of change of origin but not of scale. 4
3. (a) What do you mean by transcendental equation ? State the methods to solve transcendental equation. 4
- (b) Explain linear least square. 4
- (c) Fit the power equation $Y = aX^b$ to the following given data :

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

OR

4. (a) Explain non-linear regression. 4
 (b) Explain analytic method of finding roots of equation. 4
 (c) Find the approximate value of the root of $x - \sin x - 1 = 0$. 4
5. (a) Explain with example interpolation and extrapolation. 4
 (b) Using Newton-Gregory's formula find the number of students who obtain less than 45 marks :

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

- (c) Derive Newton-Gregory's formula for forward interpolation with equal intervals. 4

OR

6. (a) Explain divided difference and show that divided difference are symmetric function with respect to argument. 4
 (b) Explain what do you mean by backward interpolation and when it is useful ? 4
 (c) Using Newton Backward interpolation find $f(63)$ from the given data :

Age	45	50	55	60	65
Premium (in rupees)	114.84	96.16	83.32	74.48	68.48

7. (a) Explain what do you mean by cubic spline interpolation. 4
 (b) Using Lagrange's formula find the number whose logarithm is 0.30500, given :

x	1	2	3	4
log x	0	0.30103	0.47712	0.60206

- (c) Explain the concept of Chebyshev's interpolation formula. 4

OR

8. (a) Explain inverse interpolation. 4
- (b) Using Lagrange's inverse interpolation formula to compute x when $y = 0.99800$, given :

x	1.40	1.50	1.60	1.70	1.80
y	0.98545	0.99749	0.99957	0.99166	0.97385

- (c) Explain the procedure to solve cubic spline. 4
9. (a) Explain what do you mean by quadrature in numerical integration. 4
- (b) Evaluate $\int_1^2 \frac{1}{x} dx$ by Simpson's 1/3 rule. 4
- (c) Obtain Simpson's 3/8 rule by using general quadrature formula. 4

OR

10. (a) Obtain Trapezoidal rule for numerical integration. 4
- (b) Evaluate $\int_{0.5}^{0.7} x^{1/2} e^{-x} dx$ by Simpson's 1/3 rule. 4
- (c) Obtain Simpson's 1/3 rule by using general quadrature formula. 4

