B.C.A. (Part–I) Semester–II (Old) 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 Regression. 4

(b) Fit the straight line Y = AX+B by the method of least squares to the following data : 4

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

(c) Show that regression coefficients are independent of change of origin but not of scale. 4

OR

2. (a) Derive the normal equation for fitting second degree parabola. 4

(b) Fit a straight line to the given set of data :

X :	1	2	3	4	5	6
Y :	4.05	7.12	9.65	12.20	15.20	19.00

4

(c) Explain how multiple regression can be used to forecast values of the dependent variable. 4

3. (a) Explain linear least square. 4

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

X :	1	2	3	4	5	6
Y :	151	100	61	50	20	8

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(c) What is non-linear regression ? Explain. 4

OR

4. (a) How will you reduce non-linear equation in linear form ? Explain. 4

(b) 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

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(c) What do you mean by transcendental equation ? State the methods to solve transcendental equation. 4

5. (a) Using Newton Backward interpolation, find F(63) from the given data : 6

Age :	45	50	55	60	65
Premium (In Rs.) :	114.84	96.16	83.32	74.48	68.48

(b) Explain the interpolation and extrapolation with example. 6

OR

6. (a) State Newton Gregory forward interpolation formula.In which case is it useful ? 6

(b) Using Lagrange's interpolation. Find the value of y for x=3 for the data given below :

X	:	0	1	2	5
Y	:	2	3	12	147

6

7. (a) Using Lagrange's inverse interpolation compute the value of x for y = 0.6742 :

X	:	3.5	4.0	4.8	5.6
Y	:	0.5441	0.6020	0.6812	0.7482

4

(b) Explain the spline interpolation technique. 4

(c) Explain the Chebyshev interpolation polynomial. 4

OR

8. (a) Explain the inverse interpolation and find the value of x if f(x)=0.3887 from the table given below :

X	:	21	23	25
f(x)	:	0.3706	0.4068	0.4433

4

(b) Explain the procedure to solve cubic spline. 4

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

9. (a) State and explain Simpson's $\frac{3}{8}$ rule. Evaluate

$$\int_0^1 \frac{1}{1+x^2}\,dx \text{ for } h = \frac{1}{6}$$

6

(b) Explain trapezoidal rule of numerical integration. Evaluate : 6

$$\int_1^2 \frac{dx}{x} \text{ for } h = 0.25$$

OR

10. (a) State and prove Simpson's $\frac{3}{8}$ rule. 6

(b) State and prove trapezoidal rule of numerical integration. 6