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

Time : Three Hours] [Maximum Marks : 60

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

(2) All questions carry equal marks.

1. (a) What do you mean by Multiple Regression ? 4

(b) Fit a straight line to the following data :

X :	1	2	3	4	5
Y :	3	4	5	6	8

4

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

OR

2. (a) Derive normal equation for fitting of straight line. 4

(b) Explain regression. 4

(c) Fit a multiple linear regression to the data given below :

X_1 :	0	2	2.5	1	4	7
X_2 :	0	1	2	3	6	2
Y :	5	10	9	0	3	27

4

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

x :	1	2	3	4	5
y :	0.5	1.7	3.4	5.7	8.4

4

(b) Explain how you will reduce nonlinear equations in linear form. 4

(c) Explain linear least square. 4

OR

4. (a) What do you mean by transcendental equation ? 4

(b) Explain non-linear regression. 4

(c) The population of a State at ten year interval is given below :

Years	:	1925	1935	1945	1955	1965	1975	1985	1995
Population in millions	:	12.9	14.1	19.7	25.3	33.6	41.5	51.3	63.2

Fit a curve of the form $y = ab^x$ and estimate the population for the year 2005. 4

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

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

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

6

OR

6. (a) What do you mean by interpolation and extrapolation ? Explain with example. 6

(b) By means of Newton divided difference interpolation formula find the values of f(2) and f(8) from the following table :

x	:	4	5	7	10	11	13
f(x)	:	48	100	294	900	1210	2028

6

7. (a) Explain the inverse interpolation technique. 4

(b) Explain the spline interpolation technique. 4

(c) Using Lagrange's inverse interpolation formula 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

OR

8. (a) What are assumptions of inverse interpolation ? 4

(b) Explain the Chebyshev interpolation polynomial. 4

(c) Using Lagrange's interpolation formula estimate value of $e^{1.5}$ using the following data :

x	:	0	1	2	3
$e^{x}-1$	:	0	1.7183	6.3891	19.0855

4

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

(b) Evaluate $\int_0^1 \frac{dx}{1+X^2}$ by using Simpson's 1/3 rule. 6

OR

10. (a) State and prove Simpson's 3/8 rule. 6

(b) Solve using trapezoidal rule find the value of integral $I = \int_4^{5.2} \log x \, dx$. 6