AT–432

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

NUMERICAL METHODS

Paper—2ST4

Time : Three Hours] [Maximum Marks : 60

Note :— (1) All questions carry equal marks.

(2) All questions are compulsory.

1. (a) Explain method of least square regression. 4

(b) Fit a multiple linear regression to the following data :

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

(c) State the normal equation for fitting a second degree parabola. 4

OR

2. (a) Explain scatter diagram in detail. 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) What do you mean by Regression Analysis. 4

3. (a) Explain what is non-linear regression. 4

(b) Fit an exponential curve to the following data :

x :	0.4	0.8	1.2	1.6	2	2.3
y :	800	975	1500	1950	2900	3600

4

(c) Explain what is transcendental equation ? Explain the method to fit transcendental equation. 4

OR

4. (a) Fit a second degree curve $y = a + bx + cx^2$ to the following data relating to profit in a year of certain company.

Year (x) :	1980	1982	1984	1986	1988
(y) :	125	140	165	195	230

Estimate the profit in the year 1995. 4

(b) How will you reduce non-linear equation in linear form ? 4

(c) Explain the method for fitting of the polynomial functions to the given data. 4

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

(b) The population of a country in the decennial census was as under. Estimate the population for the year 1925 :

Year (x) :	1891	1901	1911	1921	1931
Population in thousands (y) :	46	66	81	93	101

6

OR

6. (a) Derive Lagrange's interpolation formula. 6

(b) Using Newton's divided difference formula, find the value of y corresponding to x = 10 form the following table :

x :	5	6	9	11
y :	12	13	14	16

6

7. (a) Explain inverse interpolation technique. 4

(b) Explain the spline interpolation technique. 4

(c) Apply Lagrange's formula inversely to find the age for which the annuity value is 13.6, given the following table :

Age x :	30	35	40	45	50
A.V. :	15.9	14.9	14.1	13.3	12.5

4

OR

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

(b) Explain the Chebyshev interpolation polynomial. 4

(c) Obtain a value of x where $y_x = 19$. Given the following values :

x	:	0	1	2
f(x)	:	0	1	20

4

9. (a) Obtain Simpson's 1/3rd rule by using general quadrature formula. Evaluate :

$$\int_0^3 \cos^2 x \, dx, \; b = 6.$$

6

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

OR

10. (a) Evaluate :

$$\int_0^1 \frac{dx}{1+x}$$ approximately in step of 0.25 by

(i) Trapezoidal rule

(ii) Simpson's 3/8th rule. 6

(b) State general quadrature formula for numerical integration. 6

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