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MCA
(SEM. II) THEORY EXAMINATION 2017-18
COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. Prove that $\mu\delta = \frac{1}{2}\Delta E^{-1} + \frac{1}{2}\Delta$
b. Write down Newton's Backward Interpolation Formula.
c. Suppose .333 is used as an approximation to $\frac{1}{3}$. Find the absolute and relative errors.
d. Explain the Simpson's rule.
e. Write short notes on Regression Analysis.
f. What do you mean by forecasting.
g. Write components of time-series.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. Find a real root of $x^3 - x - 1 = 0$ between 1 and 2 by bisection method. Compute five iterations.
b. Apply Gauss's forward formula to find the value of u_9, if u_0= 14, u_4 = 24, u_8 = 32, u_{12}= 35, u_{16} = 40
c. Using Newton's divided differences formula, evaluate f(9) for

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

d. Solve the equations by Gauss-Seidal method
20x + y – 2z = 17
3x + 20y – z = - 18
2x – 3y + 20z = 25
e. The table given below reveals the velocity '*v*' of a body during the time '*t*' specified. Find its acceleration at *t* = 1.1

t	1.0	1.1	1.2	1.3	1.4
v	43.1	47.7	52.1	56.4	60.8

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write the algorithm of Bisection and Regula-falsi method. Also explain what is the difference between them.
(b) Using Newton-raphson method, find the real root of the equation 3x = cosx + 1 correct to four decimal places.

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4. Attempt any *one* part of the following: 7 x 1 = 7

(a) What do you mean by Interpolation and Derive the Newton's Forward Interpolation Formula.

(b) Use Gauss's Backward formula to find the population for the year 1936 given

Year	1901	1911	1921	1931	1941	1951
Population (in thousand)	12	15	20	27	39	52

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Find $\int_0^6 \frac{e^x}{1+x} dx$ approximately using simpson's 3/8th rule on integration.

(b) Solve the equation $\frac{dy}{dx} = x + y$ with initial condition y(0) = 1 by Runge-Kutta rule, from x = 0 to x = 0.4 with h = 0.1.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Solve $\frac{dy}{dx} = 1 + xy$ with $x_0 = 2$, $y_0 = 0$ using Picard's method of successive approximations.

(b) Obtain a relation of the form $y = ae^{bx}$ for the following data by the method of least squares :

x	1	2	3	4	5	6
y	1.6	4.5	13.8	40.2	125	300

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define Chi-square test and discuss the various application of its in data analysis.

(b) Describe Moving average method. From the following data, calculate 4 years moving average

Year	1	2	3	4	5	6	7	8	9	10
Output	20	21	23	22	25	24	27	26	28	30

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