Q.3 The length of the day was 12 hours on March 19th, 14 hours on April 18th and 15 hours 40 minutes on May 18th. Estimate-

a) The length of the day on May 3rd.

b) The mean length of the day during the period, March 19th to May 18th.

OR

By means of Newton's divided difference formula, find the values of $f(8)$, $f(9)$ and $f(15)$ from the following table :

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

Q.4 Find the value of log2 from $\int_0^1 \frac{x^2}{1+x^3} - dx$, using Simson's $\frac{1}{3}$ rule, by dividing the range into four equal parts. Also find the error.

OR

Given that $y = \log x$ and

x	:	4.0	4.2	4.4	4.6	4.8	5.0	5.2
y	:	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate $I = \int_4^{5.2} \log x dx$ by Weddle's rule. Also compare it with exact value.

Q.5 Use Taylor's series method to find y for $x = 0.1$ correct to four places of decimal, if satisfies $\frac{dy}{dx} = x - y^2$ with $y_0 = 1,\ x_0 = 0$

OR

Use Runge-Kutta method to find y when $x = 1.2$ in steps of 0.1, given that $\frac{dy}{dx} = x^2 + y^2, y(1) = 1.5$.

----x----

Roll No......................

Total No. of Section : 03
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Annual Examination - 2017

BCA-II

BCA-201

THEORETICAL FOUNDATION OF COMPUTER SCIENCE

Paper - I

NUMERICAL ANALYSIS

Time : 3 Hrs. **Max.Marks : 50**
Min Marks : 20

Note : Section 'A' is objective type, containing 10 questions, is compulsory. Section 'B' consists of short answer type questions and Section 'C' consists of long answer type questions. Section 'A' has to be solved first.

(Section-'A')

(Very short answer type questions. Answer in one or two lines.) (1x10=10)

Q.1 Write definition of polynomial.

Q.2 Write definition of root of an eqation.

Q.3 Write definition of characteristic value problem.

Q.4 Find the eigen value of matrix $A = \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix}$. $\begin{bmatrix} 2 & 3 \\ 5 & -4 \end{bmatrix}$

Q.5 Write Newton's backward difference in terpolation formula.

Q.6 Write one assumptions for interpolation.

Q.7 Write formula of simpson's three eighth rule.

Q.8 Write formula of weddle's rule.

Q.9 Use Picard's method for first approximation y when $x = 0.2$ given that $y = 1$ when $x = 0$ a $\frac{dy}{dx} = x - y$.

Q.10 Write formula for Euler's method.

P.T.O.

(Section-'B')

(Short answer type questions with word limit 150-200)

(3x5=15)

Q.1 Find the equation whose roots are $-3, -1, \frac{5}{3}$.

OR

Find a real root of the equation $f(x) = x^3 - 4x - 9 = 0$, using bisection method in four stages.

Q.2 Find the characteristics polynomial, characteristic equation and eigen values of the following matrix :

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

OR

Apply Gauss Jordan method to solve the equations :

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

Q.3 Find the first term of the series whose second and subsequent terms are 8, 3, 0, -1, 0.

OR

Find a unique polynomial of degree 2 or less, such that $f(0) = 1,\ f(1) = 3,\ f(3) = 55$ using Newton's divided difference interpolation formula.

Q.4 Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

OR

Evaluate $\int_0^4 e^x dx$, by Simpson's $\frac{1}{3}$ rule, using the data $e = 2.72,\ e^2 = 7.39, e^3 = 20.09,\ e^4 = 54.60$ and compare it with the actual value.

Q.5 Using Taylor's series find the solution of the differential equation $xy^1 = x - y,\ y(2) = 2$ at $x = 2.1$ correct to five places of decimal.

OR

Apply Euler's method solve for y at $x = 0.6$ from $\frac{dy}{dx} = 1 - 2xy$, $y(0) = 0$ take $h = 0.2$.

(Section-'C')

(Long answer type questions with word limit 300-350)

(5x5=25)

Q.1 Evaluate $\sqrt{12}$ to four places of decimal by using Newton's-Raphson method.

OR

By Regula-Falsi method, find a real root of the equation $x^3 - 2x - 5 = 0$

Q.2 Find the characterstic equation of the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & -3 & 0 \\ 1 & 1 & -1 \end{bmatrix}$ and verify that it is satisfied by A and hence obtain A^{-1}.

OR

Apply Gauss-Jordan method to find the inverse of the matrix

$$A = \begin{bmatrix} 2 & 6 & 6 \\ 2 & 8 & 6 \\ 2 & 6 & 8 \end{bmatrix}$$