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CS-71

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Pre-Revised)

Term-End Examination

02853 **June, 2015**

CS-71 : COMPUTER ORIENTED NUMERICAL TECHNIQUES

Time : 3 hours *Maximum Marks : 75*

Note : *Question number **1** is **compulsory**. Attempt any **three** from questions number **2** to **5**. Scientific calculator is permitted.*

1. (a) (i) Round the following numbers to two decimal places :

48·21416, 2·3742, 52·275, 2·375,

2·385, 81·255

(ii) Round-off the following numbers to four significant figures :

38·46235, 0·70029, 0·0022218,

19·235101, 2·36425 *5*

(b) Let $x = 0{\cdot}345 \times 10^{0}$, $y = 0{\cdot}245 \times 10^{-3}$ and $z = 0{\cdot}432 \times 10^{-3}$. Using 3-digit decimal arithmetic with rounding, find whether $(a + b) + c = a + (b + c)$, or not. *5*

(c) Find a real root of the equation by using Bisection method $x^3 - x - 1 = 0$. 5

(d) Use the method of iteration to find a positive root between 0 and 1 of the equation $x e^x = 1$. 5

(e) Use the Newton-Raphson method to find a root of the equation $x^3 - 2x - 5 = 0$. 5

(f) For each of the following numbers, find the number of significant digits and express it in scientific notation : 5

(i) 0·00682

(ii) 1·072

(iii) 300·2

(iv) 400·0

(v) 1070

2. (a) Using Runge-Kutta fourth order method, find the value of y(0·1) and y(0·2) correct to four decimal places.

Given $\frac{dy}{dx} = y - x$,

where $y(0) = 2$. 5

(b) Use Newton-Raphson method to obtain a root of the equation $x^2 - 5x + 6 = 0$ lying between 1·0 and 2·5, correct to three decimal places. 5

(c) The population of a town in the decennial census was as given below. Estimate the population for the year 1895. 5

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

3. (a) The function $y = \sin x$ is tabulated below :

x	0	$\pi/4$	$\pi/2$
$y = \sin x$	0	0·70711	1·000

Using Lagrange's interpolation formula, find the value of $\sin(\pi/6)$. 5

(b) Using the following table, find f(x) as a polynomial in x by using Newton's interpolation formula. Hence compute f(6·5). 5

x	– 1	0	3	6	7
f(x)	3	– 6	39	822	1611

(c) Prove the following where the operators have their usual meaning : 5

(i) $\Delta \equiv E\nabla$

(ii) $E \equiv 1 + \Delta$

4. (a) Find the missing term in the following table by using interpolation method : *5*

x	0	1	2	3	4
y	1	3	9	?	81

(b) Solve the following equations by Cramer's rule : *5*

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

(c) Solve the following equations by Jacobi Iteration : *5*

$$5x_1 + x_2 + 2x_3 = 19$$

$$x_1 + 4x_2 - 2x_3 = -2$$

$$2x_1 + 3x_2 + 8x_3 = 39$$

5. (a) Solve the following equations by Gauss-Seidel method : *5*

$$3x_1 + 2x_2 + x_3 = 7$$

$$x_1 + 3x_2 + 2x_3 = 4$$

$$2x_1 + x_2 + 3x_3 = 7$$

(b) Find by the method of Regula-Falsi a real root of the equation

$$x^3 + x^2 - 3x - 3 = 0$$

lying between 1 and 2. *5*

(c) Solve by Euler's method, the equation

$$\frac{dy}{dx} = x + y.$$

Given $y(0) = 0$.

Choose $h = 0{\cdot}2$ and compute $y(0{\cdot}4)$ and $y(0{\cdot}6)$. *5*