BME-009

B.Tech. MECHANICAL ENGINEERING
(COMPUTER INTEGRATED ANUFACTURING)
BTCLEVI/BTMEVI/BTELVI/BTCSVI/BTECVI
Term-End Examination
口口写 75   December, 2014

BME-009 : COMPUTER PROGRAMMING
AND APPLICATIONS

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Find the real roots of the equation

$$x^4 + x^2 - 80 = 0$$

by Newton-Raphson method, correct to three decimal places.   7

(b) Find the roots of the equation

$$x^3 - x - 1 = 0$$

by Muller's method.   7

2. (a) Given the table of values :

x	150	152	154	156
$y = \sqrt{x}$	12·247	12·329	12·410	12·490

Evaluate $\sqrt{155}$ using Lagrange's interpolation formula.   7

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(b) Using Gauss's forward formula, find the value of f (32), given that

f(25) = 0·2707,   f(30) = 0·3027

f(35) = 0·3386,   f(40) = 0·3794.   7

3. (a) Compute a root of the equation $e^x = x^2$ to an accuracy of 10^5 using Iterative method.   7

(b) By using Horner's method, obtain the roots of the following equation :   7

$$x^3 - 6x - 13 = 0$$

4. (a) In the bending of an elastic beam the normal stress y at a distance x from the middle section is given by the following table :

x :	0·0	0·25	0·50	0·75	1·00
y :	0·46	0·39	0·25	0·12	0·04

Use Newton's forward interpolation formula to deduce the value of y, where x = 0·04.   7

(b) Use Gauss's forward central difference formula to find f(33), given the following table :   7

x :	1	2	3	4	5
f(x) :	15·30	15·10	15·00	14·50	14·00

5. (a) Find the inverse of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 & 0 \\ -1 & 2 & -1 & 0 \\ 0 & -1 & 2 & -1 \\ 0 & 0 & -1 & 2 \end{bmatrix}$$

using the Gauss-Jordan method. 7

(b) Compute four iterations of the Jacobi method for solving the system of equations given below :

$$\begin{bmatrix} 5 & 2 & 2 \\ 2 & 5 & 3 \\ 2 & 1 & 5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ -6 \\ 4 \end{bmatrix}$$

with $x^{(0)} = 0$. Exact solution is $x = (1 - 1 - 1)^T$. 7

6. (a) Write a C^{++} program to print the sum and count of non-negative numbers out of a list of 150 numbers. 7

(b) Write a C^{++} program that reads a temperature in degree Celsius and prints the equivalent in Fahrenheit by the formula

$$\frac{C}{5} = \frac{F - 32}{9}.$$ 7

7. (a) Write a C^{++} program to calculate and print the roots of a quadratic equation

$$ax^2 + bx + c = 0.$$ 7

(b) (i) How will you access the memory address of a variable ? 1

(ii) What is a null object ? 2

(iii) What is a global class and a local class ? 2

(iv) What is the difference between a pointer and an array ? 2

8. (a) Write a C^{++} program to calculate the minimum, maximum and average values of a given set of n numbers. 7

(b) (i) Find out the error(s) if any, in the following code :

If x < y min = x,

else min = y. 2

(ii) Explain the difference between the following two declarations :

Int n1 = n;

Int and n2 = n; 2

(iii) What is a nested loop ? Give an example. 2

(iv) Discuss the basic file input/output operations in C^{++}. 1