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BME-009

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

BTCLEVI/BTMEVI/BTELVI/BTCSVI/BTECVI

Term-End Examination

00974

June, 2017

BME-009 : COMPUTER PROGRAMMING AND APPLICATIONS

Time : 3 hours *Maximum Marks : 70*

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

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

$$x^3 - 4x - 9 = 0$$

by bisection method, correct to three decimal places. 7

(b) Find the real root of the equation $x = \frac{1}{(x+1)^2}$, correct to four decimal places. 7

2. (a) The values of x and y are given as below :

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

Find the value of y when $x = 10$. Use Lagrange's Interpolation formula. 7

(b) Starting with $x_0 = 0$, find an approximate root of the equation $x^3 - 4x + 1 = 0$ rounded off to five decimal places using the Newton-Raphson method. 7

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

(b) Given the table of values

x	50	52	54	56
$\sqrt[3]{x}$	3·684	3·732	3·779	3·865

Use Lagrange's formula to find x when $\sqrt[3]{x} = 3{\cdot}756$. 7

4. (a) Solve the following system of equations : 7

$$4x - y + z = -5$$

$$2x + 2y + 3z = 10$$

$$5x - 2y + 6z = 1$$

(b) Obtain a quadratic polynomial approximation to $f(x) = e^{-x}$ using Lagrange's interpolation method, taking three points $x = 0, 1/2, 1$. 7

5. (a) Use Euler's method to find the solution of $y' = x + |y|$, given that $y(0) = 1$. Find the solution on [0, 0, 8] with $h = 0{\cdot}2$. 7

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using

(i) Simpson's $\frac{1}{3}$ rule by taking $h = \frac{1}{4}$,

(ii) Simpson's $\frac{3}{8}$ rule by taking $h = \frac{1}{6}$.

Hence compute an approximate value of x in each case. 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 Celsius degrees and prints the equivalent in Fahrenheit degrees, using the formula $\frac{C}{5} = \frac{F-32}{9}$. 7

7. (a) Write a C++ program that reads three integers and prints the minimum and maximum. 7

(b) (i) What is a derived data type ? Give an example. 2

(ii) What is dynamic binding ? Differentiate it from static binding. 2

(iii) Find out the errors, if any, in the following code : 2

```
If  x < y min = x
    else min = y
```

(iv) What is overloading in context of C++ ? 1

8. (a) Write a C++ program to calculate and print the factorial of an integer. 7

(b) (i) Explain the difference between the following two declarations : 2

```
int n1 = n;
int and n2 = n;
```

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

(iii) What is the effect of execution of the following statement ? 2

```
#include <iostream.h>
#include <stdio.h>
```

(iv) Write an equivalent statement of i++. 1