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BME-009

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

BTCLEVI/BTMEVI/BTELVI/BTCSVI/BTECVI

Term-End Examination

01835

June, 2015

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.*

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1. (a) Find the 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) Use Stirling's formula to find U_{32} from the following table : 7

$U_{20} = 14{\cdot}035$, $U_{25} = 13{\cdot}674$, $U_{30} = 13{\cdot}257$

$U_{35} = 12{\cdot}734$, $U_{40} = 12{\cdot}089$, $U_{45} = 11{\cdot}309$

(b) Given the table of values

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

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

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

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

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

(b) Using Gauss's backward formula, find the value of $\sqrt{12516}$. Given that 7

$$\sqrt{12500} = 111{\cdot}803399,$$

$$\sqrt{12510} = 111{\cdot}848111,$$

$$\sqrt{12520} = 111{\cdot}892806,$$

$$\sqrt{12530} = 111{\cdot}937483.$$

4. (a) Solve the given intail value problem using Runge-Kutta method of order four :

$$y' = \frac{y - x}{y + x}, \quad y(0) = 1$$

Find y(0·5) using h = 0·5. 7

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

(i) Simpson's 1/3 rule by taking h = 1/4,

(ii) Simpson's 3/8 rule by taking h = 1/6.

Hence compute an approximate value of x in each case.

Assume following data in both cases :

$0{\cdot}7854, \pi = 3{\cdot}14156$ 7

5. (a) Solve the following system of equations

$$3x_1 + 5x_2 = 8$$

$$-x_1 + 2x_2 - x_3 = 0$$

$$3x_1 - 6x_2 + 4x_3 = 1$$

using Cramer's rule. 7

(b) Find the inverse of the matrix

$$A = \begin{bmatrix} 5 & 8 & 2 \\ 0 & 2 & 1 \\ 4 & 3 & -1 \end{bmatrix}$$

using the LU decomposition method. 7

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

(b) Write a C++ program which reads the values of A, B and C (sides of a triangle) and computes the semi-perimeter and area of the triangle, using the formula

$S = (A + B + C) / 2$

$\text{Area} = \sqrt{S(S-A)(S-B)(S-C)}$.

Also print A, B, C on one line and S and area on the next line. 7

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

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

(ii) Explain the differences between a class and a structure. 2

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

(iv) Describe the role of a pre-processor. 1

8. (a) Write a C++ program to calculate the volume of a square pyramid given by the formula

$$\text{Volume, } V = \frac{1}{3} a^2 h,$$

where 'a' is the side of the square base, 'h' is the height of the pyramid. 7

(b) (i) What is the effect of execution of the following statements : 2

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

(ii) What is wrong with the following code : 2

```
Char c = 'h' ;
Char p = & c ;
```

(iii) In the context of C++, explain what is overloading. 2

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