BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

00504

BTCLEVI/BTMEVI/BTECVI/BTELVI/BTCSVI

Term-End Examination

June, 2013

BME-009 : COMPUTER PROGRAMMING AND APPLICATION

Time : 3 hours *Maximum Marks : 70*

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

1. (a) Compute the roots of the following equation $x^4 - 2x^3 + 4x^2 + 6x - 21 = 0$, given that the sum of two of its roots is zero. **2x7=14**

   (b) Solve the following system of linear simultaneous algebraic equations by Crout's method

$$4x_1 + 3x_2 + 6x_3 = 13$$

$$2x_1 - 4x_2 + x_3 = 8$$

$$3x_1 - 2x_2 + 6x_3 = 17$$

2. (a) Find the real root of the equation $e^x - 3x = 0$ by the method of iteration, correct to three decimal places. **2x7=14**

(b) Using Bisection method, compute one root of $x^3 - 3x - 5 = 0$ correct to two decimal places, in the interval [2, 3]

3. (a) Using Newton's interpolation formula compute $f(0.5)$ for the data given as : **2x7=14**

x :	0	1	2	3	4
y :	1.000	2.718	7.389	20.086	54.598

(b) Solve the following simultaneous equation by Gauss - Seidel method.

$$6x - 3y + z = 11$$

$$2x + y - 8z = -15$$

$$x - 7y + z = 10$$

4. (a) Apply Newton - Raphson method to find an approximate root, correct to three decimal places of the equation $x^3 - 6x + 4 = 0$ which lies near $x = 0.5$. **2x7=14**

(b) Use Runge - Kutta method to approximate y, when $x = 0.1$ and $x = 0.2$ given that $x = 0$

when $y = 1$ and $\dfrac{dy}{dx} = x + y$.

5. (a) Write the output of the following program :

2x7=14

```
# include < iostream , h >
int func (int & x, int y=10)
{
    if (x%y==0) return++x ; else return y-- ;
}
void main ( )
{
    int p=20, q=23 ;
q=func (p, q) ;
cout << p << q << endl ;
p=func (q) ;
cout << p << q << endl ;
q=func (p) ;
cout << p << q << endl ;
}
```

(b) Given three numbers A, B, and C, write a C++ programme to write their values in an ascending order. For example if A=12, B=10, and C=15, your programme should print out :

Smallest number=10; Next higher number=12; Highest number=15.

6. (a) Write a C++ programme to sum the sequence **2x7=14**

$$\text{Sum} = x - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} \cdots\cdots\cdots .$$

(b) Give the out put of the following programme

```
# include < iostream .h>
Struct Pixel
{
        int C, R ;
};
void Display (Pixel P)
{
   Cout<<"Col"<<P.C<<"Row"<<P.R<<endl;
}
void main ( )
{ Pixel X={40, 50} Y, Z ;
Z=X
X.C+=10 ;
Y=Z ;
Y.C+ =10
Y.R+ =20 ;
Z.C- =15 ;
Display (X) ;
Display (Y) ;
Display (Z) ;
}
```

7. (a) Differentiate between a default constructor and copy constructor, giving suitable examples for each. **2x7=14**

(b) Write a C++ programme to calculate and print roots of a quadratic equation.

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

8. (a) Write C++ programme to input a number. If the number n is odd and positive, print its square root otherwise print n^5. **2x7=14**

(b) Write a C++ programme to calculate the function

$$f(x) = \frac{x^2 + 1.5x + 5}{x - 3}$$

for $x = -10$ to 10

(x should take values $-10, -8, -6 \ldots, 6, 8, 10$)
Also print the output.