BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

01887

Term-End Examination

June, 2010

BME-009 : COMPUTER PROGRAMMING AND APPLICATION

Time : 3 hours   *Maximum Marks : 70*

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

1. (a) Compute the real roots of the equation   **7+7**

$$x\log_{10}x - 1.2 = 0,$$

correct to three decimal places by Newton Raphson method.

 (b) Find the real root of the equation

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

correct to three decimal places using Bisection method.

2. (a) Find by iterative method, a real root of the   **7+7** following equation :

$$2x - \log_{10}x = 7$$

(b) Solve the following system of equations

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

by Crout's method

3. (a) A rocket is launched from the ground. Its 7+7
acceleration is registered during the first 80
seconds and is given in the following table.

Using Simpson's $\frac{1}{3}$ rd rule, find the velocity

of the rocket at t = 80 seconds.

t (sec)	0	10	20	30	40	50	60	70	80
f (cm/sec^2)	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

(b) Solve the following system of linear equation
by Gauss Elimination method :

$$2x - 6y + 8z = 24$$

$$5x + 4y - 3z = 2$$

$$3x + y + 2z = 16$$

4. (a) Find the real root of the equation : 7+7

$$xe^x - 3 = 0$$

by Regula - Falsi method, correct to three
decimal places.

(b) Solve the following system of linear equations by Gauss - Seidal iteration method.

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

Perform only four iteration. Assume to start with $(x_0, y_0, z_0) = (0, 0, 0)$.

5. (a) Use Lagrange's interpolation formula to find y when $x = 5$ from the following data :   7+7

$x :$	0	1	3	8
$y :$	1	3	13	123

(b) Using Runge - Kutta method of order four, find y (0.2), for the equation :

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

take $h = 0.2$.

6. **(a)** The following statement is illegal. Why ?

How would you correct it ?   **2+4+4+4**

```
main ( )
{
        int i=j=k=0;
}
```

(b) Write an equivalent C^{++} expressions for the following expressions :

(i) $ut + \dfrac{1}{2} ft^2$

(ii) $\sqrt{\sin a + \tan^{-1} a - e^{2x}}$

(iii) $|a| + b >= |b| a$

(iv) $\left(\dfrac{3x + 5y}{5x + 3y} - \dfrac{8xy}{2yx} \right)^{\frac{3}{2}}$

(c) Suppose A, B, C are integer variables A=3, B=3, C=$-$5, and X, Y, Z are floating point variables where X=8.8, Y=3.5, Z=$-$5.2. Determine the value of the following expressions.

(i)   A%C   (ii)   A*B/C

(iii) (A*C)%B   (iv)   int (X) % int (Y)

(d) What will be the output produced by following code :

```
for (i=10; i <= 50; i+ = 10)
{
    j = i/2;
    cout << j << " " ;
}
```

7. (a) Write a C^{++} program and print the values   7+7
of $f(x)$ given by :

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

for $x = -10$ to 10,
x should take values $-10, -8, -6, \ldots, 6, 8, 10$.

(b) Given three numbers A, B, and C, write a C^{++} program to write their values in descending order.

8. (a) Two one - dimensional arrays C and D   7+7
have 25 elements each. Write a C^{++} program to compute and print the following quantities :

(i) $B = \sum\limits_{i=1}^{25} (C_i - D_i)^2$

(ii) $P = \sum\limits_{i=1}^{25} C_i D_i$

(b) (i) What is the output of the following code fragment ?

```
for (int i = 1; i < 10; i + +);
cout << i;
```

(ii) How many times is the following loop executed ?

```
int s = 0, i = 0;
do s + = i
while (i < 5);
```