

**B.Tech. MECHANICAL ENGINEERING
(COMPUTER INTEGRATED MANUFACTURING)
BTCLEVI/BTMEVI/BTELVI/BTCSVI/BTECVI**

Term-End Examination

01541

December, 2015

**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) (i) Round off the following numbers to two decimal places :

48.21416, 2.3742, 52.275, 2.375, 2.385
and 81.255

- (ii) If $u = 3v^7 - 6v$, find the percentage error in u at $v = 1$, if the error in v is 0.005. 3+4

- (b) Compute the real root of the equation

$$x^3 - 2x - 5 = 0$$

by Regula-Falsi method, correct to four decimal places. 7

2. (a) Find a real root of the equation $x = e^{-x}$, using the Newton-Raphson method, correct to three decimal places.
- (b) Use the Bisection method to obtain a real root of the equation

$$x^3 - x^2 - 1 = 0,$$

correct to three decimal places.

7+7

3. (a) Show that

$$\mu = \sqrt{1 + \frac{1}{4}\delta^2}.$$

- (b) The population of a town in the decennial census was as given below. Estimate, by using Newton's difference interpolation formula, the population for the year 1895.

Year : x	Population : y (in thousands)
1891	46
1901	66
1911	81
1921	93
1931	101

7+7

4. (a) Using Lagrange's interpolation formula, find the form of the function $y(x)$ from the following table. Also compute $f(2.5)$.

x	0	1	3	4
y	-12	0	12	24

- (b) Velocity of a car (running on a straight road) at intervals of 2 minutes is given below :

Time in minutes	0	2	4	6	8	10	12
Velocity in km/hr	0	22	30	27	18	7	0

Apply Simpson's $\frac{1}{3}$ rd rule to find the distance covered by the car.

7+7

5. (a) Solve the following equations by Gauss elimination method :

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

$$3x + 2y + 3z = 18$$

$$x + 4y + 9z = 16.$$

- (b) Solve the following equations by Jacobi's method :

$$10x + 2y + z = 9$$

$$2x + 20y - 2z = -44$$

$$-2x + 3y + 10z = 22.$$

7+7

6. (a) Write a C++ programme for solving the simultaneous equations by using Gauss-Seidel iteration method.
- (b) Explain the concept of class and object with an example. 7+7

7. (a) Write a C++ programme to calculate the factorial n (i.e., n!).
- (b) Write a C++ programme to find the roots of a quadratic equation. 7+7

8. (a) What is a friend function in C++ ? Explain the need of friend function with an example.

- (b) (i) What will be the output produced by the following code ?

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

- (ii) What will be the output produced by the following code fragment ?

```
for (i = 10 ; i <= 50 ; i += 8)
j = i/2 ;
cout << j << " " ;
```

7+7
