

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

Term-End Examination

01180

June, 2016

**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 four significant figures :

38.46235, 0.70029, 0.0022218,
19.235101 and 2.36425

- (ii) If $u = \frac{5xy^2}{z^3}$, find the percentage error

in u at $x = 1, y = 1, z = 1$, if errors are given as $\Delta x = \Delta y = \Delta z = 0.001$. 2+5

- (b) Obtain a real root of the equation

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

by using Bisection method, correct to three decimal places. 7

2. (a) Compute the real root of the equation

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

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

- (b) Find a real root of the equation

$$\sin x = 1 - x,$$

using the Newton-Raphson method, correct to four decimal places.

7+7

3. (a) Show that

(i) $E \equiv 1 + \Delta$, and

(ii) $\Delta \equiv \nabla (1 - \nabla)^{-1}$.

Also deduce that

$$1 + \Delta \equiv (E - 1) \nabla^{-1}.$$

- (b) The following table gives the values of e^x for certain equidistant value of x . Find the value of e^x when $x = 0.644$.

7+7

x	$y = e^x$
0.61	1.840310
0.62	1.85893
0.63	1.877610
0.64	1.896481
0.65	1.915541
0.66	1.934792
0.67	1.954237

4. (a) Solve the following equations by Gauss-Elimination method :

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

$$2x - 3y - z = -3$$

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

- (b) Solve the following equations by Gauss-Seidel method :

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

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

$$-2x + 3y + 10z = 22 \quad 7+7$$

5. (a) Apply Runge-Kutta method to find an approximate value of y for $x = 0.2$ in steps of 0.1 , if

$$\frac{dy}{dx} = x + y^2,$$

given that $y = 1$, where $x = 0$.

- (b) Solve the following equations by factorisation method :

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$2x + 2y + 10z = 14 \quad 7+7$$

6. (a) Given three numbers A, B and C. Write a C++ program to write their values in descending order.

- (b) Write a C++ program to
- (i) find the radius of a circle whose area is given.
 - (ii) calculate the volume and surface area of a sphere.

[Given : Volume = $\frac{4}{3}\pi r^3$; and Surface Area = $4\pi r^2$] 7+7

7. (a) Write a C++ program to calculate the values of the function

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

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

- (b) Write a C++ program to input a number. If the number is even, print its square, otherwise print its cube. 7+7

8. (a) What is Nested Structure ? Give an example.
 (b) What are the outputs of the following two codes fragments ? Justify your answer.

<pre>// Version 1 int f = 1, i = 2; while (++ i < 5) f* = i; cout << f; :</pre>	<pre>// Version 2 int f = 1, i = 2; do { f* = i; } while (++ i < 5); cout << f; :</pre>
7+7	