

Roll No. ....

**24262**

**B. Tech. 5th Semester (ME)  
Examination – December, 2016**

**APPLIED NUMERICAL TECHNIQUE AND COMPUTING**

**Paper : ME-311-F**

*Time : Three Hours ]*

*[ Maximum Marks : 100*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Question No. 1 is compulsory. Attempt total five questions with selecting one question from each Section. All questions carry equal marks.*

1. (a) Round off the following numbers correct to four significant figure :  $2.5 \times 8$

3.26245, 35.46735, 0.70035, 18.265101, 0.859378

- (b) Define the terms Interpolation and Extrapolation.

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(c) What are direct methods and iterative method to solve the system of linear equations ?

(d) Using Euler's method, find approximate value of  $y$  when  $x = 0.6$  of :

$$\frac{dy}{dx} = 1 + 2xy, y(0) = 1 \text{ (take } h = 0.2)$$

(e) What is a divided difference table ? How is it useful ?

(f) State Lagrange's polynomial.

(g) State Simpson's  $\frac{3}{8}$ -th Rule.

(h) What is Crank Nicolson Method ? Why is it known as implicit method ?

**SECTION - A**

2. (a) Find the relative error in the function

$$Y = ax_1^{m1} x_2^{m2} \dots \dots \dots x_n^{mn}$$

24262-9800-(P-7)(Q-9)(16) (2)

(b) If  $R = 10 x^3 y^2 z^2$  and errors in  $x, y, z$  are 0.03, 0.001, 0.02 respectively at  $x = 3, y = 1, z = 2$ . Calculate the absolute error, percentage error and relative error in evaluating  $R$ .

3. (a) From the following table, estimate the number of students who obtained marks between 40 and 45 :

Marks:	30-40	40-50	50-60	60-70	70-80
No. of students:	31	73	124	35	31

(b) Given the values :

$x:$	300	304	305	307
$\log_{10} x:$	2.4771	2.4829	2.4843	2.4871

Evaluate  $\log_{10} 310$  by using

(i) Lagrange's formula

(ii) Newton's divided difference formula

**SECTION - B**

4. (a) Given that :

$x:$	1.0	1.1	1.2	1.3	1.4	1.5	1.6
$y:$	7.989	8.403	8.781	9.129	9.451	9.750	10.031

24262-9800-(P-7)(Q-9)(16) (3)

**SECTION - C**

find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 1.1$  and  $x = 1.6$

(b) Given that :

$x$ : 4.0 4.2 4.4 4.6 4.8 5.0 5.2

$\log x$ : 1.3863 1.4351 1.4816 1.5261 1.5686 1.6094 1.6487

Evaluate  $\int_{2.0}^{5.2} \log x \, dx$

using

(i) Trapezoidal rule

(ii) Simpson's rule

5. (a) Find a real root of the equation  $3x = \cos x + 1$  by

Secant Method correct to four decimal places.

(b) Find a real root of the equation  $x \log_{10} x = 1.2$  by

Newton Raphson Method.

6. (a) Solve the system :

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

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

$$x - y + z = 6$$

by using Gauss elimination method

(b) Solve the system :

$$9x - 2y + z = 50$$

$$x + 5y - 3z = 18$$

$$-2x + 2y + 7z = 19$$

by using Iterative method

7. (a) Determine the largest eigen value and the corresponding eigen vector of the matrix.

$$A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}$$

- (b) Determine eigen value and the corresponding eigen vector of the matrix by Jacobi Method.

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

### SECTION - D

8. Use Milne's Method to find  $y$  (0.3) from

$$\frac{dy}{dx} = x^2 + y^2, y(0) = 1. \text{ Find the initial values } y(-0.1),$$

$y(0.1)$  and  $y(0.2)$  by using Taylor's series method.

9. Solve the elliptic equation  $u_{xx} + u_{yy} = 0$  for the following square mesh with boundary values as shown :

	0	500	1000	500	0
1000					
2000					
1000					
	0	500	1000	500	0