No. of Printed Pages : 3

**ET-302(A)**

# B.Tech. Civil (Construction Management)/ B.Tech. Civil (Water Resources Engineering)

## Term-End Examination

00237

## December, 2017

## ET-302(A) : COMPUTER PROGRAMMING AND NUMERICAL ANALYSIS

*Time : 3 hours* *Maximum Marks : 70*

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

**1.** (a) Draw a flow chart and write a program in FORTRAN to find the average and standard deviation of the first 50 natural numbers with the help of a DO statement.

(b) Write a subroutine subprogram to multiply two matrices A and B each of order $5 \times 5$ using common statement. 7+7

**2.** (a) Write a FORTRAN program that gives the user the option of converting Fahrenheit to Celsius or Celsius to Fahrenheit readings of thermometer.

(b) Write a FORTRAN program to check whether a given number is a prime number or not. 7+7

3. (a) Write a FORTRAN program to calculate the area of a circle, area of a triangle, surface area of a sphere and volume of a sphere depending upon user's choice.

(b) Write a FORTRAN program to find the sum of the series

$$S = 1 + x + x^2 + \ldots + x^n.$$ 7+7

4. (a) Solve $3x + \sin x - e^x = 0$, correct to 4 decimal places using the Newton-Raphson method.

(b) Solve the following equations using the Gauss Elimination method :

$$x + y + z = 6$$
$$3x + 3y + 4z = 20$$
$$2x + y + 3z = 13$$ 7+7

5. (a) Evaluate

$$\int_0^4 e^x \, dx$$

by Simpson's rule. Compare the approximate value with the exact result.

(b) The distance(s) covered by a car in a given time (t) are given in the following table :

| Time (min) | 10 | 12 | 14 | 16 | 18 |
|---|---|---|---|---|---|
| Distance (km) | 12 | 15 | 20 | 27 | 37 |

Find the acceleration of the car at t = 13 minutes. 7+7

**6.** (a) State Lagrange's mean value theorem. Use it to find an approximate value of $\sqrt[3]{63}$.

(b) Determine the eigenvalues and the corresponding eigenvectors of the following matrix :

$$A = \begin{bmatrix} 2 & -1 & -1 \\ 3 & -2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$ 7+7

**7.** Explain the following : $4 \times 3\frac{1}{2} = 14$

(a) Round-Off and Truncation Errors

(b) Numerical Integration

(c) Global and Local Variables

(d) Bisection Method