ET-302(A)

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

Term-End Examination

□□713 **December, 2018**

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) Solve the following system of linear equations by Gauss elimination method :

$$2x - 6y + 8z = 24$$
$$5x + 4y - 3z = 2$$
$$3x + y + 2z = 16$$

(b) Solve the following system of linear equations by Gauss-Seidel iterative method : 7+7

$$5x + 2y + z = 12$$
$$x + 4y + 2z = 15$$
$$x + 2y + 5z = 20$$

2. (a) Find the real root of the following equation using Regula-Falsi method, correct to three decimal places :

$$e^{-x} = \sin x$$

(b) Compute the real root of the following equation by Newton-Raphson method, correct to three decimal places : 7+7

$$x \log_{10} x - 1\cdot2 = 0$$

3. (a) The following table gives corresponding values of x and y. Using Newton's forward interpolation formula, express y as a function of x. Also find y at $x = 2\cdot5$.

x	0	1	2	3	4
y	3	6	11	18	27

(b) Given the values :

x	0	2	3	6
f(x)	− 4	2	14	158

Using Lagrange's formula for interpolation, find the value of f(4). 7+7

4. **(a)** The velocity v (km/min) of a moped which starts from rest, is given at fixed intervals of time t (min) as follows :

t	v
0	0
2	10
4	18
6	25
8	29
10	32
12	20
14	11
16	5
18	2
20	0

Estimate approximately the distance covered in 20 minutes.

(b) Find a real root of the following equation using Bisection method, correct to three decimal places :   7+7

$$x^4 - x - 10 = 0$$

5. **(a)** Solve the following system of linear equations by Jacobi iteration method :

$$8x + y + z = 8$$
$$2x + 4y + z = 4$$
$$x + 3y + 5z = 5$$

(b)   Using Runge-Kutta method of fourth order, solve for y(0·1) and y(0·2) given that

$$\frac{dy}{dx} = xy + y^2, \text{ and } y(0) = 1.$$ 7+7

6.   (a)   Draw a flow chart to read 20 numbers and to determine its average value.

(b)   What is a file ? Explain the various types of files used.   7+7

7.   (a)   Write a FORTRAN program to calculate and print the factorial of an interger.

(b)   Write a FORTRAN program that prints the following numbers in decending order :   7+7

1   2   4   8   16   32   64   128

8.   (a)   Two one-dimensional arrays C and D have 50 elements each. Write a FORTRAN program to compute and print the following quantities :

$$P = \sum_{i=1}^{50} C_i D_i$$

(b)   Write a FORTRAN program for temperature conversion that gives the option of converting Fahrenheit to Celsius or Celsius to Fahrenheit and depending upon user's choice carries out the conversion.   7+7

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