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ET-302(A)

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

Term-End Examination

00345

June, 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.*

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1. (a) Write a FORTRAN program to find the roots of the quadratic equation

$$ax^2 + bx + c = 0.$$

(b) Write a FORTRAN program to arrange five numbers in increasing order. 7+7

2. (a) What are the different types of common files used for storage of data ? Explain each of them.

(b) Explain the syntax of each of the following :

(i) Logical IF

(ii) DO statement

(iii) File open, file close

(iv) Constant 6+8

3. (a) Write a FORTRAN program to calculate the sum of the series, taking input as x and N.

$$SUM = 1 - x + \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{4} - \frac{x^5}{5} + \ldots + \frac{x^N}{N}$$

(b) Write a FORTRAN program to calculate $f(x) = \frac{x - x^2}{2x - 6x^3 + 19}$ for the values of x as 10, 20, 30, 40, ..., 100. Also write a program to print the result in a tabular form. 7+7

4. (a) Use the Newton-Raphson method to find a root of the equation $\cos x = xe^x$.

(b) Solve by using the Gauss-Seidel method :

$$10x + 2y + z = 9$$
$$2x + 20y - 2z = -44$$
$$-2x + 3y + 10z = 22$$

7+7

5. (a) Use Lagrange's formula to compute the value of y when x = 5, if the following values of x and y are given :

x	1	2	3	4	7
y	2	4	8	16	128

(b) Evaluate $\int_0^2 \frac{x^2}{1+x^3}\,dx$, using the Simpson's $\frac{1}{3}$ rule, taking $h = \frac{1}{2}$. 7+7

6. (a) A real root of the equation

$$f(x) = x^3 - 5x + 1 = 0$$

lies in the interval (0, 1). Perform four iterations of the Regula-Falsi method to obtain this root.

(b) Given that one root of the non-linear equation

$$x^3 - 4x - 9 = 0$$

lies between 2·625 and 2·75. Find the root, correct to 4 significant digits, using Bisection method. 7+7

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

(a) Difference between formatted Write/Read and unformatted Write/Read statements

(b) Convergence of Newton-Raphson method

(c) Application of eigenvalues and eigenvectors

(d) Taylor's theorem and Intermediate Value theorem