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ET-302(A)

01107

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

Term-End Examination

June, 2013

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) If 0.667 is the approximate value of $\frac{2}{3}$, find the absolute, relative and percentage errors. **7+7**

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

2. (a) Find a real root of the following equation **7+7**

$x = 0.21 \sin (0.5 + x)$

by iteration method with the approximate root as 0.1.

(b) Solve the following simultaneous equations using Gauss' elimination method.

$x + y + z = 6$

$3x + 3y + 4z = 20$

$2x + y + 3z = 13$

3. (a) Solve the following systems of equation by using Jocabi's iteration method. 7+7

$13x_1 + 5x_2 - 3x_3 = 14$

$2x_1 + 12x_2 + x_3 = 29$

$3x_1 - 4x_2 + 10x_3 = 25$

(b) By using the Regula - Falsi method, find the root, correct to 3 decimal places of the equation

$x \log_{10} x = 1.2$

that lies between 2 and 3.

4. (a) Use Lagrange's interpolation formula to compute $f(27)$ from the given data : 7+7

x :	14	17	31	35
$f(x)$:	68.7	64.0	44.0	39.1

(b) Evaluate $\int_0^1 e^x \, dx$ approximately in steps of 0.2 using trapezoidal rule.

5. (a) Given three numbers A, B and C, write a FORTRAN programme to write their values in an ascending order. 7+7

(b) Write a FORTRAN programme to sum the sequence

$$1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots\ldots\ldots + \frac{1}{100!}$$

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

(b) Write a C++ programme to input a number. If the number n is odd and positive, print its square root otherwise print n^3.

7. (a) Write a FORTRAN programme to calculate the roots of a quadratic equation $ax^2 + bx + c = 0$. 7+7

(b) Write a FORTRAN programme to subtract two matrices.

8. (a) Write a FORTRAN programme to calculate the sum of the series, taking input as x and N. 7+7

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

(b) Write a FORTRAN programme to calculate

$$f(x) = \frac{x - x^2}{2x - 6x^3 + 19}$$ for the values of x as

10, 20, 30, 40, ..., 100. Also print the result in a tabular form.