ET-302(A)

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

Term-End Examination

December, 2013

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

me : 3 hours *Maximum Marks : **70***

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

(a) Find the roots of the equation 7+7

$$x^3 + 6x + 20 = 0,$$

Given that, one root being $1 + 3i$.

(b) Solve the set of simultaneous equations by Crouts method :

$$x_1 + 2x_2 - 3x_3 = -4$$
$$2x_1 - 3x_2 + x_3 = -1$$
$$3x_1 - 5x_2 + 4x_3 = 5$$

(a) Using Newton-Raphson method, compute the real root of the following equation $xe^x = 1$ and correct to four decimal places. 7+7

(b) Find a root of the following equation $\cos x - 1.3x = 0$ correct to three decimal places, which lies between 0 and 1, by using Bisection Method.

3. (a) Compute $f(78)$ by using Newton's forward interpolation formula from the given data.

x	80	85	90	95	100
$f(x)$	5026	5674	6362	7088	7854

(b) Use Gauss-Seidel Method to solve the following systems of equations :

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

4. (a) Find a real root of the following equation $x^3 - 5x - 7 = 0$ 7

by using the Regula-Falsi method, correct to 4 decimal places.

(b) Use Runge-Kutta method to approximate y, when $x = 0.1$ and $x = 0.2$, given that $x = 0$, when $y = 1$ and $\frac{dy}{dx} = x + y$

5. (a) Write a FORTRAN program to calculate the sum of the series 7

$$\text{Sum} = x + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \frac{x^8}{8!} + \ldots\ldots$$

upto 50 terms for $x = 2$, $x=4$ and $x=6$.

(b) Write a FORTRAN program to calculate area of circle, rectangle or a triangle depending upon user's choice.

6. (a) Write a FORTRAN programme to tabulate the function **7+7**

$$f(x)=\frac{x^2+1.5x+5}{x-3}$$

for $x=-10$ to 10,

x should take values $-10,-8,-6,\ldots, 6, 8,10$

(b) Write a FORTRAN programme to calculate and print the sums of even and odd integers of the first 500 natural numbers.

7. (a) Write a FORTRAN programme to input a number. If the number is even, print its square, otherwise print its cube. **7+7**

(b) Write a pro FORTRAN programme to print FIBONACCI series, i.e. 0,1,1,2,3,5,8,

8. (a) Write down the FORTRAN expression for the following : **7+7**

(i) $P=e^x+\tan x+\log x$

(ii) $Q=\dfrac{x^2-2x+3}{(x-2)(x-4)}$

(iii) $R=S^3+2S^2+9S+10$

(iv) $v^2=u^2+2as$

(v) $K.E=\dfrac{1}{2}mv^2$

(vi) $R = \dfrac{(\alpha + \beta^2 + \alpha\beta)^5}{\sqrt{\alpha + \beta + 1}}$

(vii) $\eta = \dfrac{EI}{EI + P_0 + I^2R}$

(b) The Fermi-Dirac distribution for a normalized energy U is given by the formula

$$FDD = \frac{1}{e^u - 1}$$

Write a FORTRAN programme that will prepare a table of this function for U varying from 1.0 to 10.0 in steps of 0.05.