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ET-302(A)

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

Term-End Examination

June, 2014

00575

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 calculator is permitted.*

1. (a) Write assignment statement to interchange the values of two variables X and Y having values 2·0 and 5·0 respectively. *4*

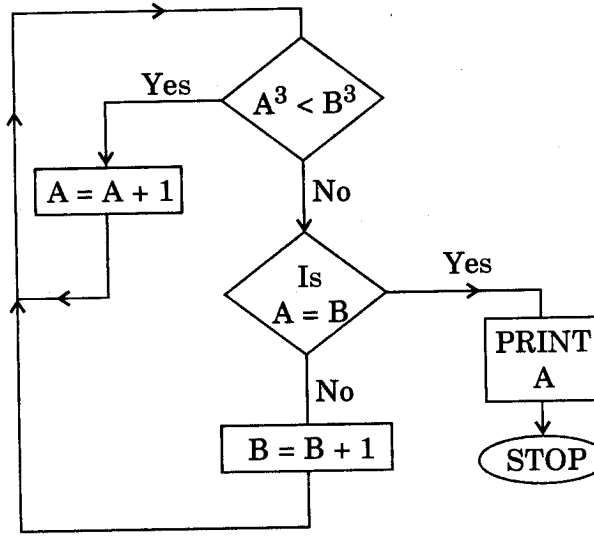
(b) In which order will the elements of the array A be stored ?

A (– 2 : 2, 1 : 3). *5*

(c) Write the following expression in FORTRAN :

$$\frac{ax^i}{ad^2} + 4a + \log_e 15 + \sec x$$ *5*

2. (a) Write the FORTRAN program for the following flow chart using 'IF THEN ELSE' statement. *8*



(b) Explain the following : *3*

(i) Sequential file

(ii) Direct or random file access

(iii) Indexed sequential file

(c) Explain with example the difference between 'COMMON' and 'EQUIVALENCE' keywords. *3*

3. (a) Find a real root of $x^3 - x = 1$ between 1 and 2 by bisection method. Compute five iterations. *7*

(b) Find a positive value of $(17)^{1/3}$ correct to four decimal places by Newton-Raphson method. *7*

4. (a) From the given table :

x :	20	25	30	35
y(x) :	0·342	0·423	0·5	0·65

Find the value of x for y(x) = 0·390. 7

(b) Solve the following system of equations by LU decomposition method or triangularization method.

$$x + 2y - z = 3$$
$$x - y + z = -1$$
$$2x - 2y + 3z = 2$$

7

5. (a) The speed, v metres per second, of a car, t seconds after it starts, is shown in the following table :

t	v
0	0
12	0
24	3.60
36	10.08
48	18.90
60	21.60
72	18.54
84	10.26
96	4.56
108	5.40
120	9.00

Using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule, find the distance travelled by the car in 2 minutes. 7

(b) Assuming that the following values of y belong to a polynomial of degree 4, compute the next three values : 7

x :	0	1	2	3	4	5	6	7
y :	1	–1	1	–1	1	–	–	–

6. (a) Given, the initial value problem

$$y' = 1 + y^2, y(0) = 0$$

Find y(0·6) by Runge-Kutta fourth order method taking h = 0·2. 7

(b) Determine the eigenvalues and the corresponding eigenvectors of the following matrix : 7

$$\begin{bmatrix} 2 & -1 & -1 \\ 3 & -2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

7. (a) Find the 2nd Taylor's expansion of $f(x) = \sqrt{1+x}$ in $]-1, 1[$ about x = 0. Also find the bound of the error at x = 0·2. 7

(b) Divide the polynomial $p(x) = x^5 - 6x^4 + 8x^3 + 8x^2 + 4x - 40$ by $(x - 3)$ by the synthetic division method and find the remainder. 7

8. (a) Find the inverse of the matrix by using Gauss-Jordan method 7

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

(b) Find the first and the second derivative of f(x) at x = 0·04 from the table given below : 7

x	f(x)
0·01	0·1023
0·02	0·1047
0·03	0·1071
0·04	0·1096
0·05	0·1122
0·06	0·1148