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ET-302(A)

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

01635

Term-End Examination

June, 2010

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

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. All questions carry **equal** marks.*

1. (a) State mean value theorem. Use it to find a point z in the interval $]0, 4[$ such that

$$f'(z) = \frac{f(4) - f(0)}{4 - 0}$$

for the function

$$f(x) = (x-1)\ (x-2)\ (x-3)$$

(b) Explain truncation error, calculate the truncation error in approximating

$$e^{-x^2} \text{ by } 1 - x^2 + \frac{x^4}{2}$$

in $-1 \leq x \leq 1$

2. Use L U decomposition method to solve the system of equations

$x + y + z = 1$

$4x + 3y - z = 5$

$3x + 5y + 3z = 3$

(b) Using synthetic division check whether $\alpha = 3$ is a root of the polynomial equation $x^4 + x^3 - 13x^2 - x + 12 = 0$. Also find the quotient polynomial.

3. (a) (i) Show that a matrix A and its transpose A^T have same eigen values.

(ii) Show that a matrix A is singular if and only if it has zero eigen value.

(b) Estimate the production for 2004 and 2006 from the following data :

Year :	2001	2002	2003	2004	2005	2006	2007
Production :	200	220	260	-	350	-	430

4. (a) Determine by Lagrange's formula, the percentage number of criminals under 35 years :

Age	% no of criminals
under 25 yrs	52
under 30 yrs	67.3
under 40 yrs	84.1
under 50 yrs	94.4

(b) The distance covered by an athlete for the 50 metre race is given in following table :

Time (sec) :	0	1	2	3	4	5	6
Distance (mt) :	0	2.5	8.5	16	25	37	50

Determine the speed of the athlete at t = 5sec (correct to two decimals)

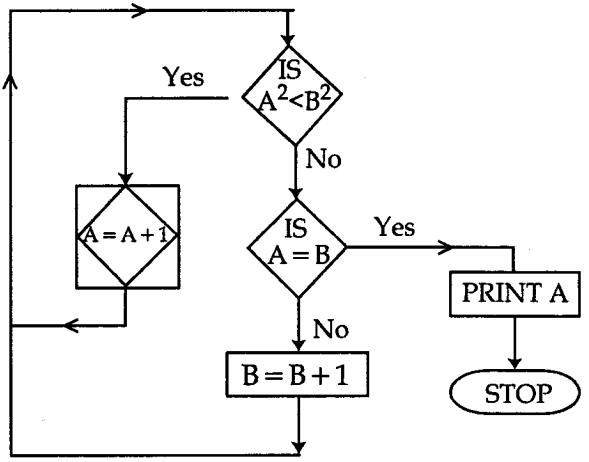
5. (a) Evaluate $\int_0^1 \frac{dx}{1+x}$ by dividing the interval of integration into 8 equal parts. Hence find $\log_e 2$ approximately.

(b) Use Runge's method to approximate y when $x = 1.1$, given that $y = 1.2$ when $x = 1$ and $\frac{dy}{dx} = 3x + y^2$.

6. (a) Write the FORTRAN program segment for the following flow chart using :

(i) Logical IF

(ii) If THEN ELSE



(b) Given an array of numbers, locate the position of the largest number. Print its value and the corresponding element, write a program for the above task.

7. (a) Write a subroutine to multiply a matrix A with its transpose A^T.

(b) Draw a flow chart and also a program to find the roots of the quadratic equation $ax^2 + bx + c = 0$.

8. (a) What are different type of common files used for storage of data ? Write about each one of them.

(b) Explain the syntax of each of following :

(i) Logical IF

(ii) Do statement

(iii) File open, file close

(iv) Constant