



Printed Pages : 4

CS – 406

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 1034**

Roll No.

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### B. Tech.

(SEM. IV) EXAMINATION, 2006-07

### COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

*Time : 2 Hours]*

*[Total Marks : 50*

*Note : Attempt all the questions.*

1 Attempt any **four** of the following : **4×3=12**

- (a) If  $u = 3g^7 - 6g$  find the percentage error in  $u$  at  $g = 1$ , if the error in  $g$  is 0.05.
- (b) Compute the real root of  $x^3 - 5x + 3 = 0$  in the interval  $[1,2]$  by the Regula falsi method. Perform three iterations only.
- (c) By Newton Raphson method find the positive root of  $f(u) = x - 2 \sin x$ .  
Choose suitable initial guess and perform three iterations.
- (d) Find the root of the equation  $f(u) = x^3 - 3x - 5 = 0$  which lies between 2 and 3 by the Muller's method. Perform two iterations only.

- (e) Apply the quotient – difference method to obtain the approximate roots of the equation.  
 $X^3 - 7x^2 + 10x - 2 = 0$ .
- (f) Define rate of convergence. Obtain rate of convergence of Newton Raphson method.

**2** Attempt any **four** of the following : **4×3=12**

- (a) From the following table, find the number of students who obtained less than 45 marks by method of interpolation :

<b>Marks :</b>	0-30	31-40	41-50	51-60	61-70	71-80	81-100
<b>No. of Students :</b>	0	31	42	51	35	31	5

- (b) The ordinates of the normal curve are given by the following table

<b>x :</b>	.0	.2	.4	.6	.8
<b>y :</b>	.3989	.3910	.3683	.3332	.2897

Calculate : (i)  $y(.25)$  (ii)  $y(.62)$ .

Use Newton's method of interpolation.

- (c) Use Stirling formula to find  $y(28)$  given

<b>x :</b>	20	25	30	35	40
<b>y :</b>	49225	48316	47236	45926	44306

- (d) Applying Lagrange's formula, find the interpolating polynomial  $f(x)$  for the following set of observations.

<b>x :</b>	0	1	4	5
<b>y :</b>	4	3	24	39

Also find  $f(2)$ .

- (e) By means of Newton's divided difference formula, find the values of  $f(2)$ ,  $f(8)$  and  $f(15)$  from the following table.

$x :$	4	5	7	10	11	13
$f(u) :$	48	100	294	900	1210	2028

- (f) Differentiate between interpolation and curve fitting.

**3** Attempt any **two** parts : **7×2=14**

- (a) Fit a natural cubic spline to the following data:

$x:$	2	3	4
$y:$	11	49	121

Hence compute

- (i)  $y(2.5)$  and  
(ii)  $y'(2)$
- (b) Find the first and second derivative at 1.1 for the data

$x :$	1.00	1.2	1.4	1.6	1.8	2.00
$f(u) :$	0	.1280	.5440	1.2960	2.432	4.00

- (c) Evaluate the integral

$$\int_0^1 \frac{x^2}{1+x^3} dx$$

Simpson's rule taking four equal intervals, and hence find the value of  $\log_e 2$ .

4 Attempt any **two** parts : **6×2=12**

(a) For a bi variate distribution  $n = 18$ ,

$$\sum x^2 = 60, \sum y^2 = 96, \sum x = 12, \sum y = 18, \sum xy = 48$$

Find the equations of lines of regressions.

(b) Fit the curve  $y=ax^b$  to the following data, using method of least squares.

$x :$	1	2	3	4	5	6
$y :$	2.98	4.26	5.21	6.1	6.8	7.5

(c) Write short notes on : **6×2=12**

- (i) Quality Control Methods
  - (ii) Multiple Regression Analysis.
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