Printed Pages : 5 | 616 | NCS-303

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

Paper ID :110303 Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech.

(SEM. III) THEORY EXAMINATION, 2015-16

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

[Time:3 hours] **[Total Marks:100]**

Section-A

1. Attempt **all** parts.All parts carry equal marks. Write answer of each part in short. (10x2=20)

   (a) Describe briefly the floating point representation of numbers.

   (b) Suppose 1.414 is used as an approximation to $\sqrt{2}$. Find the absolute and relative errors.

   (c) Express $2\,T_0(x)-\frac{1}{4}T_2(x)-1/8\,T_4(x)$ as polynomials in x.

   (d) Differentiate between ill conditioned and well conditioned methods.

   (e) Explain underflow and overflow conditions of error in floating point's addition and subtraction.

(f) Write differnce between the truncation error and round off error.

(g) Differentiate false position method and secant method.

(h) How can the rate of convergence of two methods be compared, explain by taking an example?

(i) Find the number of terms of the exponential series such that their sum gives the value of e^x correct to six decimal places at $x=1$.

(j) The numbers 0.01850×10^3 and 386755 have..........and.....................significant digits respectively.

Section-B

Attempt **any five** questions from this section. (5×10=50)

2. The following table gives the marks obtained by 100 students in Statistics:

Marks	Number of Students
30-40	25
40-50	35
50-60	22
60-70	11
70-80	7

Use Newton's forward formula to find the number of students who got more than 55 marks.

3. Solve the following system of equation by Gauss elimination method:

$$x_1 + 2x_2 + 3x_3 + 4x_4 = 10$$
$$7x_1 + 10x_2 + 5x_3 + 2x_4 = 40$$
$$13x_1 + 6x_2 + 2x_3 - 3x_4 = 34$$
$$11_{x1} + 14x_2 + 8x_3 - x_4 = 64$$

4. The speed v meters per second of a car, *t* seconds after its starts, is shown in following table:

t	V
0	0
12	3.6
24	10.08
36	18.9
48	21.6
60	18.54
72	10.26
84	5.40
96	4.50
108	5.40
120	9.00

Using Simpson's 1/3rd rule find the distance traveled by the car in 2 minutes.

5. Find the form of function F (x) of the following table using Lagrange's method.

x	0	1	4	5
F(x)	8	11	68	123

6. Find a real root of the equation 2x-log 10x=7 c, correct to three decimal places using Aitken;s method and Iteration method. Also show how the rate of convergence of Aitken's method is rapid than iteration method.

7. A real root of the equation $f(x) = x^3 - 5x + 1 = 0$, lies in the interval (0,1). Perform four iterations of the secant method.

8. Evaluate the intergral I=dx/(x2+1) in the interval [0,1] using the Lobatto and Radau 3 point formula.

9. Find the value of integral, using Gauss-Legendre three point integration rule.

$$I = \int_{2}^{3} \frac{\cos 2x}{1+\sin x} dx$$

Section–C

Attempt **any two** questions from this section. (15×2=30)

10. Using Gram-Schmidt orthogonalization process, compute the first three orthogonal polynomials $P_0(X)$, $P_1(X)$, $P_2(X)$ which are orthogonal on interval [0,1] w.r.t. weight function W (x)=1. Using these polynomials obtain least square approximation of first degree for $f(x)=x^{1/2}$ on interval [0, 1].

11. Fit a natural cubic Spline to every subinterval for the following data.

x	y
0	2
1	-6
2	-8
3	2

Hence compute: y (2.5)

12. (a) Apply Milne's predictor-corrector method, find y (0.8) if y (x) is the solution of dy/dx=1+y2. Given y(0)=0, y (0.2) =0.2027, y(0.4) =0.4228 and y (0.6) = 0.6841.

(b) Apply Runge kutta fourth order method to find y (0.1) for the initial value problem, dy/dx=y-x Given y(0)=2.

—×—