Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

Fourth Semester B. Tech. (CS/IT)

Summer Term – 2016

Course Code: CSU401

Course Name: Numerical Methods and Computer Programming

Time: 2 hr. 30min.   Max. Marks: 60

Instructions to Candidate
1) All questions are compulsory.
2) Assume suitable data wherever necessary and clearly state the assumptions made.
3) Diagrams/sketches should be given wherever necessary.
4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
5) Figures to the right indicate full marks.

1.   Solve

(a) Find the real root of equation using Newton Raphson Method   6
     which is correct up to 3 decimal places x log x – 1.2 = 0.

(b) Find the root of equation $2x = cosx + 3$ correct up   6
     to 3 decimal places by direct substitution method.

2.   Solve Any Two

(a) Solve the following equation using Gauss Seidal Method   6

$$20x + y - 2z = 17;$$
$$3x + 20y - z = -18;$$
$$2x - 3y + 20z = 25;$$

(b) Apply Lagrange's Interpolation Formula to find f(1.5) using the given table   6

x	1	1.2	1.4	1.6	1.8	2
y	0.2420	0.1942	0.1497	0.1109	0.0790	0.0540

(c) Find the Inverse of matrix using Gauss Jordan method.   6

$$\begin{pmatrix} 2 & 1 & 1 \\ 1 & -1 & 1 \\ 4 & 2 & -3 \end{pmatrix}$$

3.   **Solve**

(a) Derive the Simpsons 1/3 rd rule and evaluate $\int_0^6 (1 - e^{-\frac{x}{2}}) \, dx$.   6

(b) Evaluate $\int_0^1 (\sin x - \log x + e^x) \, dx$ taking $h = 0.2$ by using trapezoidal rule.   6

4.   **Solve Any Two**

(a) Calculate the mean and SD for following data   6

X	5-10	10-15	15-20	20-25	25-30	30-35
F	6	8	17	21	15	11

(b) Find the median of the following series   6

Marks	frequency
0-10	22
10-20	38
20-30	46
30-40	35
40-50	20

(c) Consider the set of number 2,3,7,8,10 find the first four   6
movement about the mean .

5.   **Solve Any Two**

(a) fit the straight line to the data given below

6

X	1	2	3	4	5
Y	10	12	8	10	14

(b) Describe the T-test with suitable example and also write   6
the significance of T-test.

(c) Describe the F-test with example.

6

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1. **Solve any two:**

a) Find the root of equation $x-5\log_e x=0$ with starting value $x_0=1.3$ using regula-falsi method.   6

b) Use fixed – point iteration method to evaluate root of equation $x^2-x-1=0$ using following form of $g(x)$
    $X = x^2-1$ 6

c) Prove the Newton – Raphson method to evaluate $x-1.5\sin x-2.5 = 0$ to four decimal places.   6

2. **Solve:**

a) Solve by Gauss Jordan Method : $3x+4y+5z = 18$; $2x-y+8z = 13$; $5x-2y+7z = 20$.   6

Contd..

[OR]

b) Find a Lagrange's interpolating polynomial for data given below

$x_0=1$, $x_1=2.5$, $x_2=4$, $x_3=5.5$

$f(x_0)=4$, $f(x_1)=7.5$, $f(x_2)=13$, $f(x_3)=17.5$ 6

c) The distance covered by athlete for the 50 metre race is given in the following table

Time	0	1	2	3	4	5	6
Distance	0	2.5	8.5	15.5	24.5	36.5	50

Determine speed of the athlete at t=5 sec correct to 2 decimal.   6

3.

Solve any two

a) Find the first & second derivatives for the function tabulated below at a point x=3.0   6

x	3	3.2	3.4	3.6	3.8	4.0
y	-14	-10.032	-5.296	0.256	6.672	14

b) Table gives the value of tan x for $0.10 \leq x \leq 0.30$ 6

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

Find tan 0.26

c) A die is thrown 8 times & it is required to find probability that 3 will show-   6
i) Exactly 2 times   ii) At least once

4.

Solve

a) From the following table find y when x=1.84   6

x	1.7	1.8	1.9	2.0	2.1	2.2	2.3
y	5.474	6.050	6.686	7.389	8.166	9.025	9.97

b) Find the value of $_3\int^7 x^2 \log x\, dx$ by taking 4 strips.   6

$$\frac{7-3}{4} = h.$$

5.

a) Solve:
Find mean, median, mode, M.D & S.D for the following data   6

x	1	2	3	4	5	6	7	8	9
y	8	10	11	16	20	25	15	9	6

b) Determine the constants a & b by the method of least squares such that $y=ae^{bx}$ fits the following data.   6

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

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           of equation $x^2-x-1=0$ using following form of $g(x)$
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