Seat No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 711507N Subject Name: Numerical Methods Time: 02.30 pm – 05.00 pm Instructions:

1. Attempt all questions.

- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Find the root of the following equations using bisection method upto three 07 decimal places,
 - $x^3-4x-9=0$
 - (b) Find the real root of equation $1.2 x \log_{10} x = 0$ by false position method 07 correct to fourth place.

Q.2 (a) The following table gives the marks secured by students

Range	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
marks					
No. of students	31	42	51	35	31

Find the number of students who got marks between 40 and 45.

(b) The following table gives velocity 'v' of particle in time 't'. Find the distance moved by particle in 12 seconds and also acceleration at t

			• •					-
Time 't'	0	2	4	6	8	10	12	$=2 \sec \theta$
in sec.								
Velocity	4	6	16	34	60	94	136	
'v' in								
m/s								
OR								

- (b) Evaluate integration of function $\log_e(1 + x^2)$ over a range of 0 to 1.2 using 07 trapezoidal rule
- Q.3 (a) Determine the largest Eigen value and corresponding Eigen vector of 07 following matrix

2	-1	0	
-1	2	-1	
0	-1	2	

(b) A cantilever beam of span 1m carries a point load 10kN at its end. If the 07 beam has rectangular cross section 20 x 100mm and is made up of mild steel, find the deflection of beam at 0.25L, 0.5L, 0.75L and L from fixed end. Use Finite Difference Method.

Q.3 (a) The following values of x and y are obtained in an experiment which 07 follows $y = ax^2 + b \log_{10} x$. Find 'a' and 'b' graphically

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x	2.85	3.88	4.66	5.69	6.65	7.77	8.67
у	16.7	26.4	35.1	47.5	60.6	77.7	93.4

(b) Variation of x and y are shown in table below. Use method of group 07

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Date: 16-01-2013

Total Marks: 70

average to determine the constants if variation follows

$y = a + bx + cx^2.$										
x	87.5	84.0	77.8	63.7	46.7	36.9				
у	292	283	270	235	197	181				

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Q.4

(a) Calculate correlation coefficient from following data

	x	50	50	55	60	65	65	65	60	60	60		
	у	11	13	14	16	16	15	15	14	13	13		
(b)	b) From the following data obtain regression line 'y' on 'x'.											07	
	x	1		2	3	4		5					
	у	9		11	5	8		7					
	OR												
(9)	(a) Write a computer algorithm to solve simultaneous linear equation by Gauss												07

- Q.4 Write a computer algorithm to solve simultaneous linear equation by Gauss 07 (a) Seidel Method using C++ language. (b) Solve the following equation using Gauss-Jordan method 07
 - 10x + y + z = 122x + 10y + z = 13
 - x + y + 5z = 7
- Q.5 (a) If 2/3 is approximated to four digits find, (a) Absolute error 07 (b) Relative error (c) Relative percentage error
 - (b) Use Euler's method to obtain approximate value of y(0.4) for the equation 07 y' = x + y, y(0) = 1 with h = 0.1

OR

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- Q.5 Write a short note on following (a) Type of errors
 - (b) Various methods of curve fitting
 - (c) Importance of correlation coefficient
 - (d) Usage of numerical method in Structural Engineering
