BACHELOR OF ENGINEERING IN

ELECTRICAL ENGINEERING (FINAL) EXAMINATION, 2017

(4th Year, 2nd Semester, Old Syllabus)

ADVANCED COMPUTING TECHNIQUES

Time: Three Hours   Full Marks: 100

(50 marks for each part)

Use a separate Answer-script for each Part

PART-I

Answer *any three* questions

Two marks are reserved for neat and well organized answer script

1. a) Discuss the "Backward Difference Scheme" with respect to FDM.   6

   b) A differential equation is given by

   $$\frac{d^2y}{dx^2} + y = 0 \quad \text{with the conditions } y(0) = 1 \text{ and } y'(0) = 0$$

   Solve this equation by finite difference method and highlight the percentage of error with respect to step size that you have chosen.   10

2. a) Explain how FDM can be applied in dielectric boundaries with unequal nodal distance.   10

   b) Form the set of finite difference equations and solve them to find the voltages at node 1 and node 2 for the system in air as shown in Fig. 1.   6
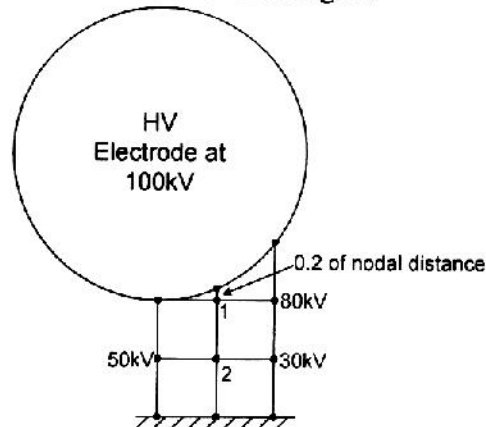

Fig. 1.

3. a) A triangular lamina has the following coordinates and node voltages as shown in Fig. 2. Find the potential inside the element at (5, 5) by applying FEM.   6
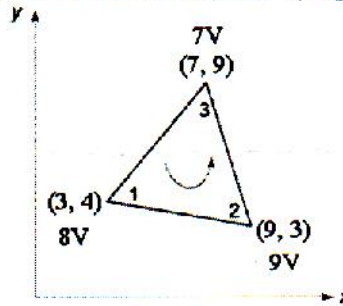

Fig. 2.

b) A curve is represented by $y=x^2$ (-1 $\leq x \leq$ 1). Show how the choice of suitable elements can approximate the area under the curve with the help of FEM. Comment on the different elements and associated percentage error in estimating the area.   10

4. a) Give some cases where ANN can be applied.   4

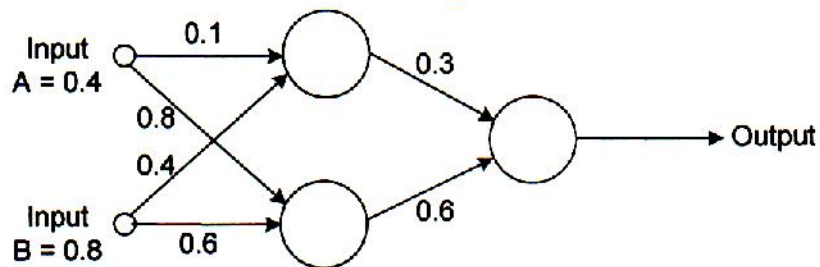b) Consider the network as shown in Fig. 2.

Fig. 2.

Assuming that the neurons have a sigmoidal activation function, perform training with target value 0.49 and comment on the result after a second forward pass.   12

5. Give example of crisp set and Fuzzy set. Explain some important fuzzy set operations. What is Membership Function with respect to Fuzzy Logic? Mention one application of Fuzzy Logic Controller.   2+9+4+1

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Ex/EE/T/424A/2017 (Old)
B.E. ELECTRICAL ENGINEERING EXAMINATION FOURTH YEAR SECOND SEMESTER
EXAMINATION, 2017 (Old)

SUBJECT: - ADVANCED COMPUTING TECHNIQUES

Time: Three hours

Full Marks: 100
(50 marks for this part)

Use a separate Answer-Script for each part

No. of Questions		PART -II Answer any Three (Two marks reserved for well organized answers)	Marks
6)		Use two phase method of SIMPLEX algorithm to obtain a solution of the following problem Minimize $\quad f = 2x_1 + 3x_2 + 2x_3 - x_4 + x_5$ Subject to $3x_1 - 3x_2 + 4x_3 + 2x_4 - x_5 = 0$ $x_1 + x_2 + x_3 + 3x_4 + x_5 = 2$ and $x_i \geq 0, i = 1$ *to* 5	(16)
7)	a)	Use the Newton's Method to find the next searching point while minimizing the function $f = (x_1^2 - x_2)^2 + (1 - x_1)^2$ starting at (-2,-2).	(8)
	b)	Explain the SIMPLEX Direct Search method in connection to an NLP problem.	(8)
8)	a)	Minimize: $10x_1^2 + 2.5x_2^2 - 5x_1 x_2 - 1.5x_1 + 10$ Subject to: $x_1^2 + 2x_2^2 + 2x_1 \leq 5$. Check whether the following points are likely candidates of the optimum point: (0,0) ;(0.1, 0.1) ; (2,1)	(7)
	b)	Write the K-T conditions for the following NLP problem Minimize $f(x) = \left(x_1^2 + x_2 - 11\right)^2 + \left(x_1 + x_2^2 - 7\right)^2$ Subject to $g_1(x) = 26 - (x_1 - 5)^2 - x_2^2 \geq 0$ $g_2(x) = 20 - 4x_1 - x_2 \geq 0$ $g_3(x) = x_1 \geq 0$ $g_4(x) = x_2 \geq 0$	(6)
	c)	For the function $f(x_1, x_2) = 2x_1^2 + x_2^2 - 2x_1 x_2 + 4$ find the direction at	(3)

[Turn over

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		the point (1, 1) along which the rise in the function value is maximum.	
9)		Four persons A, B, C, D are to be assigned with four tasks 1, 2, 3, 4 such that the total number of hours needed to complete the jobs is minimum. No person can be assigned with more than one job. Solve the assignment problem using Branch and Bound method. Number of hours by each of the persons to complete each of the four tasks is given below.	(16)

Persons	Jobs			
	1	2	3	4
A	6	5	8	3
B	10	6	4	15
C	13	7	2	11
D	13	9	7	10

10)	a)	Explain the elements which comprise the design of an algorithm based on simulated annealing.	(8)
	b)	Briefly explain the genetic algorithm principle.	(8)