Ref. No: Ex/EE/T/424A/2019

B.E. ELECTRICAL ENGINEERING FOURTH YEAR SECOND SEMESTER - 2019

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 -I Answer any Three (Two marks reserved for well organized answers)	Marks
1)	The furnace used in a cogeneration plant is capable of burning coal, oil, or gas simultaneously. Taking efficiency into consideration, a total input rate of 4000 kW equivalent of fuel must be burnt. Regulations require that the sulphur content of the emission be limited to 2.5%. The heating capacities, emission values, and the costs will now be given	(16)

Fuel Type	Sulphur Emission %	Cost $ per 1000 kg	Heating value kW/(kg/s)
Gas	0.12	55	61,000
Oil	0.45	41	45,000
Coal	2.8	28	38,000

Formulate and solve this Linear Program (LP) problem & determine the minimum cost per hour and the corresponding fuel burning rates in thousands of kg per hour (Do not use graphical method of solving LP problem.)

2) Explain Marquardt's Method in connection to a Non Linear Programming problem. (6+10)

Minimize the following function using Marquardt's Method $f(x_1, x_2) = (x_1{}^2 + x_2 - 11)^2 + (x_1 + x_2{}^2 - 7)^2$ where the initial point is chosen to be $X_0 = (0,0)$. Maximum no. of iterations = 100 and termination parameter $= 10^{-3}$.(Two no. of iterations has to be shown)

3) Maximize $f(x, y) = x^3y^5$ subject to the constraint $+y = 8$. (8+8)

Illustrate the method used to solve this particular problem.

4) Solve the following integer programming problem using Branch and Bound technique. Solution of the individual LP problems has to be found out using graphical method. (use graph paper) (16)

(please turn over)

[Turn over

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Time: Three hours **(50 marks for this part)**

		Maximize $Z = 5x_1 + 4x_2$ Subject to: $x_1 + x_2 \leq 5$ $10x_1 + 6x_2 \leq 45$ $x_1, x_2 \geq 0$ and integer	
5)	a)	Illustrate, with suitable example, how Genetic Algorithms evolve to generate improved solutions. (Maximum no. of iterations = 2)	(8)
	b)	Illustrate the elements which comprise the design of an algorithm based on simulated annealing.	(8)

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Use a separate Answer-Script for each part

Two marks for neat and well-organized answers

Question No.	Part II	Marks

Answer any three questions

1.	(a)	What do you understand by finite difference method (FDM)? With suitable example, show how 2D FDM equations can be formed in the case of a homogeneous dielectric material for unequal nodal distance.	2+6
	(b)	A differential equation is given by $y'' + y = 0$, with the constraints $y(0) = 1$ and $y'(0) = 0$. Use forward difference scheme of FDM and solve the equation. Comment on the percentage error versus the chosen step size.	8
2.	(a)	What is Finite Element Method (FEM)? In which areas FEM can be applied?	6
	(b)	Discuss how approximate solutions can be obtained by finite element method. Explain in brief with the help of a simple geometrical pattern.	10
3.	(a)	What do you understand by ANN? Discuss about the similarity and dissimilarity (if any) of ANN with an actual neural network.	2+4
	(b)	Show how an ANN can be "Trained" to achieve target value using a suitable example.	10
4.	(a)	State differences between Crisp Logic and Fuzzy Logic.	4
	(b)	Give the scheme of implementing a Fuzzy Logic Controller in a system of your choice. Define the input and output parameters along with their dependencies.	12
5.		Write short notes on following topics (any four) (i) Forward difference method (ii) Central difference method (iii)Intersection with respect to Fuzzy Set (iv)Fuzzy membership function (v) Fuzzy controller	4×4