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Tanta University
Faculty of Science
Department of Mathematics

Examination for :		Level Four – Mathematics	
Course Title:	Electrodynamics	Course Code:	MA4218
Time: 15/ 6/ 2015	Term: Second	Total Assessment Marks: 150 M	Time Allowed: 2H

Answer the following questions:

First question: (35 Marks)

- (a) Define the following expressions: Faraday's Law, TE wave, TEM wave, polarization of plane waves
- (b) Suppose the electric field vector in free space is: $\underline{E} = 100 \cos \left(\omega t + \frac{4\pi}{3} x \right) \hat{z}$. Find the magnetic field \underline{B} , the Poynting's vector \underline{P} , the frequency, the wave length, and the direction of propagation.

Second question: (40 Marks)

- (a) Discuss the rectangular metal waveguides for TM-guided modes.
- (b) State the difference between Lorentz force and Lorentz condition for antenna radiation.

Third question: (35 Marks)

- (a) Define the Hertzian dipole with figures.
- (b) Determine the Near-field and the Far-field radiation from a Hertzian dipole.

Fourth question: (40 Marks)

- (a) Consider the interface between free space and a lossy material having $\sigma = 20$, $\epsilon_r = 1$ and $\mu_r = 1$. A uniform plane wave with a magnitude of 100 V/m and frequency of 1 GHz is propagating in free space normal to the material surface. Compute the incident, reflected, and transmitted fields and the average power transmitted through an $5 - m^2$ area at the surface of the material.
- (b) Deduce the reflection and transmission coefficient for an ideal transmission line, if the voltage is sinusoidal in time.

With best wishes
Prof. Dr. Ahmed Abo-Amber
Dr. K.M. El-Morabie



COURSE TITLE:	NEURAL NETWORKS	COURSE CODE:	C4214
DATE:	13/6/2015	TERM:	SECOND
TOTAL ASSESSMENT MARKS:		100	
TIME ALLOWED:		2 HOURS	

Question No 1: [Total marks: 40]

1. Compare between autoassociation and heteroassociation. (8 marks)
2. What are the two phases involved in associative memory operation? (2 marks)
3. Assume that you want to learn a perceptron to perform a binary NAND function on inputs x_1 and x_2 . The training sample introduced to perceptron has the form $((x_0, x_1, x_2), z)$ where x_0, x_1, x_2 are inputs with input $x_0 = 1$ and z is the desired output. Let the threshold $t = 0.5$, Bias $b = 0$, and Learning rate $r = 0.1$. The training set consists of four samples: $\{((1,0,0),1), ((1,0,1),1), ((1,1,0),1), ((1,1,1),0)\}$. (30 marks)
 - a. Apply the weight vector adapting algorithm to update the weight vector with initial weight vector $(w_0, w_1, w_2) = (0.7, -0.2, -0.1)$.
[Hint: you can perform the computations in table]
 - b. What are the solution vector, n_0 , and n_{max} ?
[Hint: n_0 is the iteration of perceptron convergence and n_{max} is the maximum iteration that the adaptation process must be terminated after it]

Question No 2: [Total marks: 40]

1. Define Rosenblatt's perceptron. What is its goal? What is its classification decision rule? What is the sufficient condition for perceptron? What are the components of perceptron? (10 marks)
2. Explain the two rules that the weight vector adapting algorithm of perceptron is based on. (10 marks)
3. State the fixed-increment convergence theorem for perceptron. (5 marks)
4. Explain in brief the four major processes that the algorithm responsible for the formation of self-organizing map precedes by them. (15 marks)

Question No 3: [Total marks: 20]

1. Choose the best answer for each of the following points: (10 marks)
 - i. Principal goal of the self-organizing map (SOM) is:
 - a. Transform an input pattern of arbitrary dimension into a one- or two-dimensional discrete map.
 - b. Perform transformation adaptively in a topologically ordered fashion
 - c. both a and b
 - d. none of the above
 - ii. Which of the following is true about self-organizing map?
 - a. is type of ANN that is trained using unsupervised learning to produce map.
 - b. consists of components called nodes or neurons.
 - c. describes mapping from input space to map space.
 - d. all of the above

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- iii. Basic learning task that involves associating a new pattern with a stored pattern, is called:
 - a. pattern association
 - b. pattern recognition
 - c. pattern quantization
 - d. none of the above
- iv. The set of patterns sharing common attributes is called:
 - a. pattern sampling
 - b. pattern quantization
 - c. pattern class
 - d. none of the above
- v. Learning with teacher include:
 - a. supervised learning
 - b. reinforcement learning
 - c. both a and b
 - d. none of the above

2. Put (√) or (×) in end of each of the following sentences: (10 marks)

- i. In self organization process the training precedes with labeled input data.
- ii. Gaussian neighborhood function used in cooperative process in SOM algorithm is independent of the location of winning neuron.
- iii. Neural network is said to be fully connected if every node in input layer is connected to every other node in all layers.
- iv. The principle motivation for Kohonen's network model is the location of an output neuron in a topographic map corresponds to a particular domain or feature of data drawn from the input space.
- v. The absence of feedback loops has a profound impact on the learning capability of the network and on its performance.

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End of examination
With our best wishes

EXAMINERS	DR. MOSAAD WAJEH HASSAN	DR. ABD EL-MONEM KOZAE
		

