TANTA UNIVERSITY
FACULTY OFENGINEERING
ELECTRONICS&COMMUNICATIONS DEP.

JANUARY 2009
TIME ALLOWED: 3 HOURS
3rd YEAR COMMUNICATION

FINAL EXAMINATION

SUBJECT: WAVE PROPAGATION II

Attempt all questions:

1- a- (1) Write down expressions for the different field components in a rectangular wave guide operating in the dominant mode. Then, derive an expression for the transmitted power W_T

(2) If the **Longitudinal magnetic field** component (H_Z) in a rectangular wave guide of dimensions (5 cm x 4 cm), filled with a lossy- dielectric material with $\varepsilon_r = 16$ and $\sigma_d = 10^{-5}\,\upsilon/m$ and **the walls losses is neglected** is given by:

$$Hz(x,y,z,t) = 10^{-4} e^{-\alpha z}\cos(40\pi x)\cos(12\pi x 10^9 t - \beta_g z) \quad \text{A/m}$$

determine : i- The mode of operation ii- $\alpha, f_c, \beta_g, V_g$ and η_g

iii- Write expressions for the other field components.

b- If the **Longitudinal electric field** component (E_Z) in an empty rectangular wave guide operating in the TM_{11} mode is given by:

$$Ez(x,y,z,t) = 10^{-4}\sin(20\pi x)\sin(25\pi y)\cos(18\pi x 10^9 t - \beta_g z) \quad \text{V/m}$$

determine :

i- The W,G dimensions ii- $f_c, \beta_g, V_g\, \eta_g$ and f at which walls losses is minimum

iii- Write expressions for the other field components

2- a- For an empty cylindrical wave guide operating in the TM_{01} mode, **write down** expressions for the different field components and wave guide parameters.

b- If the **Longitudinal** electric field component (E_Z) in a cylindrical wave guide with radius 10 cm and walls are made of cupper with $\sigma_w = 10^8\ \Omega^{-1}/m$ and is filled with a lossy- dielectric material having $\varepsilon_r = 25$ and $\sigma_d = 10^{-4}\,\upsilon/m$ is given by:

$$Ez(r,\theta,z,t) = 10^{-4} e^{-\alpha z} J_0(55.45 r)\cos(4\pi x 10^9 t - \beta z) \quad \text{V/m}$$

determine :

i- The mode of operation ii- $f, f_c, \eta, \alpha_d, \alpha_w$ and α iii- f at which α_w is minimum and evaluate α_{min} as well as the magnitude of E_z at $z = 20\,m$

3- a- (1) For a cubic cavity resonator operating in the TE_{101} mode , **write down** expressions for the field components in the cavity as well as the resonance frequency and the quality factor.

(2) i-Calculate the resonance frequency and the quality factor of an **air filled** cubic cavity resonator of length 6 cm and walls made of cupper where $\sigma_w = 10^8\ \Omega^{-1}/m$.

ii-When the above cavity was re-filled with a **lossy dielectric material** the new values of the resonance frequency and the quality factor became 6 GHz and 500 respectively, evaluate the material parameters (ε_r and σ_d).

b-For **an air filled circular cavity** resonator with **radius 6 cm**, and **operating in the TE_{111}** mode:

(1) **Write down** an expression for the resonance frequency.

(2) i- If the **quality factor** and the **resonance frequency** of the above cavity is **3000** and **6 GHz** respectively, **calculate the length d of the cavity.**

ii-If the above cavity **is filled with a lossless dielectric material with** $\varepsilon_r = 36$ calculate the new values of the resonance frequency and quality factor.

4- a- **For the micro-strip lines**:-

(1) Discuss briefly its main applications

(2) Show with sketches the evolution of the strip and micro-strip lines.

(3)Show with sketches the geometry of the micro-strip line indicating the distribution of both E and H fields.

(4) Discuss briefly the losses in the micro-strip line

(5) Make a comparison between the micro-strip line and the other popular transmission lines.

(6) Calculate the characteristic impedance Z_0 of the microstrip line having the Following parameters :

$\varepsilon_r = 7.64, h = 6 miles, t = 2.5 miles and\ w = 10\ miles$

b- For the optical fiber :

(1) Draw the simplified block diagram of the optical fiber transmission system.

(2) Draw the single fiber structure indicating the characters and functions of each element.

(3) Write down what do you know about the basic optical lows and definitions.

(4) If the light is traveling in **glass with refractive index of 1.5** towards a **glass-to-air interface** with **an incident angle of 30^0** , evaluate the reflection and refraction angles as well as the required incident angle to ensure total reflection.

"ربي اشرح لي صدري ويسر لي أمري"

Dr. Abdel-Fattah A. Abu-Hashem

Tanta University Faculty of Engineering Dept. of Electrical Communications Eng.	3rd Year **Optoelectronics** Time Allowed: 3 Hours

Answer the following questions:

1- (a) Describe with sketches the optical fiber attenuation as a function of the wavelength?
(b) Describe the critical angle and total internal reflection at a glass-air interface?
(c) Compare between the different modes in the optical fiber?

2- (a) Describe with sketches the different types of graded-index fiber?
(b) Describe the method of outside vapor-phase oxidation?
(c) Discuss the attenuation and losses in the optical fiber?

3- (a) What is meant by direct and indirect band gaps?
(b) Define the optical and carrier confinement and draw a schematic diagram for the surface emitting LED ?
(c) Find the composite materials ratios for a LED structure to have a light of 850 nm wavelength?

4- (a) Describe with sketches the transition processes involved in the laser action?
(b) For a LED to have 1350 nm wavelength, find the composite ratios of the InGaAsP structure?
(c) Draw the Fabry-Perot resonator cavity for a laser diode?

5- (a) Describe with sketches the distributed-feedback laser diode?
(b) Prove that the condition to just reach the lasing action is

$$\Gamma_{gth} = \alpha_t = \bar{\alpha} + \frac{1}{2L} \ln\left(\frac{1}{R_1 R_2}\right)$$

(c) Describe the three fundamental structures for confining the optical waves in the lateral direction?
(d) Describe with curves the temperature effects on the laser diode operation?

With Best Wishes

جامعة طنطا
كلية الهندسة
قسم الالكترونات والاتصالات الكهربية

المادة/ الادارة والتسويق
(EEC31H4)
الفرقة الثالثة

بسم الله الرحمن الرحيم
التاريخ : 2009 /1/29
الزمن : ساعتان

أجب عن الأسئلة الآتية:- (40 درجة)

السؤال الاول:- (10 درجة)

1- اشرح اهم الاسباب التى ادت الى عدم تطوير وظيفة التسويق كلية فى كثير من المنظمات حتى الان.
2- تكلم عن أهم النقاط الأساسية عن دور التسويق في سوق البائعين .
3- اذكر بعض الأمثلة لبعض حالات الإصابة بقصر النظر التسويقي.

السؤال الثانى:- (10 درجة)

1- تكلم بالتفصيل عن أهم المفاهيم التى تحكم ادارة العمل التسويقى.

السؤال الثالث:- (10 درجة)

1- تكلم عن مهام مدير التسويق.
2- اكتب نبذة مختصرة عن:-
المستهلكون - الادوات التسويقية

السؤال الرابع:- (10 درجة)

1- عرف السوق طبقا للمفهوم الاقتصادى – مع شرح لدوافع الشراء الاولية والانتقائية
2- ما المقصود ب فكرة تقسيم السوق – ولماذا تقسيم السوق وما هى المزايا التى تجنيها المنظمة من تقسيم السوق.

مع أطيب التمنيات بالنجاح
ا.د/عبد الفتاح مصطفى خورشد

Standard Normal Distribution

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952

Values of $t_{\alpha,\nu}$[†]

ν	$\alpha = .10$	$\alpha = .05$	$\alpha = .025$	$\alpha = .01$	$\alpha = .005$	ν
1	3.078	6.314	12.706	31.821	63.657	1
2	1.886	2.920	4.303	6.965	9.925	2
3	1.638	2.353	3.182	4.541	5.841	3
4	1.533	2.132	2.776	3.747	4.604	4
5	1.476	2.015	2.571	3.365	4.032	5
6	1.440	1.943	2.447	3.143	3.707	6
7	1.415	1.895	2.365	2.998	3.499	7
8	1.397	1.860	2.306	2.896	3.355	8
9	1.383	1.833	2.262	2.821	3.250	9
10	1.372	1.812	2.228	2.764	3.169	10
11	1.363	1.796	2.201	2.718	3.106	11
12	1.356	1.782	2.179	2.681	3.055	12
13	1.350	1.771	2.160	2.650	3.012	13
14	1.345	1.761	2.145	2.624	2.977	14
15	1.341	1.753	2.131	2.602	2.947	15

25/1/2009 نموذج الإجابة

Tanta University
Faculty of Engineering
Dept. of Elect. & Commun.

Digital Electronics in C.Systems.
3rd Year, TIME: 3 Hr.
Date: 25/ 1 / 2009

Answer the following questions:

Q1. i- Design a circuit for 6 bit even parity generator. Using a parity checker circuit, show how these bits and the generated parity are checked.
ii-What design changes are required to modify the system to handle odd parity ?

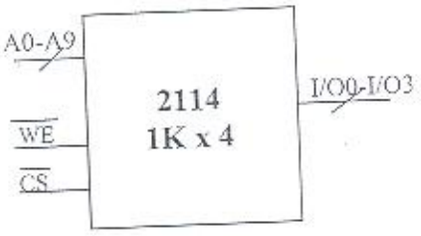
Q2. Using the suitable logic gates, draw a circuit diagram for:
i. MUX (8x1) ii. 2-to-4 line decoder circuit
iii. DEMUX (1x 8). Hence, write the required truth table for each.

Q3. Using minimum no. of the following ICs:
7490 (Decade counter) -7492 (Divide by 12 counter) – 7493 (4 bit binary counter) – 74192 (Decade counter) and any combinational logic gates needed.

Draw a circuit diagram to count *minutes* in a digital clock, and hence, explain how to modify it to count the *days of the month* as numbers.

Q4. i- Design the circuit diagrams for a 4 bit shift register, for parallel in serial out with asynchronous load.
ii- Repeat Your design for synchronous load.

Q5. a) Write short notes on the following:
i. Tristate devices
ii. Static &dynamic RAMs.
b) Design a 4K x 8 memory using 2114 RAM chips shown. Specify any additional ICs needed. *Also* determine the range of addresses for each chip.



Q6. a) Sketch the block diagram of a 6 bit DAC using R-2R resistor network.
b) If the accuracy of this DAC is ⅓ LSB, and its references voltage 12 volt.
- What is the o/p range that can expected, if the digital inputs is 111111
- Calculate its resolution. Suggest how to improve it.

Q7. a) Sketch the block diagram of the following:
- Successive approximation A/D converter and hence write its advantages over linear type.
- An 3 bit flash A/D converter, and state its limitations

b) A 12 bit dual-slope ADC utilizes a 1 MHz clock and has $|V_{ref}|$ =10V. Its analog input voltage is in the range from 0 to 10V. The fixed interval T_1 is the time taken for the counter to count the full 2^N counts. What is the time required to convert an input voltage equal to full scale value (i.e. V_A =10V)? If the peak voltage reached at the output of integrator is 10V, what is the integrator time constant? If through aging, R increases by 2% and C decreases by 1%. What does V_{peak} become? Does the conversion accuracy change?

Good Luck ,Prof. M. Nasr

Tanta University *Faculty of Engineering* *Physics & Mathematics Dept.* *Third Year Electrical Power* *Final First Term Exam*	*Engineering Mathematics (4)* *Code : PME3114* *Date : 22/1/2009* *Total Mark : 70* *Time Allowed: 3 Hours*

Answer the following questions:

[1] 15 Marks

(a) A certain item is manufactured by three factories, say A, B and C. It is known that A turns out twice as many items as B, and that B and C turn out the same number of items (during a specific production period). It is known that 8% of the items produced by A and B are defective, while 4% of those manufactured by C are defective, one item is chosen at random:
i) What is the probability that the chosen item is defective?
ii) If the chosen item was defective, what is the probability that it come from factory C?

(b) Three cards are drawn without replacement from a deck of 52 playing cards, what is the probability that they are all aces?

(c) The mean and variance of binomial distribution are 4 and 3 respectively; find $P(x \geq 1)$.

[2] 22 Marks

(a) Use the moment generating function to obtain the mean and variance of the random variable X whose density function is given by:

$$f(x) = \frac{1}{2}e^{-|x|}, \qquad -\infty < x < \infty$$

(b) If X is a random variable its density function is given by

$$f(x) = \begin{cases} kx(1-x), & 0 < x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

i) Find the value of k.
ii) Find the cumulative distribution function>
iii) Find $P(x<0.2)$

(c) Derive a formula for the mean, variance and moment generating function for the Poisson distribution.

[3] 15 Marks

(a) If $X \sim N(\mu, \sigma^2)$, such that $P(\mu - k\sigma \leq x \leq \mu + k\sigma) = 0.823$; find the value of k.

(b) The probability that a student pilot passes the written test for a private pilot license is 0.7; find the probability that the student will pass the test on the third try.

(c) The grads of a class of 9 students on a midterm examination (X) and on the final examination (Y) are as follows:

Midterm (X)	77	50	71	72	81	94	96	99	67
Final (Y)	82	66	78	34	47	85	99	99	68

i) Compute the correlation coefficient.
ii) Find the linear prediction equation.
iii) Estimate the final examination grade pf student who received a grade of 85 on the midterm examination.

[4]	(a) A machine is producing metal pieces that are cylindrical in shape , a sample of pieces is taken and the diameters are 1.01, 0.97, 1.03, 1.04, 0.99, 0.98, 0.99, 1.01, 1.03 centimeters, find a 95% confidence interval for the mean diameter of pieces from this machine. (b) All boxes of a certain type of coffee indicate that they contains 21 grams of coffee, a government agency receives many consumer complaints that the boxes contain less than 21 grams. To check the consumer complaints at the 5% level of significance, the government agency buys a sample of 100 boxes of this coffee and finds that the sample mean is 20.5 grams with a standard deviation of 2 grams. Should the government agency order the seller to put more coffee into its boxes? (c) If we have a finite population of five observations 3, 5, 7, 9, 11; find the sampling distribution of the mean if we draw a random sample of size 3.	18 Marks

Tanta University
Faculty of Engineering
Dept. of Electronics & Communication Eng
Subject: Neural Networks-(١) مقرر اختياري (3rd year)

Date: 20/1/2009
Time allowed: 180 Min.
Full Mark: 85 Mark
Final Term Exam (First Semester)

(ملحوظة هامة: الأسئلة في ورقتين)

Answer Only Five Questions

The First Question

(a) Biological neurons have a cell body, axons, dendrites and synapses.
   1- Draw a diagram and label these terms on it.
   2- Draw the Mathematical equivalent and label it.

(b) What are the properties of Artificial neural networks.

(c) A Fully connected feed forward network has 10 source nodes ,2 hidden layers, one with 4 neurons and the other with 3 neurons and single output neuron .construct an architectural graph of this network and specify labels for inputs, weights and output.

The Second Question

(a) The human brain has 10^{10} neurons, whereas a large computational model may have only 10,000. Give reasons why the difference in number may matter, and reasons why it may not.

(b) What is the difference between supervised and unsupervised learning in neural networks.

(c) Derive expressions for the weights and threshold of a Perceptron that computes the logical function NOR.

The Third Question

(a) What is the difference between Linearly Separable Patterns and Non-Linearly Separable Patterns.

(b) Single layer Perceptrons are limited in the class of input-output mappings they can perform. Identify that class, and give one simple example of a problem within that class, and one simple example from outside that class.

(c) Let us consider pattern classes C1 and C2, where C1: {(0,2), (0,1)} and C2: {(1,0), (1,1)}. Determine and obtain a decision surface based on perceptron learning. The 2-D graph for the above data is shown in Fig. 1.

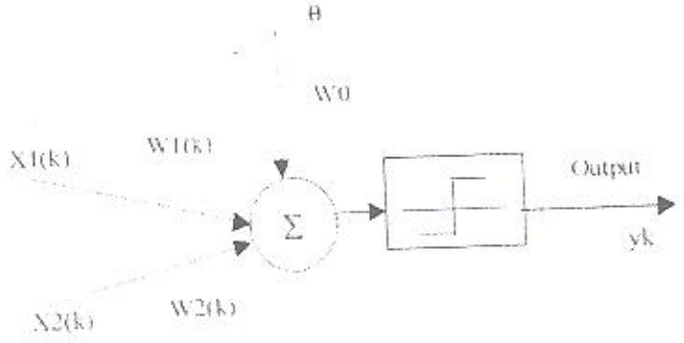


Fig. 1. Perceptron Structure.

The Fourth Question

(a) Explain what the following equation, and each symbol in it, represents:

$$\xi = \langle d_k^2 \rangle - \mathbf{w}^t \mathbf{R} \mathbf{w} - 2\mathbf{p}^t \mathbf{w}$$

(b) Show that the minimum value of the mean squared error can be written as

$$\xi_{min} = \langle d_k^2 \rangle - \mathbf{p}^t \mathbf{w}^*$$

(c) Write down the equation for the output of a McCulloch-Pitts neuron in terms of its two inputs, its connection weights and its threshold. Derive expressions for the weights and thresholds of a McCulloch-Pitts neuron that can compute the following input-output mappings:

in1	*in2*	*out*
0	0	1
0	1	1
1	0	1
1	1	0

State in words what values the weights and thresholds can take, and provide an example of particular values.

The Fifth Question

(a) Compare between Adaline and Madaline.

(b) Given examples, (x_1, d_1), (x_2, d_2),..., (x_L, d_L), of some processing function that associates input vectors, x_k, with the desired output values, d_k. Derive an expression for the best weight vector, w* (optimum weight vector) using LMS, for an ALC that performs this mapping.

(c) Suppose the use of the MRI algorithm to train a MADALINE to solve the XOR problem as shown in Fig. 2. The training patterns are:

x_1	x_2	t
1	1	−1
1	−1	1
−1	1	1
−1	−1	−1

The initial weights and biases are selected as shown below

Weights into Z_1			Weights into Z_2			Weights into Y		
w_{11}	w_{21}	b_1	w_{12}	w_{22}	b_2	v_1	v_2	b_3
.05	.2	.3	.1	.2	.15	.5	.5	.5

The learning rate is 0.5.

1- Show the computations for the first weight updates.
2- Show that the network solves XOR problem.
3- Draw the decision boundaries for hidden layer constructed by the network.

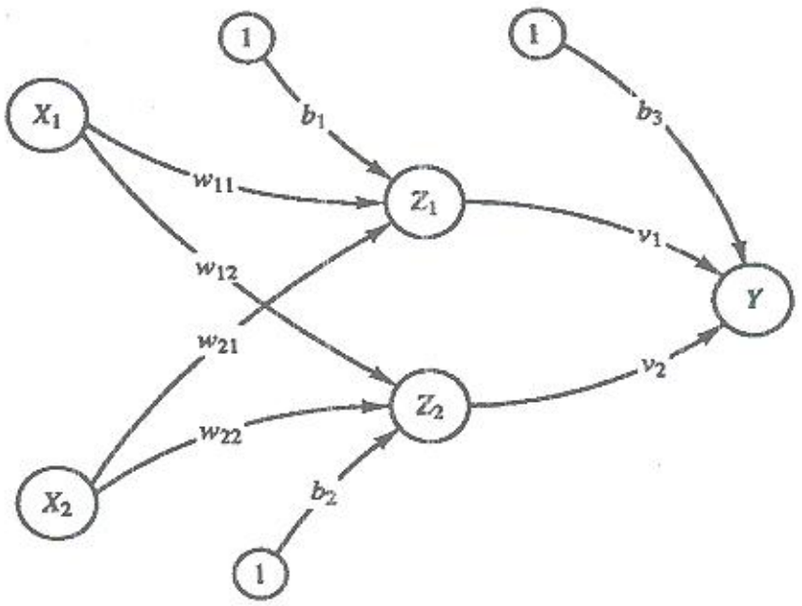


Fig. 2. MADALINE with two hidden ADALINES and one output ADALINE.

With my best wishes