٣-١ اتصالات

جامعة طنطا – كلية الهندسة
قسم هندسة الحاسبات والتحكم الآلي
امتحان الفصل الدراسي الأول للعام الجامعي2019/2018

الفرقة الثالثة قسم هندسة الاتصالات
المادة : شبكات عصبية الدرجة 85
الزمن : 3 ساعات يناير 2019

Answer the following questions:

Q(1) The neural network has the two input neurons N_1 and N_2 receiving two inputs x_1 and x_2, respectively, two hidden neurons N_3 and N_4, and one output neuron N_5. All neurons of the hidden and output layers produce binary threshold signals. The weight values are:

$w_{13} = -1$, $w_{23} = 1$, $w_{03} = -0.6$

$w_{14} = 1$, $w_{24} = -1$, $w_{04} = -0.5$

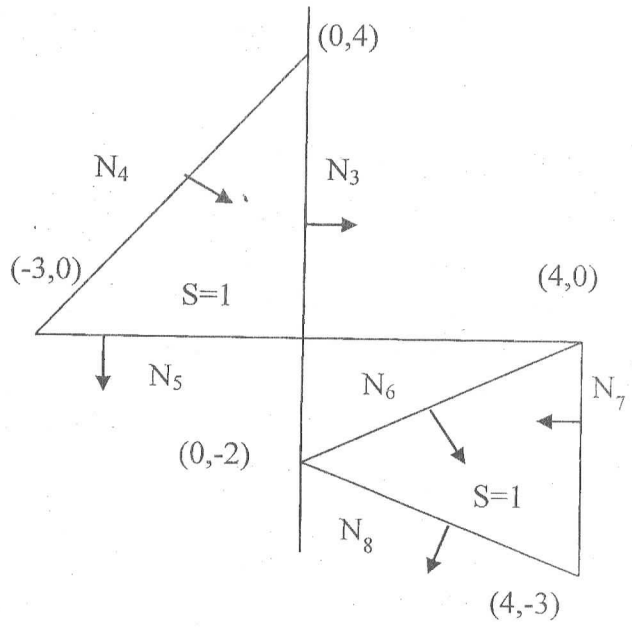
$w_{35} = 1$, $w_{45} = 1$, $w_{05} = -0.4$

(a) Draw the network and show that it can behave as a two-class data classifier through implementation of logic XOR function. (5 Marks)

(b) Determine the equations of the separation lines. (8 Marks)

(c) How will the network classify the input data patterns (-1, 1)and (0.5 , 0.7)? (4 Marks)

Q(2): Consider the neural network with input data pattern (x_1,x_2) and an output signal s. All neurons of the hidden and output layers produce binary threshold signals.



a) Define and draw the network which produces the given figure. (3 Marks)

b) Find the various weights of your network such that it behaves as a two-class data classifier such that the absolute value of largest weight should equal 1 (12 Marks)

c) Check your network by the input patters (1,-1) and (-1,1). (5 Marks)

Q(3): a) Write short notes about the learning algorithms . (8 Marks)

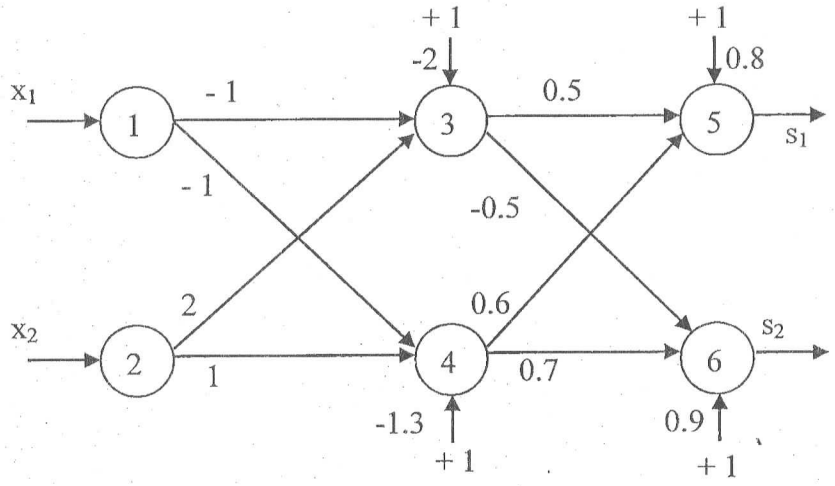
b) Assume the network consists of one neuron . Perform two training steps of the network using the delta learning rule for $\lambda=1$, $c=0.25$. Train the network using the following data pairs. $x_1 = \begin{bmatrix} 2 \\ -1 \\ -1 \end{bmatrix}$, $x_2 = \begin{bmatrix} -1 \\ 2 \\ -1 \end{bmatrix}$ and the initial weight vector is $w = [1 \quad 0 \quad 1]^T$ and derived responses are $d_1 = -1, d_2 = 1$. (8 Marks)

Q(4): Use the Hebb rule (outer products) to store the vectors (1,1,1,1) and (1,1,-1,-1) in an autoassociative neural net.

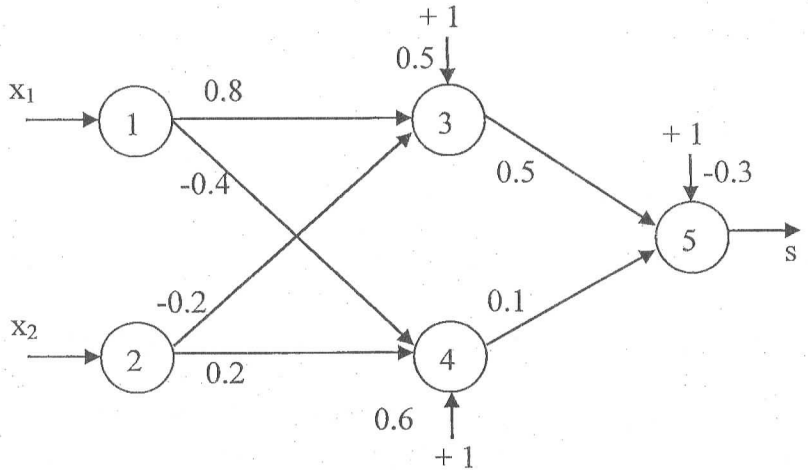
a) Find the weight matrix. (Do not set diagonal terms to zero.) (5 Marks)

b) Test the net, using (1,1,1,0) and (1,0,1,0) as inputs; discuss (5 Marks)

Q(5): Consider a three layer neural network. It has the two input neurons N_1 and N_2 receiving two inputs x_1 and x_2, respectively, two hidden neurons N_3 and N_4, and two output neurons N_5 and N_6. The Neurons N_3 and N_4 employ bipolar sigmoidal functions while output neurons N_5 and N_6 employs binary sigmoidal function. If the outputs are measured as $s_1 = 0.75$ and $s_2 = 0.58$. Find the values of the inputs x_1 and x_2. (12 Marks)



Q(6): Find new weights through back propagation from the network shown.
Input pattern is (-1,1) and target output is 1. Using the learning rate 0.25 and bipolar sigmoidal activation function. (10 Marks)



الدقة في الأرقام 4 أرقام عشرية.

$$\left(f(y)=\frac{2}{1+e^{-y}}-1 \text{ and } f'(y)=\frac{1}{2}(1-o^2)\right)$$

٣ اتصالات

Tanta University

Department: Electronics and Communication Engineering
Total Marks: (90) Marks

Faculty of Engineering

Course: Digital Electronics in Comm Systems	**Code:** EEC 3111	**Year:** 1st Semester 2018-2019
Date: 9/1/2019 (**Final Exam**)	**Time:** 3 hours	**No of Pages:** (3) pages

Remarks: Answer **All** of the following Questions.

Question # 1: (15) Marks

(a) (**5 Marks**) State the advantages and disadvantages of using digital integrated circuits (ICs).
(b) (**4 Marks**) Describe the differences between current sinking and current sourcing.
(c) (**6 Marks**) For the shown circuits in Fig. 1, analyze it to find the logic gates it implement. What is the logic family of this circuits?

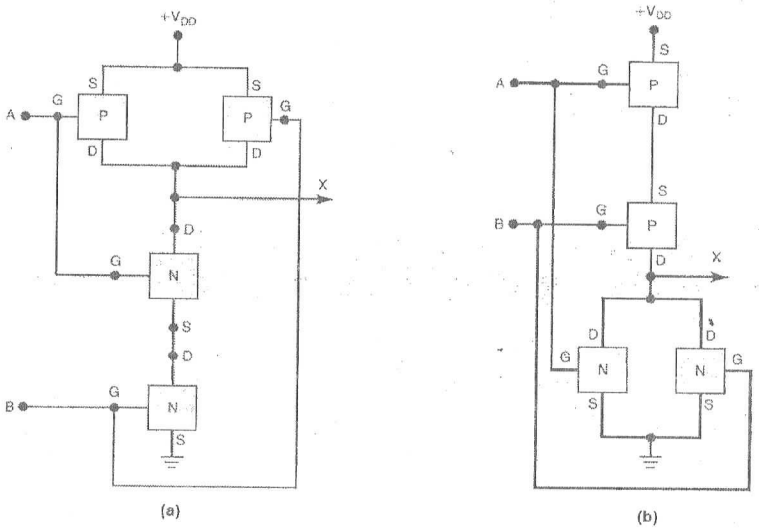


Figure 1: Question 1 (c)

Question # 2: (15) Marks

(a) (**3 Marks**) For each item, indicate whether it is referring to a decoder, an encoder, a MUX, or a DEMUX:-
(i) Often has driver-type outputs to handle large I and V.
(ii) Only one of its outputs can be active at one time.
(iii) Is used to convert key actuations to a binary code.
(iv) Can be used to route an input signal to one of several possible outputs.
(v) Has more inputs than outputs.
(vi) Uses select inputs.

(b) (**6 Marks**) What is a DEMUX and how it differ from a decoder? Can a decoder be used as a DEMUX? If yes, from where do we get the required input line?
(c) (**6 Marks**) Design a 1-to-8 decoder using **INVERTER** and a **two** 1-to-4 decoders with enable input.

Question # 3: (15) Marks

(a) (**5 Marks**) Draw the circuit diagram of the SR latch using **NAND** gates indicating its truth table. Then, show how can you convert SR latch to JK flip-flop.
(b) (**4 Marks**) An edge-triggered D flip-flop can be made to operate in the toggle mode by connecting it as shown in Fig. 2. Assume that Q=0 initially, and deteremine the Q waveform.

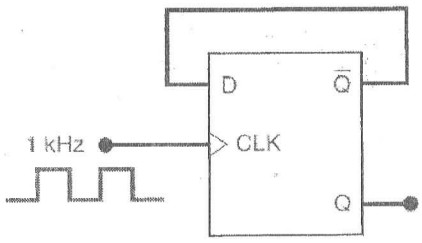


Figure 2: Question 3 (b)

(c) (**6 Marks**) A retriggerable OS can be used as a pulse-frequency detector that detects when the frequency of a pulse input is below a predetermined value. A simple example of this application is shown in Fig. 3.The operation begins by momentarily closing switch SW1.
(i) Describe how the circuit responds to input frequencies above 1kHz.
(ii) Describe how the circuit responds to input frequencies below 1kHz.
(iii) How would you modify the circuit to detect when the input frequency drops below 50 kHz?

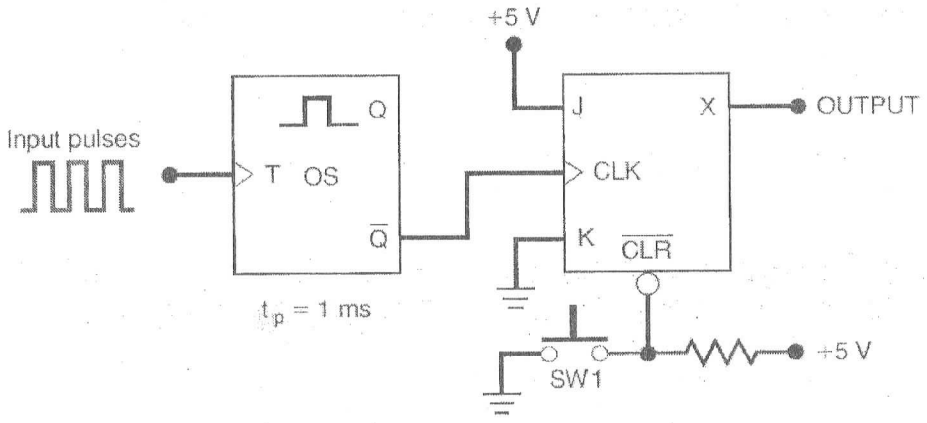


Figure 3: Question 3 (c)

Question # 4: (15) Marks

(a) (4 Marks) Design a MOD-4 ripple counter that counts in the sequence 3, 4, 5, 6, 3, ... and so on.
(b) (6 Marks) Design a 3-bit synchronous counter that counts as 000, 010, 100, 110, 111, 000,... using a D-type flip-flop. Ensure that the unused states of 001, 011, and 101 go to 000 on the next CLK pulse.
(c) (5 Marks) Design a 4-bit **Johnson** counter and draw its timing diagram for a period of 8 CLK pulses. If the counting sequence is to be reduced from 8 to 7 by the omission of the 1111 state, determine the modification of the feed back logic that is required.

Question # 5: (15) Marks

(a) (5 Marks) Determine the frequency of the pulses at points x, y, and z in the circuit of Fig. 4

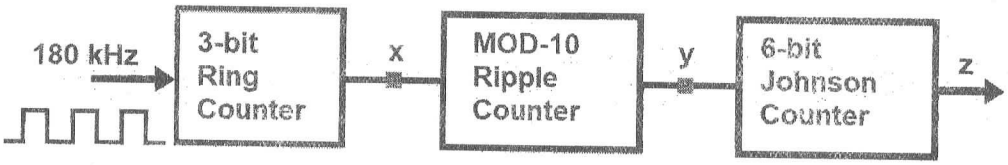


Figure 4: Question 5 (a)

(b) (6 Marks) Design a 4-bit Parallel-In Serial-Out shift register.
(c) (4 Marks) An 8-bit SISO shift register is clocked at 100 kHz. How long will the data be delayed in passing through this register?

Question # 6: (15) Marks

(a) (5 Marks) What is the largest value of output voltage from an 8-bit DAC that produces 3.55 V for a digital input of 10110110? Determine the resolution and % resolution of this DAC? Determine V_{OUT} for a digital input of 11110000.
(b) (5 Marks) Briefly explain the advantage of using R/2R ladder DAC over simple DAC using op-amp summing amplifier with binary weighted resistors?
(c) (5 Marks) Design a 3-bit flash ADC with reference voltage 15 V mentioning its advantage and disadvantages.

Good Luck

Dr. Hussein E. Seleem (Course Coordinator)

Tanta University	Department of Electronics and Electrical Communication Engineering	Faculty of Engineering
Course Title: **Optical Electronics** Date: **Sat.,12-Jan.-2019,**	Course Code: EEC3112, Time Allowed: **3 hours,** Total Marks: **100** **Final Exam**	Students: **3rd year.** No. of Pages: **2**

Remarks: (answer the following questions… assume any missing data … arrange your answer booklet … Use graphs and examples whenever you have a chance during your answer)

Question 1: (20 Marks)

a- Calculate the number of modes for $50/125$ graded index with $g = 1.5, \Delta = 1.55\%, n_1 = 1.445.$ at the operating wavelengths of 1550. Calculate the number of modes under the same conditions for a step index fiber.

b- Draw the refractive index profiles for dispersion shifted fibers. What are the advantages of shifted fibers?

c- Consider a $50/125$ multimode fiber win $n_1 = 1.48$ and $\Delta = 1.55\%$. If the light wavelength $\lambda = 1330\ nm$, Find:

i. The modal dispersion in units of $ns.km^{-1}$ using an exact expression for a SI MM fiber.

ii. The modal dispersion in units of $ns.km^{-1}$ if this fiber is a GI MM at g_{opt} , $g = 1.55$.

iii. If the fiber length is $50\ km$, what will the bandwidth for the fibers described in (i), (ii) if other sources of dispersion are negligible?

Question 2: (20 Marks)

a- With the aid of sketches, compare between optical fiber joining loss mechanisms.

b- Consider the two fibers with the properties given in the table shown:

i. Assume perfect alignment and calculate the splicing loss for the light in the two ways (from fiber 1 to fiber 2 and from fiber 2 to fiber 1)

ii. If a joint between *Fiber 1* and *Fiber 1* suffers from lateral shift, $d = 5\ \mu m$ and longitudinal shift, $s = 12\ \mu m$, Calculate the loss.

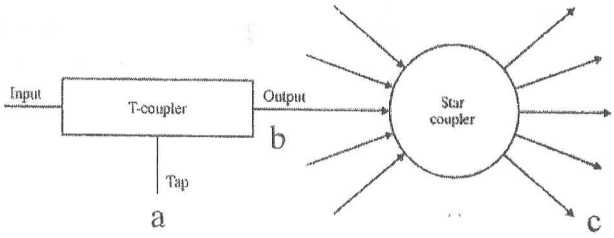
iii. If a joint between *Fiber 1* and *Fiber 2* suffers from lateral shift, $d = 6\ \mu m$ and longitudinal shift, $s = 10\ \mu m$, Calculate the total loss.

Parameter	*Fiber 1*	*Fiber 2*
n_1	1.4	1.3
Δ	1.1%	1.3%
Dimensions	62.5/125	50/125
g	∞	1.0

Question 3: (20 Marks)

a- Compare the two methods for splicing fibers.

b- In the figure, Find the output optical power in dBm at the outputs a, b, c. The input power to the star coupler is 50 dBm. The star coupler has excess loss of 1 dB. The T couplers has power division ratio as $Output/Tap = 85/15$

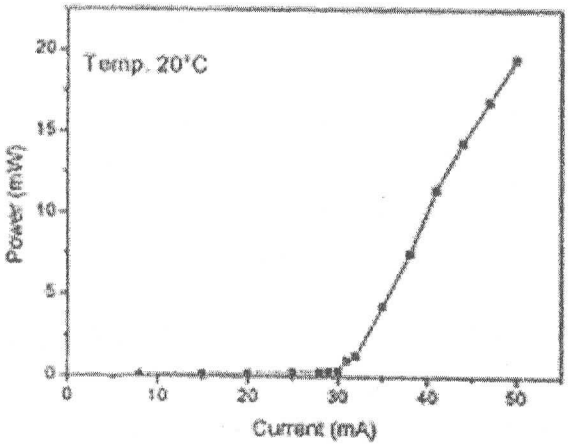


Question 4: *(20 Marks)*

a- Using sketches, briefly explain the structure and operation of Fabry-Perot Laser resonator.

b- Using sketches, briefly compare between the internal and external light signal modulation techniques.

c- A Laser Diode source has characterized as shown in the following figure. If the digital signal changes the diode current form 10 mA to 40 mA and vice versa, and $\tau_{sp} = 3.22 \times 10^{-8}\ sec.$, find the turn on delay. Sketch the input step signal and the resulting output light signal intensity



Question 5: *(20 Marks)*

a- A detector receives a 1500 μm light signal and produces 120 μA of output current for a 700 μW input light beam. Find the responsivity of the detector and its quantum efficiency. ($h = 6.63 \times 10^{-34}\ J.s,\ q = 1.6 \times 10^{-16}\ C,\ c = 3 \times 10^{8}\ m/s$).

b- An optical communication link has the following characteristics:
LED power = 100 mW. LED to fiber loss = 1.3 dB. Modulator insertion loss = 0.53 dB. Fiber loss per km = 0.05 dB/km. Fiber length = 120 km (composed of 20 segments). Connector loss= 1 $dB/connector$. Fiber to detector loss = 1 dB . Receiver sensitivity = – 20 dBm.

i. Does this configuration can deliver the signal to the receiver?

ii. If not, what can you add to recover this connection capability for communicating data?

The end of questions

Use only black or blue pens or pencils in your answer
Do not make any mark in your booklet
Answer only the required questions (Extra answers will not be considered)

Good luck
Dr. Sameh A. Napoleon (Coordinator of the Course)

كلية إتصالات
٢٠١٩/١/٢٣

Tanta University — Department: Prod Engineering and Mech Design Dept — Faculty of Engineering
Total Marks: 40 Marks

Course Title: *Management and Marketing*	Course Code: *EEC31H4*	Year: *3rd EEC Students*
Date: *23- 01-2019 [Final Exam]*	Allowed time: *2 Hrs*	No.of Pages: *(2)*

Answer All The Following Questions By Illustrating Your Answers With Neat Sketches (As You Can):-
(Five Questions…Every Question Carries"8" Marks)

Question (1):- *(8 Marks = 2 + 6)*

(a) When the minimum-cost batch size is produced, it is known that the variable costs constitute 25% of the total production costs. If "Q_m" is increased by 20%,what increase in production costs can expected?

(b) It is required to establish the production range for the following data:-

set up costs.....= L.E. 1000
carrying charges factor.....= L.E. 0.25×10^{-3} / unit / day
constant cost per piece.....= L.E. 2
allowable increase in costs per piece.....= 2.5%

Question (2):- *[8 Marks=1.5+1.5+5]*

(a) Define: Management – Maintenance – Marketing – Production Range – BEP

(b) Prove that: $\xi = (p-1)/(0.5u + 1)$.

(c) Operating expenses and revenue for a manufacturing plant approximately by the following relationships:-

Revenue $= 100Q - 0.001Q^2$ L.E.
Total costs $= 0.005Q^2 + 4Q + 200000$ L.E.

Required: (a) What is the output for maximum profit?.
(b) What is the quantity at maximum profit?.
(c) What is the output at the BEP?.
(d) What is the marginal revenue?.
(e) What is the marginal costs?.

Question (3):- *(8 Marks)*

A company is considering the advantages of automating a part of their production line.The company' s financial statement is shown below:-

Total sales	*= L.E. 40000000*
Direct labor	*= L.E. 12000000*
Indirect labor	*= L.E. 2000000*
Direct material	*= L.E. 8000000*
Depreciation	*= L.E. 1000000*
Taxes	*= L.E. 500000*
Insurance	*= L.E. 400000*
Sales cost	*= L.E. 1500000*

The above report is based on the production and sales of 100000 units. The production manager believes that with an additional investment of L.E. 5000000 he can reduce variable costs by 30%. The same production volume would be maintained. Using of five-years, straight-line depreciation (that is L.E. 1000000 per year), construct a break-even chart.
If the company inserts an a 20% return on its investments, should they automate?.

Question (4):- *[8 Marks= 1.5+1.5+5]*

(a) Prove that the production range: $Q_{I,II} = Q_m[p + \sqrt{p^2-1}]$.

(b) In the minimum-cost batch size, prove that: $Q_m = \sqrt{2a_cS/[I(1+y) + 2B]}$.

P.T.O.→ (2)

(c) A certain area can be irrigated by piping water from a nearly river. Two competing insallations are being considered for which the following engineering and cost data apply:-

	6" system	8" system
Size motor required	*25*	*10*
Energy cost per hour of operation	*$0.22*	*$0.07*
Cost of pipe and fitting	*$2050*	*$2640*
Salvage value at end of 10 years	*$80*	*$100*
Cost of motor installed	*$360*	*$160*

On the basis of a 10 year life with an interest rate of 12%, determine the number of hours of operation per year for which the 2 systems will breakeven,[n, hours]. { Note: (A/p 12,10) =0.1770 }.

<u>Question (5)</u>:- (8 Marks = 4×2)

(a) Define and explain the break-even analysis with neat sketches..

(b) Explain and state types of costs and what do the costs to the firm consist of?..

(c) Explain briefly how can you construct the multiproduct profit-volume chart..

(d) Define the depreciation and classify the depreciation and what are importance of Depreciation and what are causes?..

The End of Examination Paper

Good Luck
And
Best Wishes

Examiner: Dr Eng: Alaa-Eldin A. El-Hammady..

Course Title: statistics analysis(85M) | PME 3115 | (3rd Communications)
Date:Jan.2019 | Time: 3 hour

Q(1) (28 M)

(a) From the following distribution of data

Age	0 -5	5-10	10-15	15-20	20-25	25-30	30-35
frequency	4	8	12	20	11	9	5

Find: (i)Mean by short cut method
(ii)Standard deviation by shortest method
(iii) Median for grouped data
(iv)Mode for grouped data

(b) The following table show 10 students according to achievements in both the laboratory and lectures of a course .

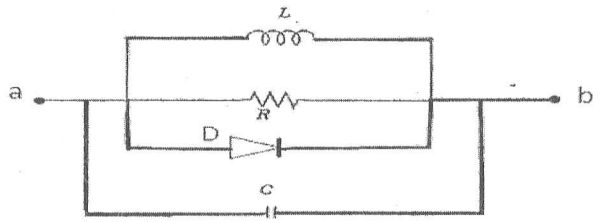
Laboratory(x)	8	3	9	2	7	10	4	6	1	5
Lecture (Y)	9	5	10	1	8	7	3	4	2	6
Lecture (z)	10	7	11	4	9	12	6	8	3	7

Find (i) r_{xy}, , r_{yz} (ii) Regression plane equation of X on Y and Z

(c) Prove $P(A \cup B \cup C)$=P(A)+P(B)+P(C)-P(A∩ B)- P(A ∩C)- P(B∩ C)+ P(A∩ B ∩C)

Q(2) (28M)

(a) In the following diagram, when we turned on Inductor L works with probability 0.8 , Capastor C works with probability 0.9 , Resistor works with probability 0.7 and Diade works with probability 0.6 . If it working properly current can flow through it when it is turned on



Let y be arandom variable represented the numbers of paths from a to b find (i) The cumulative distribution function
(ii) Expected number of paths,V(5y+6) and $M_{3y}(6t+4)$

(b) In certain assembly plant, three machines A, B, C make 50%, 20%and 30% respectively of the products.If 2%,6%,4% of products made by each machine, respectively are defective. If we select one item from finished product
(i)what the probability that it is defective and its numbers if total numbers 1000?
(ii)If the chosen item is defective what the probability that it is from A and its numbers ?
(iv)If we chose three items what the probability that the 3d is defective if the 1st is defective

(c) Consider $P(A-B)=0.3$, $P(B-A)=0.2$ and $P(A\cup B)=0.6$ find

(i) $P(A^c/B)$ (ii) $P(A^C/B^c)$

Q(1) (29M)

(a) Consider $f(x)=\begin{cases} kx+3 & -3\le x\le -2 \\ 3-kx & 2\le x\le 3 \\ 0 & \text{otherwise} \end{cases}$

(i)Find the value of k to make f(x) P.D.F and $p(-1\le x\le 1\ /\ 0\le x\le 5)$

(ii)Find accumulative distribution function F(x)

(ii)Find μ_r' and use it to find $E[(3x+5)^4]$ and V(4x+8)

(b) In a production of iron rods X is continuous random variable with normally distribution represent defectives in iron rods diameter with mean $\mu=2$ and standard deviation $\sigma=0.008$.

(i)what probability of defectives between tolerance limits 1.98 and2.02

(ii) what probability of defectives in at least 2.66 limit

(c) Deduce the form of

(i)Expectation E(x)

(ii) Variance V(x)

(iii) Moment generating $M_x(t)$

For geometric Distribution by used its probability mass function

With my best wishes

Dr: M.Shokry

٣ اتصالات

٢٠١٩/١/١٦

Electronics and Electrical Comm. Dept.
Total Marks: 90 Marks

Course Title: **Wave Propagation and Antennas (1)**	Course Code: EEC 3110	Year: 3rd
Date: Jan, 2019-1-16	Allowed Time: 3 Hours	No. of Pages: (2)

Answer the following questions:

Question (1) [18 marks]

(a) Draw the lumped element circuit model of a transmission line (T.L) and **derive** the expressions for voltage $V(z)$ and current $I(z)$ wave equations.

(b) Define the following terms:

1. Phase velocity.
2. Group velocity.
3. Characteristic impedance of a T.L.
4. Explain why the circuit theory is not suitable for solving microwave network problems.

Question (2) [18 marks]

(a) For a T.L of characteristic impedance $Z_o = 100\Omega$ terminated with a load Z_L, **only write down** the general expression for the T.L input impedance Z_{in}. **Then;**

1. Explain how to obtain pure real input impedance $Z_{in} = 83.333\Omega$.
2. The reflection coefficient at the load estimated in (1) and the corresponding VSWR.
3. Explain how to obtain pure inductance of $L = 4mH$ at $f = 300MHz$.
4. Explain how to obtain pure capacitance of $C = 20PF$ at $f = 1GHz$.
5. To obtain a pure inductance, explain how to select between a T.L terminated by open circuit or short circuit.

Question (3) [18 marks]

(a) For slotted line of characteristic impedance Z_o terminated with a load impedance Z_L, **derive an expression for** the phase θ of the reflection coefficient.

(b) A slotted line experiment is performed with the following results: the distance between successive minima is $2.1cm$, distance of first voltage minimum from the unknown load is $0.9cm$, the maximum measured voltage is $V_{max} = 7.5volt$ and the minimum measured voltage is $V_{min} = 2volt$, and the transmission line characteristic impedance is $Z_o = 50\Omega$ **determine**:

1. The operating frequency.
2. The terminal load impedance Z_L .

Question (4) [18 marks]

For air filled parallel plates wave guide operating in TM mode if the longitudinal electrical field component is given by;

$$E_z(x,y,z) = 10^{-5} \sin\left(\frac{n\pi}{d}\, y\right) e^{-j120\pi z} \quad V/m.$$

Course Title: **Wave Propagation and Antennas (1)** Course Code: EEC 3110 Year: 3rd
Date: Jan, 2019-1-16 Allowed Time: 3 Hours No. of Pages: (2)

1. Determine the phase constant β.
2. At $f = 300MHz$, determine plates separation distance $\boldsymbol{d}$ to operate at the dominant mode.
3. **Derive** the general expression for the average power P_o passing a transverse section of the parallel plate wave guide.
4. Calculate P_o of the dominant mode if the width of the plate is $\boldsymbol{W = 10\,d}$.
5. Explain why at $f < f_c$ the wave does not propagate along the wave guide.

Hint: ($\varepsilon_o = 8.85 \times 10^{-12}\ F/m, and\ \mu_o = 4\pi \times 10^{-7}\ H/m$)

Question (5) [18 marks]

(a) A Tiflon filled circular waveguide with radius a = 0.5cm. The Tiflon has $\varepsilon_r = 2.08$ and $\mu_r = 1$, and tangent loss of 0.0004. The inner walls are covered with gold with conductivity $\delta = 4.1 \times 10^7 S/m$. The longitudinal magnetic field component in the waveguide is given by:

$$H_z(\rho, \varphi, z, t) = 10^{-3}\ e^{-\alpha z} \sin(\varphi)\, J_1(368.2\,\rho) \cos(28\pi \times 10^9 t - \beta z) \quad A/m.$$

1. Determine the operating mode and its cutoff frequency.
2. The phase constant β, cutoff wave number k_c, and wave number k.
3. The dielectric loss α_d, conductor loss α_c, and total attenuation constant α in dB/m.
4. Determine the total attenuation in dB for a guide of length $50cm$.
5. Determine the phase velocity.
6. Determine the first three propagation modes and their cutoff frequencies. What is the required operating frequency to pass the third mode.
7. For explain why the general solution of $h_z(\rho, \varphi)$ is based on the Bessel function of first kind only.

	$\grave{P}_{nm}$		
n	$\grave{P}_{n1}$	$\grave{P}_{n2}$	$\grave{P}_{n3}$
0	3.832	7.016	10.174
1	1.841	5.331	8.536
2	3.054	6.706	9.970

Course Coordinator: Prof. Amr Hussein