



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / النجف



قسم هندسة تقنيات الاتصالات

المرحلة الثانية

أسئلة الفصل الأول للعام الدراسي

٢٠١٧-٢٠١٦

شعبة ضمان الجودة والإدارة الجامعية



- Note:1. Attempt only 10 questions. For each question 10 marks only.**
- 2. Support your answers with the required equations.**
 - 3. To complete the blanks you should derive or solve the problem before you fill the blanks.**
 - 4. Support your questions also by any drawing if it is necessary.**
 - 5. Questions number three and four should be answered.**

1. For vector W where $W = A+B$, and $A = 2i - k$, while $B = -j + 2k$, then vector $W = \dots\dots\dots$
(a) $W = 2i + k$, (b) $W = 2i - j + k$, (c) $W = -2i - k$.
2. What is the Divergence theorem? State it in details and give the most important relations that explain this theory.
3. Compute the electric field strength, if you know that it was generated from two point charges moved in free space with a velocity of $(0.2C)$ meter per second. The time required for the two charges to hit themselves is about 10 ns, and one of them is electron and the other is proton.
4. If you know that $[\vec{A} \times (\vec{B} \times \vec{C}) = \vec{B}(\vec{A} \cdot \vec{C}) - \vec{C}(\vec{A} \cdot \vec{B})]$ also, if you know that; $\vec{A} \cdot (\vec{B} \times \vec{C}) = \vec{B}(\vec{C} \cdot \vec{A}) = \vec{C}(\vec{A} \cdot \vec{B})$ this obtained using the ((bac-cab)) rule.
Now let $\vec{A} = 2a_x - a_z$, $\vec{B} = 2a_x - a_y + 2a_z$, and $\vec{C} = 2a_x - 3a_y + a_z$, compute all of the following:
a) $\vec{B} \cdot \vec{A} \times \vec{C}$, b) $\sin\theta_{BC}$
5. State the Gauss's Law in the integral form. Give a practical example for this form.
6. Prove that the connection between any two mobile phones is depends on end points not on the path way of the charged particles.
7. Assume there is a point charge moved from point 1 to point 2 then travelled to point 3 along straight line in vacuum. Assume also the electric field



generated at point 1 is 0.5 V/m, where the time required for the charged particle to arrive to this point is 0.05 msec. Compute the electric force generated at point 2, if the time required from the point charge is doubled. Where the charge is electron.

8. According to charge distribution principle, give the relations of the charge distribution on a conducting ball.

9. Two points (P located at (0,2,4) and Q located at (-3,1,5)) compute the distance between P and Q.

10. What is the meaning of curl theorem? Give the curl relation in three polar coordinate system.

11. What is the inverse square law? Also what is the gravitational constant and when and where it used? Also what is the permittivity constant?

12. Derive and relation to show the Stocke's theorem. Then explain in details the unit vector cross product properties.

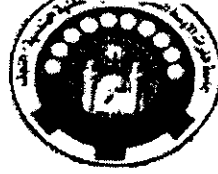
Good Luck for All Students

18/01/2017

رئيس القسم
ليث وجيه عبدالله



مدرس المادة
حسام نعمان الانصاري



اسئلة امتحان الفصل الاول 2016-2017

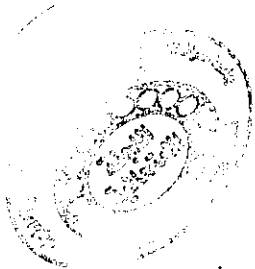
Answer all questions

Q1: Select the correct choice for the following statements: (Answer 5 only) (20 degree)

1. Assume txtName is a textbox control, which of the following is a valid assignment statement?
A. txtName = 'Jones' B. . txtName.Caption = 'Jones'
C. txtName.Text = "Jones" D. . txtName.Text = 'Jones'
2. How do we declare a variable?
A. Using Integer command B. Using DIM command
C. Using A and B command in the Public Class D. using private sub
3. Creates a box that can be used to retrieve one piece of information from a user.
A. MSGBOX B. INPUTBOX C. Dialog Box D. Label
4. What is the purpose of the Toolbox?
A. To select controls with associated event procedures B. To select controls and place on an application form
C. To select methods to be placed on the form D. To design user defined methods
5. Which of the following is NOT a Visual Basic Control?
A. Textbox B. Label C. Form D. Algorithm
6. What is the code used to display the words "Visual Basic" in a label named lblTitle?
A. titleLabel.Name. Visual Basic B. "Visual Basic" = lblLabel.Text
C. lblTitle.Text = "Visual Basic" D. lblTitle.Name = "Visual Basic"

Q2: Complet the following codes to be executed correctly: (30 degree)

1. Me.controlbox =
2. Textbox2.multiline=
3. Textbox5.passwordchar=
4. Label.visible=
5. Button2.width=
6. me.autoscroll=
7. me.minimumsize.height=
8. label.width=
9. textbox7.scrollbars=
10. textbox3.maxlength=



19/01/2017
رئيس قسم ه.ت. ا. الكليات
لبن و عبد الله



اسئلة امتحان الفصل الاول 2016-2017

Q3.A: Give the correct representation in visual basic for the following equations: (15 degree)

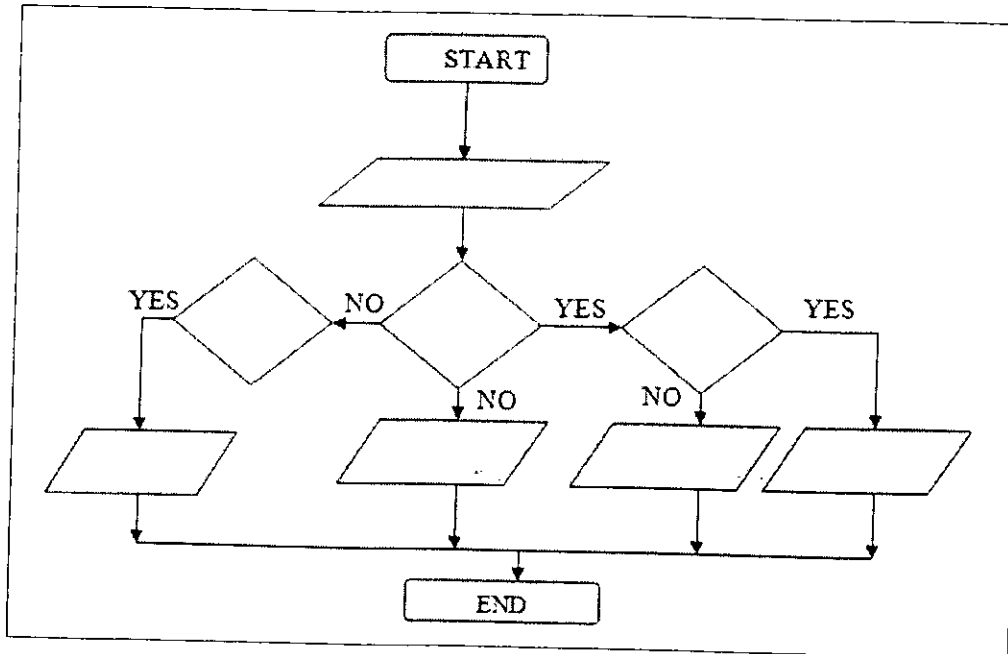
1. $\cos(t^2) - \sin(t^2)$.
2. $e^t (1 + \cos(3t))$.
3. $|89 - 233 - x^3|$

Q3.B: What will be the value of total after execution of these statements? (10 degree)

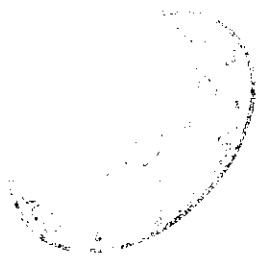
valueI= 2

total= ((valueI + 2) * (valueI+ 4)) / valueI + 1

Q4: Complete the flowchart to find the largest of three numbers A,B, and C from the following statement (25 degree)



1. PRINT B
2. IS B>C
3. IS A>C
4. READ A, B, C
5. PRINT C
6. PRINT A
7. IS A>B
8. PRINT C



القسم : هندسة تقنيات الاتصالات
المرحلة : الثانية
المادة: نظم الاتصالات/١
زمن الامتحان: ساعتان
التاريخ: ٢٠١٧/٠١/٢٢



جمهورية العراق
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الكلية التقنية الهندسية / نجف

أسئلة امتحان الفصل الأول للعام الدراسي ٢٠١٧/٢٠١٦

Note: Answer all questions

Q1/

A given amplifier has a 4-dB noise figure, a noise bandwidth of 500 kHz, and an input resistance of 50 Ω. Calculate the rms signal input which yields an output signal-to-noise ratio of unity when the amplifier is connected to a 50-Ω input at 290 K.

Boltzmann's constant $k = 1.38 \times 10^{-23} \text{ Joule / K}$ (20 marks)

Q2/

A. The rms antenna current of an AM transmitter increases by 15% over its unmodulated value, when sinusoidal modulation by 1 kHz signal is applied. Determine the modulation index. (15 marks)

B. A standard AM transmission, sinusoidally modulated to depth of 40%, produces sideband frequencies of 6.824 and 6.854 MHz. The amplitude of each sideband frequency is 50 V. Determine the amplitude and frequency of the carrier. (15 marks)

Q3/

A. Find the energy of signal

$$x(t) = A[u(t + a) - u(t - a)] \quad \text{for } a > 0 \quad (10 \text{ marks})$$

B. Prove that the convolution of a function $x(t)$ with an unit impulse function results the function itself. (10 marks)

Q4/

A. Draw the Quadrature Amplitude Modulation (QAM) system

(a) QAM transmitter (b) QAM receiver. (15 marks)

B. Show that if $\mathcal{F}\{x(t)\} = X(\omega)$, then:

$$\mathcal{F}\left\{\frac{dx(t)}{dt}\right\} = j\omega X(\omega) \quad (15 \text{ marks})$$

22/01/2017

رئيس القسم: ليث وجيه عبد الله

مدرس المادة: أحمد حسن هادي

القسم : هندسة تقنيات الاتصالات
المرحلة : الثانية
المادة : تكملة كهربائية
زمن الامتحان : ساعتان
التاريخ : 2017/ 01/23



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
هيئة التعليم التقني
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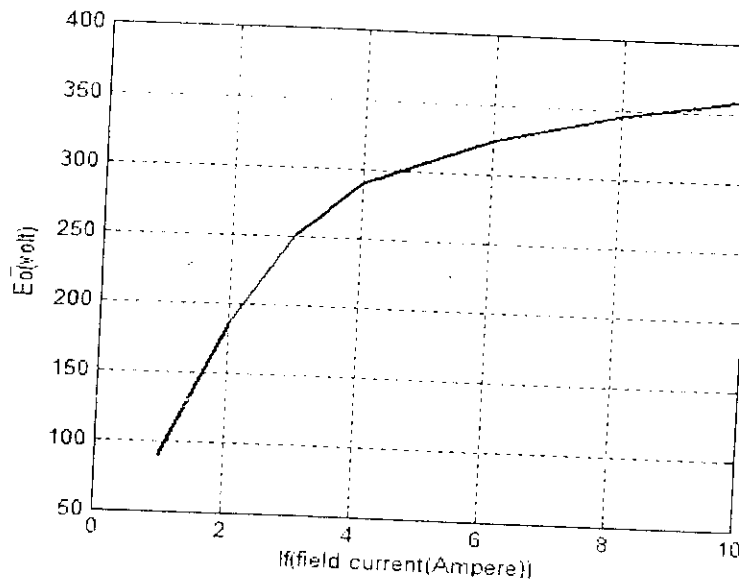
امتحان الفصل الأول- العام الدراسي 2016/2017

Q1) on half -load a (300 V) series motor takes (60 A) and runs at (900 r.p.m) the armature resistance is (0.15 ohm) and the series winding resistance is (40 m ohm). Determine the speed when developing a half load torque but with a (0.2 ohm) diverter in parallel with the field winding, (assume that the flux is proportional to the field current). (25 pts)

Q2) A 200 V compound long motor draws a current of 30 A. The armature resistance is 0.2 ohm, the series and shunt field resistances are 0.13 and 50 ohm, respectively. Determine the maximum efficiency of the motor when the mechanical power loss is 30 watt, and the iron losses power is 20 watt. (25 pts)

Q3) Explain briefly the **Characteristic of series-wound generator**. (25)

Q4) A shunt generator has the following result in the O.C.C. test at a speed of (600 r.p.m), shown in figure below.



Determine:

- (i) The voltage to which it will excite on open circuit.
- (ii) The approximate value of the critical resistance of shunt circuit.
- (iii) The generated induced voltage (E_g) and armature current (I_a) for a load resistance of 6 ohm the armature and field resistance are 0.3 and 50 ohm, respectively.

(25 pts)

مع تمنياتي لكم بالنجاح والموفقية...

٢٠١٧/١/٢٢
رئيس القسم
ليث ربيع

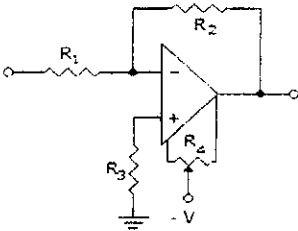
١/١٥
مدرس مادة الأستاذ المساعد الدكتور
حمد طه عبد السادة الجياشي



Answer All Questions

Q1/ Choose the correct answer with the solutions if need: (30 Marks)

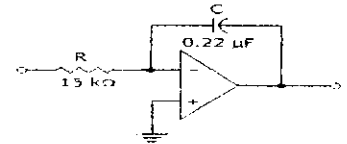
1. When a sinusoidal voltage wave is fed to a Schmitt trigger, the output will be _____
 A. triangular wave. B. asymmetric square wave. C. rectangular wave. D. trapezoidal wave.
 2. Refer to this figure. The purpose of R4 is _____



- A. for bias current compensation. B. for input offset voltage compensation.
 C. to set input impedance. D. to set input impedance and voltage gain.

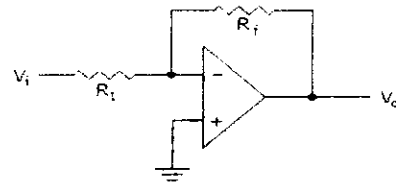
3. _____ is a head-to-tail arrangement of two or more op amp circuits.
 A. a Schmitt trigger. B. a cascade connection. C. a multivibrator. D. none of the above.
 4. Refer to the given figure. A square-wave input is applied to this amplifier. The output voltage is most likely to be _____
 A. a square wave. B. a sine wave.
 C. a triangle wave. D. no output.
 5. How many op-amps are required to implement this equation?

$$V_o = V_1$$



- A. 2 B. 3 C. 4 D. 1

6. If $R_f = R_1$, the voltage gain is _____.



- A. 1 B. -1 C. 10 D. very small

7. The differential gain is _____.
 A. very high B. very low C. about 100 D. dependent on input voltage
 8. Another name for a unity gain amplifier is _____
 A. difference amplifier B. comparator C. single ended D. voltage follower
 9. A certain non-inverting amplifier has R_i of 1 kΩ and R_f of 100 kΩ. The closed-loop voltage gain is _____
 A. 100,000 B. 1000 C. 100 D. 101
 10. The gain of an amplifier without feedback is known as _____ gain.
 A. resonant B. open loop C. closed loop D. none of the above

Q2/a) You have the following resistor values available: 1 kΩ; 5 kΩ; 10 kΩ and 20 kΩ Design the OP-amp circuit to have a voltage gain of -4. (10Marks)

b) Design an OP-AMP circuit to have an output $V_o = -(V_1 + 10V_2 + 100V_3)$. Given that $R_f = 100K\Omega$

(15 Marks)

Q3/a Figure (1) shows a non-inverting op-amp summer with $V_1=2V$ and $V_2=3V$. Determine the output voltage V_{out} .

b) Calculate the CMRR for the circuit measurements shown in Figures below.

(10 Marks)

(10 Marks)

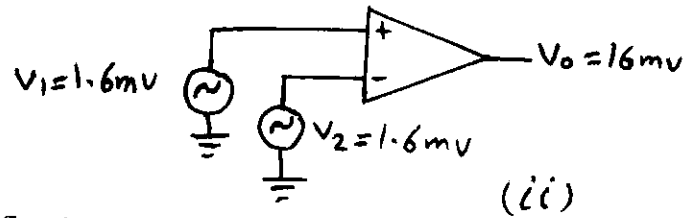
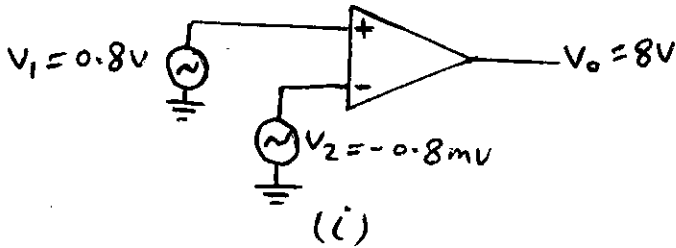


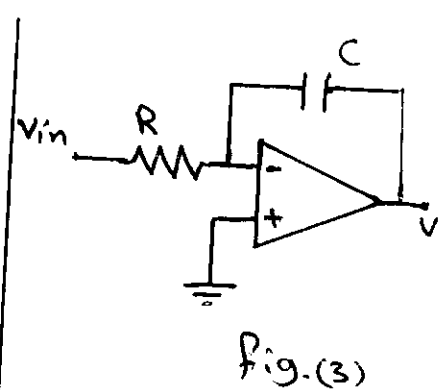
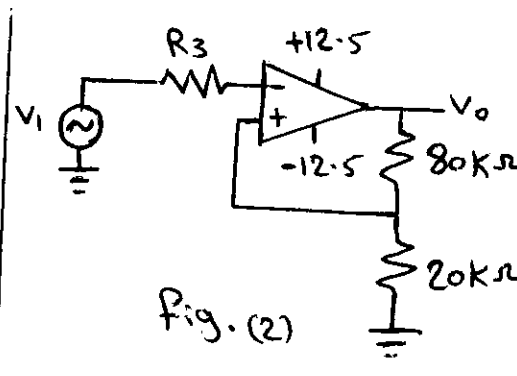
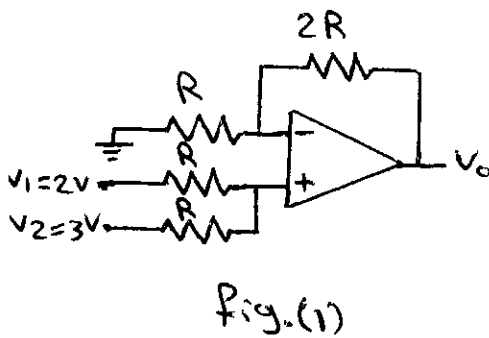
Fig. (i) shows the differential-mode operation whereas fig. (ii) shows the common-mode operation.

Q4/a Determine the threshold voltages (upper trip & lower trip voltages) and the hysteresis voltage of the Schmitt's trigger circuit shown in figure (2).

(15 Marks)

b) What the output voltage & voltage gain of the circuit shown in figure (3)?

(10 Marks)



GOOD LUCK

24/01/2017

H.of.D.

Laith Wajeeh



Ruaa

Assistant Lecturer

Ruaa Shallal Abbas

القسم : هندسة تقنيات الاتصالات
المرحلة : الثانيه
المادة: رياضيات ٢/
زمن الامتحان: ساعتان
التاريخ: 2017/ 01 / 26



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
هيئة التعليم التقني
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / نجف

امتحان الفصل الأول- العام الدراسي ٢٠١٦/٢٠١٧

Q1// Solve the following equations:(choose only four).

(40 marks)

1) $y^2 \frac{dy}{dx} = \cos^2 x$

2) $(1 + e^{x/y}) dx + \left(1 - \frac{x}{y}\right) e^{x/y} dy = 0$

3) $\frac{d^2 y}{dx^2} - \frac{dy}{dx} = x e^x$

4) $\frac{d^2 y}{dx^2} - \frac{dy}{dx} = -8x + 3$

5) $(x^4 e^x - 2mxy^2) dx + 2mx^2 y dy = 0$

Q2// 1// Find Taylors series for $y' = 2y + 3e^x$, $y(0)=0$.

(30 marks)

2// Find Maclaurin series for $y' = \frac{1}{(1-x)^2}$, given $y(0)=1$.

Q3//1// Find a fourier series to represent x^2 in the interval $(-1,1)$.

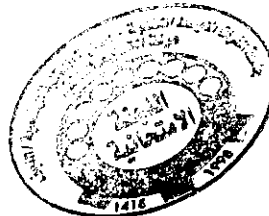
(30 marks)

2// Find the fourier series for $f(x) = \begin{cases} 1 : 0 < x < \pi \\ -1 : -\pi < x < 0 \end{cases}$.

Good Luck

26/01/2017

رئيس القسم
ليث وجيه عبدالله



مدرس المادة
رسل عاشور جواد

القسم : هندسة تقنيات الاتصالات
المرحلة : الثانية
المادة: نظرية المعلومات
زمن الامتحان: ساعتان
التاريخ: 2017/ 01/ 27



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
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إمتحان الفصل الأول- العام الدراسي 2016/2017

Answer all questions

Q1:A:- Design a linear block code with a minimum distance of three and a message block size of eight bits. In this (n,k) code satisfies the inequality: $(n - k) \geq \log_2(n + 1)$
Hint: the first eight rows of H^T are arbitrarily chosen. With the restriction that no row is identical zero and all rows are distinct. **(15 MARKS)**

Q1:B:- Given $P(A) = 1/4$, $P(B) = 1/3$ and $P(A \cup B) = 1/2$, evaluate $P(A/B)$, $P(B/A)$, $P(A \cap B)$ and $P(A/B)$ **(10 MARKS)**

Q2:- ADMS X has five equally probability likely symbols **(25 MARKS)**

- Construct a Shannon-fanon code for X , and calculate the efficiency of the code.
- Repeat for the Huffman code and compare the results.
- Show that the Kraft inequality is satisfied by the codes.

Q3:- Consider the simultaneous rolled of two dies X and Y . **(25 MARKS)**

Find:

- $H(X,Y)$
- $H(X)$
- $H(Y)$
- Conditional entropies.

Q4:A:- Calculate the information rate of a telegraph source having two symbols : dot and dash. The dot duration is 0.2 sec. The dash is twice as long as the dot and half as probable. **(15 MARKS)**

Q4:B:- Draw block diagram of a decoder for (n,k) linear block code. **(10 MARKS)**

29/01/2017

HoD:
Laith Wajeed


Lecturer:

Hawraa Fadhil Al-Haboobi



القسم: قسم هندسة تقنيات الاتصالات
المرحلة: الثانية
المادة: تطبيقات رقمية
وقت الامتحان: ساعتان
التاريخ: 2017/01/31

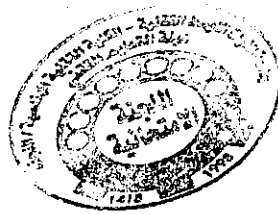


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جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية نجف

امتحان الفصل الاول للعام الدراسي 2016 - 2017

Q1. A) Multiple Choice Questions: (20 Marks)

1. If an S-R latch has a 1 on the S input and a 0 on the R input and then the S input goes to 0, the latch will be
(A) set (B) invalid (C) reset (D) clear
2. A J-K flip-flop with $J = 1$ and $K = 1$ has a 10 kHz clock input. The Q output is
(A) constantly HIGH (B) constantly LOW
(C) a 10 kHz square (D) a 5 kHz square wave
3. A 4-bit binary counter has a maximum modulus of
(A) 16 (B) 32 (C) 8 (D) 4
4. Which of the following is an invalid state in an 8421 BCD counter?
(A) 1100 (B) 0010 (C) 0101 (D) 1000
5. The terminal count of a modulus-31 binary counter is
(A) 11111 (B) 11110 (C) 00000 (D) 11101
6. With a 100 kHz clock frequency, eight bits can be serially entered into a shift register in
(A) 80 μ s (B) 8 μ s (C) 80 ms (D) 10 μ s
7. A modulus- 10 Johnson counter requires
(A) 10 flip-flops (B) 20 flip-flops (C) 5 flip-flops (D) 12 flip-flops
8. When an 8-bit serial in/serial out shift register is used for a 24 μ s time delay, the clock frequency must be
(A) 41.67 kHz (B) 333 kHz (C) 125 kHz (D) 8 MHz
9. A 4-bit ripple counter consists of flip-flops that each have a propagation delay from clock to Q output of 20 ns. For the counter to recycle from 1111 to 0000, it takes a total of
(A) 20 ns (B) 40 ns (C) 60 ns (D) 80 ns
10. The group of bits 0111 is serially shifted (right-most bit first) into an 4-bit parallel output shift register with an initial state of 1110. After three clock pulses, the register contains.
(A) 1111 (B) 1110 (C) 0111 (D) 0000



Q2. A) Develop a synchronous 2-bit up/down counter. The counter should count up when an UP / \overline{DOWN} control input is 1 and count down when the control input is 0 using T Flip-Flops. **(15 Marks)**

Q2. B) Define **asynchronous** counters and design a Mod-9 **asynchronous** counter using J-K Flip-Flops. **(10 Marks)**

Q3. A) Define a Shift Register? What are its various types? Describe the operation one of them. **(15 Marks)**

Q3. B) Draw the logic diagram of 4-bit Twisted Johnson counter and explain its operation with the help of truth table. **(10 Marks)**

Q4. A) How to construct a 4x16 decoder using eight 1x2 decoders and one 3x8 decoder with enable? **(15 Marks)**

Q4. B) Implement the full subtractor function using a 3 line to 8 line decoder. **(15 Marks)**

31/01/2017

Head of dept.
Laith Wajeeh



1219

Examiner
Ali M. Alsaahly