(ii) Calculate the cavity length and the reflectivity at each mirror of a GaAS laser with λ= 0.95μm , refractive index = 3.5, Assume a mode spacing of 4 A°.

(b) (i) Derive an expression for a photocurrent as a function of drift velocity and the length of a Photoconductor.

(ii) A visible light spectrum extends in the range 370 nm - 770 nm . Determine the range of energy gap of the semiconductors material suitable for such a visible spectrum.

(h = 6.63 x 10^{-34} J/s , c = 3 x 10^{8} m/s, e = 1.6 x 10^{-19} C).

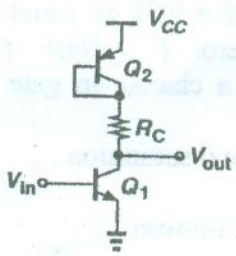


Fig.1

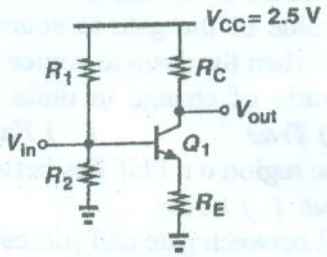


Fig.2

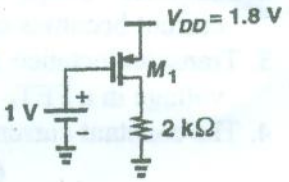


Fig.3

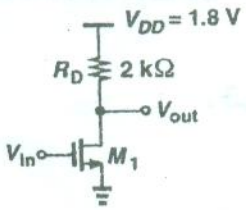


Fig.4

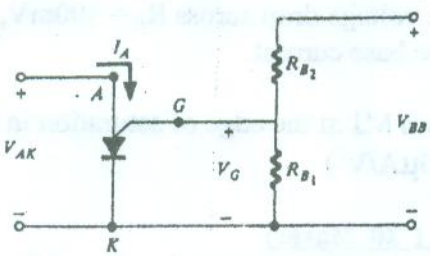


Fig.5

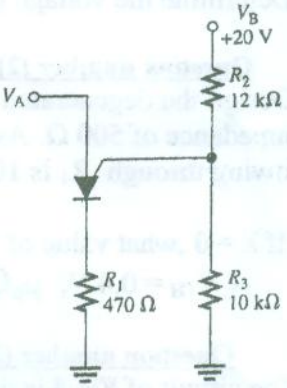


Fig.6

Good Luck

Course Coordinator: Prof. Mustafa Mahmoud Abd Elnaby

Tanta University

Department: Electronics & Comm. Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Electronics (2)	Course Code: EEC1202	Year: First Year
Date: June 2011 (Second term)	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: (answer the following questions… assume any missing data… answers should be supported by sketches…etc)

Question number (1) **(15 Marks)**

(a) ***Choose the right answer:***

1. A FET is a linear device because of the linear relation of I_D and V_{GS}. ***( ) True ( ) False***
2. Pinch-off voltage is the value of the gate to source voltage of a FET at which the drain current becomes constant when the drain to source voltage is zero. ***( ) True ( ) False***
3. Transconductance is the ratio of change in drain current for a change in gate to source voltage in a FET. ***( ) True ( ) False***
4. The constant current source region o a FET lies between cutoff and saturation . ***( ) True ( ) False***
5. There is a 180° phase shift between gate and source in a source follower. ***( ) True ( ) False***
6. For both good voltage gain and high input resistance , you must use a common drain amplifier ***( ) True ( ) False***

(b) Determine the voltage gain and I/O impedances of the circuit shown in **Fig.1**. Assume $V_A = \infty$

Question number (2) **(15 Marks)**

(a) Design the degenerated CE amplifier shown in **Fig.2** for a voltage gain of 5 and an output impedance of 500 Ω. Assume the voltage drop across $R_E = 300mV$, $V_T = 26$ mV, and the current flowing through R_1 is 10 times the base current.

(b) If $\lambda = 0$,what value of W/L places M1 at the edge of saturation in **Fig.3** .
($V_{TH} = 0.4$ V, $\mu_p C_{ox} = 100\mu A/V^2$)

Question number (3) **(20 Marks)**

(a) The circuit of **Fig.4** is designed with W/L= 20/0.18 , $\lambda = 0$, and $I_D = 0.25$ mA.
($V_{TH} = 0.4$ V, $\mu_n C_{ox} = 200\mu A/V^2$)

(i) Calculate the required gate bias voltage.
(ii) With such a gate voltage ,how much can W/L be increased while M1 remains in saturation?

(b) (i) Explain how to turn an SCR on and off.
(ii) Calculate the photocurrent generated in a photodiode if the junction area is 10^{-2} cm^2, and the incident photon flux is 5×10^{17} cm^{-2}-s^{-1} . Assume quantum efficiency is 1.

Question number (4) **(20 Marks)**

(a) (i) Explain the difference between PUT and a UJT. Discuss one application for each one.
(ii) For the circuit shown in **Fig.5** , Determine R_{B1} and V_{BB} for a PUT, if $V_P = 10.3$ V , $\eta = 0.8$, $V_{Pn} = 0.7$ V and $R_{B2} = 5k\Omega$

(b) (i) At what anode voltage V_A will the PUT in **Fig. 6** begin to conduct.
(ii) Draw the current waveform for the circuit when there is a 10V peak sinusoidal voltage at the anode. Neglect the forward voltage of the PUT

Question number (5) **(20 Marks)**

(a) (i) Explain the basic operation and structure of a semiconductor laser.

السؤال الثالث:

١. استخدم مصفوفة مكونة من سلاسل حرفية لكتابة برنامج لحساب المجموع الكلى للمبيعات الخاصة لشخص ما خلال أسبوع واحد وطباعة اسم الشخص و اليوم الذي حدثت فيه أكثر مبيعات.

٢. اكتب برنامجا لتحديد وطباعة اكبر قيمة واصغر قيمة من بين عدة قيم مدخلة مستخدما دالة فرعية لتحديد القيمة العظمى ودالة فرعية أخرى لتحديد القيمة الصغرى.

٣. اكتب برنامجا رئيسيا يستدعى دالة فرعية لإيجاد وطباعة اكبر عنصر في مصفوفة يتم إدخال قيمها عن طريق لوحة المفاتيح في البرنامج الرئيسي .

السؤال الرابع:

١. اكتب خوارزمية وارسم خريطة التسلسل واكتب برنامجا رئيسيا يستدعى دالة فرعية لترتيب مصفوفة تصاعديا والبرنامج الرئيسي يعطى قيما ابتدائية لمصفوفة أحاديه البعد بها ١٠ عناصر ويقوم البرنامج الرئيسي بطباعة هذه المصفوفة بترتيبها الاصلى وبعد ترتيبها تصاعديا يطبعها مره أخرى .

٢. اكتب برنامجا رئيسيا يستدعى دالة فرعية لإيجاد مجموع الأعداد الزوجية في مصفوفة ويتم إدخال قيم المصفوفة في البرنامج الرئيسي وتمرير قيم المصفوفة إلي الدالة بواسطة المؤشرات.

مع أطيب الأمنيات بالتوفيق د/السيد سلام

Course Title: **Programming 2** برمجة الحاسب٢ أولي كهرباء | Course Code: CCE1204 | 1st. year
Date: 23-6-2011 | Allowed time: 3 hrs | No. of Pages: (2)

أجب عن جميع الأسئلة الآتية بلغة سي ++ (C++):

السؤال الأول:

١. اكتب برنامجا لحساب العلاقة التالية:

$$x = 1^r + 2^r + 3^r + 4^r + \ldots\ldots + n^r$$

باستخدام دالة فرعية لحساب قيمة العلاقة السابقة ودالة أخري لطباعة النتائج ، ويتم إدخال عدد الحدود n وكذلك قيمة r بوساطة الدالة الرئيسية.

٢. اكتب برنامجا لحساب مجموع درجات طالب في ستة عشرة مقرر يتم إدخالها عن طريق لوحة المفاتيح ثم حساب النسبة المئوية لمجموع درجاته وطباعة تقرير باسم الطالب يفيد تقدير حالة النجاح ومجموع درجاته وتقديره مستخدما دالة لحساب المجموع والتقدير ودالة أخرى للطباعة علما بأن التقدير يحسب كالتالي :

النسبة المئوية	٨٥ - ١٠٠	٧٥ - ٨٤	٦٥ - ٧٤	٥٠ - ٦٤	٠ - ٤٩
التقدير	ممتاز Excellent	جيد جدا V.Good	جيد Good	مقبول Pass	راسب Fail

٣. اكتب برنامجا يستخدم الماكرو لإجراء العمليات الحسابية الأساسية الأربعة(الضرب والقسمة والجمع والطرح).

السؤال الثاني:

١. اكتب برنامجا لرسم شكل قطع ناقص يتم إدخال احداثيا مركزه وأنصاف أقطاره عن طريق لوحة المفاتيح ويتقلص القطع الناقص للداخل من الخارج حتى يصير نقطة ، علي أن يكون خط الرسم بلون ازرق(red) والخلفية بلون احمر(Blue) والرسم يكون بخط منقط(dotted).

٢. اكتب عبارات برنامج يطلب من المستخدم إدخال سلسلة حرفية مكونة من عدد من الكلمات ثم يقوم البرنامج بطباعة السلسلة كاملة وعدد أحرفها بدون المسافات بين الكلمات.

٣. اكتب خرج العبارات التالية:

```
#include<iostream.h>
int main()
{ int i =10;
int *i_ptr =&i ;
cout<<  "\n the value of i+ 10 = "<<  i +  10  ;
cout<<  "\n the address of i = "<<&i + 10 ;
cout<<  "\n the value of i_ptr = "<<i_ptr + 10 ;
return 0;
}
```

B. Store a file of 20000 records on a disk with the following characteristics:

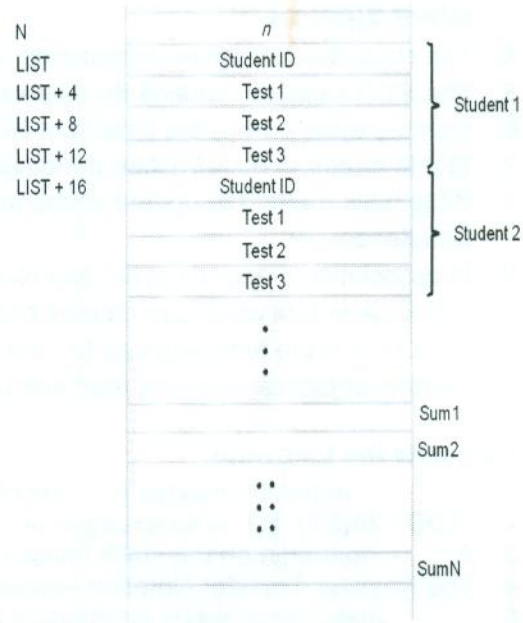
# of bytes per sector = 512
# of sectors per track = 40
# of tracks per cylinder = 12
# of cylinders = 1331

1. How many cylinders does the file require if each data record requires 256 bytes?
2. What is the total capacity of the disk?

C. The figure shown is the memory organization for a list of scores for N students. Each student has 3 scores for 3 tests. Scores are stored starting from memory location LIST.

i. Write an assembly program to calculate the sum of the 3 test scores for each student and store them in memory locations from Sum1 to SumN. Use indexed addressing.

ii. Rewrite the program to use a subroutine TestAdd that calculates the sum of the 3 test scores for each student.



Q3. ***(20 points)***

(A) For a dynamic memory chip:

1. Explain briefly the function of the RAS, CAS, CS, R/W signals.
2. Explain briefly the function of the row address latch, the row decoder, and MFC signal.
3. How refreshing is implemented in SDRAM? Discuss the overhead caused by refreshing on memory performance.

(B) Draw the timing diagram for burst read of length 4 in an SDRAM. On the diagram show the system clock, R/W signal, RAS signal, CAS signal, address bus, and data bus.

(C) Draw a diagram showing memory hierarchy of a computer system showing all types of system memories and how they differ in their characteristics.

(D) Explain what is meant by:

1. Locality of reference of cache memory
2. Cache memory management
3. VM Address Translation
4. A memory controller
5. Time cost of a disk access

GOOD LUCK

Tanta University

Department: Computers & Automatic Control Engineering
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Computer Hardware	Course Code: CCE1205	Year: 1st Electrical Eng.
Second term 2011	Allowed time: 3 hrs	No. of Pages: (2)

Remarks: ***Make your answers as neat as possible. Answer briefly and don't write un-needed information.***

Q1. ***(30 points)***

(A) For each of the following statements, state whether it is True or False. Explain if False:

1. The assembly instruction "**INC R1**" is an example of absolute addressing.
2. When the stack is empty, the Stack Pointer (SP) contains the highest memory address it may have.
3. The Register Transfer Notation R1 ← [MEM(X + [R0])] is equivalent to the assembly instruction **MOVE X(R0),R1**
4. The stack data structure implements Last-In-First-Out concept.
5. The MDR register contains the address of memory location to be processed.
6. Memory cycle time is the time from Read issued to MFC received.
7. SRAM needs to be refreshed periodically.
8. Write back method to update cache memory updates main memory and cache memory simultaneously.
9. In associative-mapped cache, any block of main memory can be put in any block in the cache
10. Too large virtual page size causes slow access.
11. Seek time is the time required to move the disk arm to the correct cylinder.
12. Number of cylinders is less than number of tracks in a disk surface.

(B) Complete the following:

1. ..... register contains the code of the instruction being executed.
2. **ADD 20(R1), R2** is an example of ..... addressing
3. A ..... operation on the stack causes the Stack Pointer (SP) to be decremented
4. The Register Transfer Notation equivalent to the instruction ADD R1,R2,R3 is .....
5. ..... addressing needs no memory reference to fetch the data.
6. A ..... is the set of tracks at a given radius of a disk pack.
7. Minimum latency time of a disk is .....
8. A ..... is the smallest addressable unit in a disk.
9. ..... of a disk is loss of space within a sector or a cluster.
10. In CD a ..... is represented by a change in height (land to pit or pit to land).
11. ..... register is used for storing the return address of the main program when calling a subroutine.
12. Capacity of high definition DVD disk is around .....

Q2. ***(20 points)***

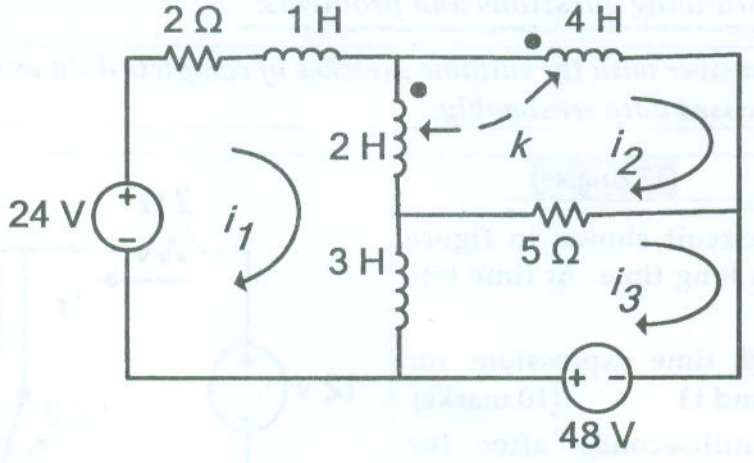
A. If register R0 contains the binary value 11001101 and the carry bit C contains 0, what will be the value stored in R0 and C after each of the following instructions:
   i. ADD #9, R0
   ii. RotateL #3, R0
   iii. RotateLC #3, R0
   iv. AShiftR #2, R0

The fourth question (15 marks)

1. Find an expression for determining mutual inductance between two coils in terms of their self inductances

2. Explain the dot convention employed to determine the polarity of the mutually induced voltages. Then show how it can be determined experimentally.

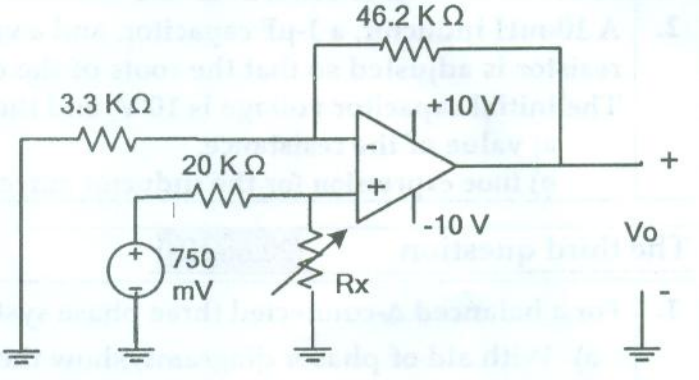
3. Write a set of loop equations that describe the circuit shown in figure in terms of shown currents. The coupling coefficients are k= 0.53



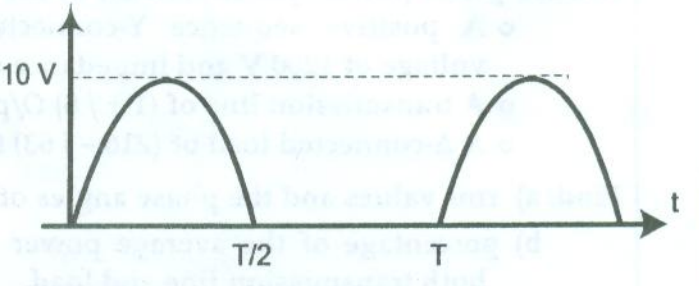
The fifth question (21 marks)

1. With the aid of a circuit diagram and suitable relations, show how an operational amplifier can be used as: (6 marks)
   a) an inverting amplifier.
   b) a summing amplifier
   c) an integrator

2. The operational amplifier shown in the figure is ideal:
   a) Find the output voltage Vo when Rx= 80 KΩ (3marks)
   b) What is the range of Rx value to avoid amplifier saturation. (4 marks)



3. Find the Fourier series spectrum of the half-wave rectified sinusoidal voltage shown in figure. (8marks)



TANTA UNIVERSITY

Electrical Power and Machines Department

Faculty of Engineering

Final EXAM 2010/2011 - Second Term

Course	Electrical Circuits (2) (EPM1203)	Time Allowed	3 hours
Students	1st Year (Electrical)	Total Mark	85
Date	Mon, June 13th , 2011	Number of pages	2

Attempt ALL the following questions and problems:

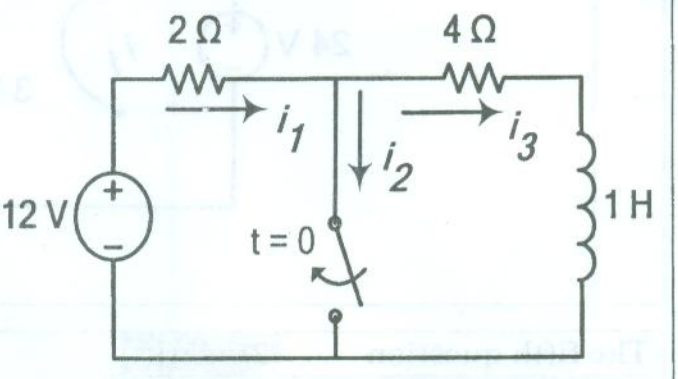
- *Clarify your answer with the suitable sketches of complete data as you can.*
- *Assume any missed data reasonably.*

The first question (13 marks)

The switch in the circuit shown in figure has been open for a long time. At time t=0, the switch is closed.

a) *Find and sketch* time expressions for currents i_1 , i2 and i3 (10 marks)

b) How many milliseconds after the switch has been closed will i2=5 A (3 marks)



The second question (16 marks)

1. Write down the differential equation describing the step response of an RLC series circuit. With aid of mathematical relations and simple sketches, explain the effect of resistance on the nature of the response. (5 marks)

2. A 10-mH inductor, a 1-μF capacitor, and a variable resistor are connected in parallel. The resistor is adjusted so that the roots of the characteristic equation are $-8000 \pm j6000$ rad/s. The initial capacitor voltage is 10 V, and the initial inductor current is 80 mA. Find:
   a) value of the resistance. (3 marks)
   b) time expression for the inductor current. (8 marks)

The third question (20 marks)

1. For a balanced Δ-connected three phase system:
   a) With aid of phasor diagrams, show the relation between phase and line currents
   b) Show that instantaneous power is constant (time invariant)

2. A three-phase power system consists of the following parts:
   - A positive sequence Y-connected generator having an internal phase voltage of 1200 V and impedance of $(1 + j\,3)\ \Omega$/phase.
   - A transmission line of $(1 + j\,8)\ \Omega$/phase.
   - A Δ-connected load of $(216 - j\,63)\ \Omega$/phase.

   Find: a) rms values and the phase angles of load currents.
   b) percentage of the average power delivered by the generator consumed in both transmission line and load.

Please Turn Over

with the boundary and initial conditions:
$u(x,0,t)=u(x,b,t)=0,\ 0<x<a,\ t>0,\quad u(0,y,t)=u(a,y,t)=0,\ 0<y<b,\ t>0,$
and $u(x,y,0)=10xy,\ 0<x<a,\ 0<y<b.$

10 Marks

c) Apply Laplace transform to solve the wave equation $\frac{\partial^2 v}{\partial t^2}=\frac{\partial^2 v}{\partial x^2}$,
subject to the boundary and initial conditions:
$u(x,t)$ is always bounded, $u(0,t)=\cos t, u(x,0)=\sin x$ and $u_t(x,0)=0$.

With our best wishes

Dr. Abdallah Shalaby

Dr. Waheed Kamal Zahra

Course Title: Eng. Math.2(b)
Date: 16/6/2011

First Year Elec.PME1206
Allowed time: 3 hrs

No. of Pages: (2)

Remarks: (answer the following problems… assume any missing data)

Problem number (1) (30 Marks)

a) Discuss the stability of solution of the system:
$\frac{dx}{dt}=\begin{pmatrix}7 & -1\\ 5 & 1\end{pmatrix}x, \quad x(0)=\begin{pmatrix}1\\ 0\end{pmatrix}$. Find the solution of this system.

b) If A is a square matrix of order 2×2 whose eigen values are -1 & 2 with corresponding eigen vectors $\begin{pmatrix}1\\ 1\end{pmatrix}$ & $\begin{pmatrix}5\\ 2\end{pmatrix}$ respectively. (i) Is A semi-simple, (ii) Obtain the eigen values and eigen vectors of A^{15}.

c) Prove that the eigen values of real symmetric or hermitian matrix are real, and two eigen vectors corresponding to two different eigen values are orthogonal.

d) Find $L[e^{2t}\cosh(t)\sin(3t)]$, $L[\sin(t).\ln(t).\delta(t-\frac{\pi}{2})]$, $L^{-1}[\frac{1}{2}\ln(\frac{s^2}{s^2+1})]$.

e) Solve the integro differential equation $\dot{y}+\int_0^t y(u)\cosh(t-u)du=0,\ y(0)=1$.

Problem number (2) (30 Marks)

a) Find $F(s)$ if $f(t)=[t^4-4t^3+2t^2+t-1]u(t-3)$.

b) Use Laplace transforms to prove that $\int_0^\infty \frac{e^{-t}\sin t}{t}dt=\frac{\pi}{4}$.

c) Show that for $0<x<\pi$, $\sin x=\frac{4}{\pi}(\frac{1}{2}-\frac{1}{1.3}\cos 2x-\frac{1}{3.5}\cos 4x-\ldots)$.
Hence prove that $\frac{\pi}{4}-\frac{1}{2}=\frac{1}{1.3}-\frac{1}{3.5}+\frac{1}{5.7}-\ldots$

d) Expand in Fourier series the function $f(x)=\begin{cases}1, & 0<x<3\\ 0, & 3<x<6\end{cases}$.

e) Find the function $f(x)=e^{2x}$, $-\pi<x<\pi$ in a complex Fourier series. Hence deduce the real one. Obtain the amplitude and phase angle of the nth harmonics.

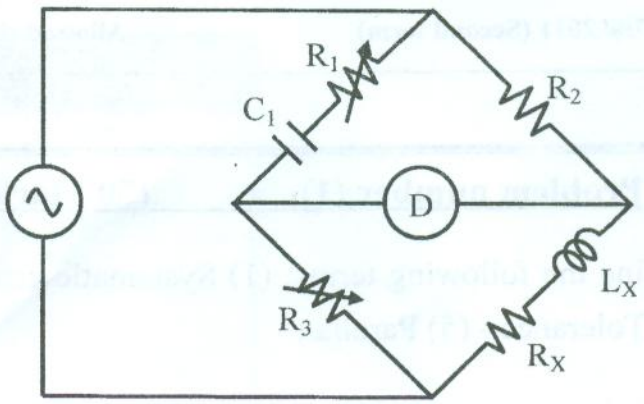
Problem number (3) (25 Marks)

a) Find the general solution of $yu_{yy}+u_y=y(2x^2+4y^2)$. **5 Marks**

b) Find $u(x,y,t)$ such that **10 Marks**

$$\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=\frac{\partial u}{\partial t}, \qquad 0<x<a,\ 0<y<b,\ t>0.$$

Problem number (3) **(30 Marks)**



Derive the balance equations of the shown bridge. If $R_2=200\Omega$, $C_1 = 4000$ nF and the balance takes place when $R_1 = 600\ \Omega$ and $R_3 = 1000\ \Omega$ at a supply frequency of 50 Hz, find the unknown inductance and resistance. The unknown impedance is replaced with a new one, where its resistance is 150 Ω. If changing the frequency was enough to restore the balance with the new impedance, where the other impedances are maintained fixed, what are the supply frequency and the new value of the unknown inductance? (10 points)

(I) The gauge factor of a strain gauge transducer is 20. If the normal resistance of the strain gauge is 500Ω, find the strain-gauge resistance when subjected to a strain of $8*10^{-4}$. (5 points)

(II) Chose ***another*** transducer that can be used to convert the pressure change into a change in a resistance and explain its theory of operation. (5 points)

Explain in detail how the cathode ray oscilloscope can be used to measure current and frequency. (10 points)

Good Luck

Course Examination Committee

Dr. Ahmed Refaat
Dr. Ayman Abd Raboo
Dr. Saeed Allam
Dr. Doaa Mokhtar

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 90 Marks

Faculty of Engineering

Course Title: Electrical Measurements	Course Code: EPM1202	Year: First year
Date: 27/6/ 2011 (Second term)	Allowed time: 3 hrs	No. of Pages: (2)

الإمتحان مكون من ٣ أسئلة فى صفحتين

Problem number (1) (30 Marks)

Define the following terms: (1) Systematic errors – (2) Sensitivity - (3) Precision - (4) Tolerance - (5) Parallax (10 points)

The dynamic performance of analogue instruments depends on the interaction between a number of torques. Explain this statement showing the function of each torque. Discuss also how each torque can affect the dynamic movement of the pointer. (10 points)

Explain in detail the reasons making the permanent magnet moving coil instruments widely used in dc measurements. (10 points)

Problem number (2) (30 Marks)

A PMMC instrument has a three-resistor Ayrton shunt connected across it to form an ammeter. The resistance values are $R_1 = 0.05\Omega$, $R_2 = 0.45\Omega$ and $R_3 = 4.5\Omega$. The meter has an internal resistance of $R_m = 1k\Omega$ and a full-scale deflection of $50\mu A$. Calculate the three ranges of the ammeter (10 points)

A 100Ω basic movement is to be used as an ohmmeter requiring a full-scale deflection of 5mA and an internal battery voltage of 6V. A half scale deflection marking of 1 $k\Omega$ is desired. Calculate the value of R_1 and R_2 under these conditions. Find the maximum value of R_2 to compensate for 5% drop in the battery voltage. Calculate the scale error at half scale when R_2 is set for 5% drop in the battery voltage (10 points)

Compare between electrodynamic instruments and moving-iron instruments when used as ammeters. (10 points)

جامعة طنطا

قسم هندسة القوى والآلات الكهربية
درجة الجزء الكهربي: ٣٥ درجة

كلية لهندسة

الفرقة: الأولى كود المادة: EPM/MEP 1261 المقرر: هندسة التركيبات والمعدات الكهروميكانيكية (الجزء الكهربى)
عدد أوراق الامتحان: ١ زمن الامتحان : ٣ ساعة تاريخ الامتحان : ٢٧ – ٦ – ٢٠١١ (الفصل الدراسي

تنبيه هام: (أجب على الأسئلة الآتية، افرض آي قيم غير معلومة ، الإجابة يجب أن تكون مدعمة برسم أشكال توضيحية)

السؤال الأول (٢١ درجة)

أ. علل لما يأتي: -

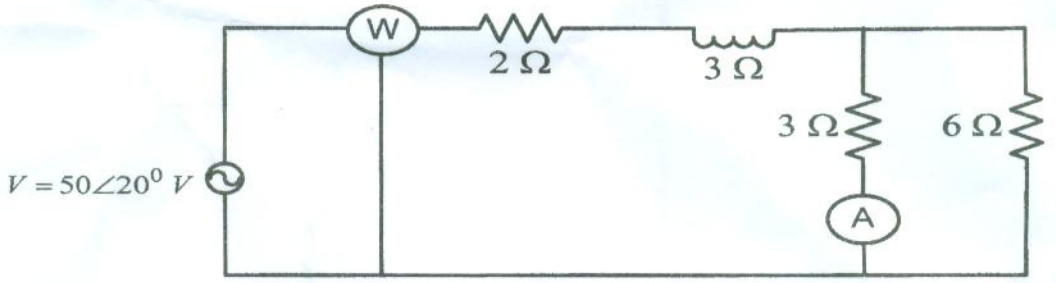
١. استخدام الطاقة الكهربية بكثرة في الحياة المعاصرة.
٢. استخدام القاطع فى اللوحات الكهربية وعدم استخدام المفاتيح العادية.
٣. طلاء الأنبوب الزجاجي فى مصابيح الزئبق من الداخل بطبقة من الفسفور.
٤. استخدام البادئ فى اللمبات الفلوريسنت.
٥. استخدام المحولات الكهربية بعد مرحلة التوليد و قبل مرحلة نقل القدرة الكهربية.

ب. اشرح باختصار مع التوضيح بالرسم كلما أمكن كل من الآتي: -

١. الطرق المتبعة فى عملية التأريض الوقائي في المباني.
٢. الطرق المتبعة فى التوصيلات الكهربية رأسياً داخل المنشآت.
٣. أنواع محطات القدرة الكهربية التقليدية.
٤. جهاز الديناموميتر مع التوضيح بالرسم كيف يمكن استخدامه كأميتر و فولتميتر و واتميتر.

جـ. في الدائرة الموضحة في الشكل احسب:

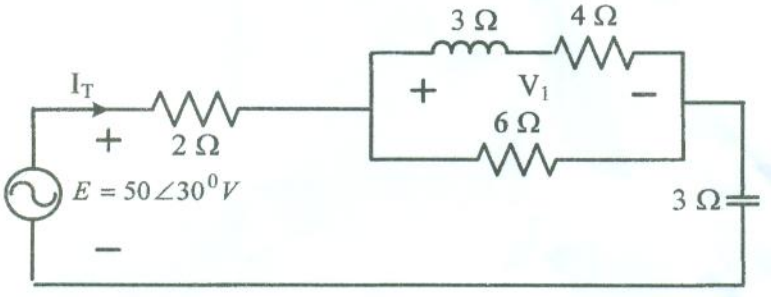
١. القدرة الفعالة الكلية - القدرة الغير فعالة الكلية - القدرة الظاهرية الكلية - معامل القدرة للدائرة.
٢. ارسم مثلث القدرة.
٣. ما هى قراءة الواتميتر و الأميتر.



السؤال الثاني (١٤ درجات)

أ. يراد إضاءة حجرة كبيرة عرضها 20m وطولها 20m وارتفاعها 3m بمصابيح معلقة على ارتفاع 2.5m و الاستضاءة المطلوبة هى $150 Lm/m^2$ علماً بأن معامل الانتفاع هو 0.5 و معامل الصيانة هو 0.75 والنسبة بين الارتفاع والفراغ هى 0.5. المطلوب تحديد كفاءة إضاءة المصابيح المستخدمة إذا كانت قدرة المصباح هى 200W ثم احسب التكلفة الكلية إذا كان ثمن المصباح خمس جنيهات.

ب. للدائرة الموضحة في الشكل أحسب:(١) V_1 باستخدام قاعدة توزيع الجهد (٢) تيار المصدر والقدرة الفعالة والغير فعالة الكلية.



مع خالص أمنياتي بالتوفيق

د. إبراهيم بدير