Mansoura University		2nd Term
Faculty of Science		Credit hours Students: Physics
Physics Department		Level: 3 Date : 27 May 2013
Subject: Physics		Time allowed : 2 hours
Course: Physics 320, Computer Programming		Full Mark : 80 Mark

Answer the 1st question then any other two questions

[1] a-What will be the values of X and INDEX after the execution of the following instruction:

```
     X = 2.0
     Y = 3. 0
     I = 1
10   GOTO (20, 30, 40, 50, 50), I
20   I = I+ 4
     X = X + 2.0
     Y = Y + X
     GOTO 10
30   X= X + 2.0
     Y= Y - 25
     I = I + 14
     GO TO 60
40   X = X +2.0
     Y = Y + X
     I = I –1
     GOTO 10
50   X = X + 4.0
     Y=Y +  X
     I = I– 1
     GOTO 10
60   CONTINUE
     END              [10] Marks
```

b- Determine the values of Y, X, and J after execution of the following:

i-
```
     Y=5.0
     X=8.0
     J = 1
1    IF (J*3.LE.13) X=X+3.0
     X=X+1.0
     Y=Y+X
     J=J+2
     IF (J.LE.9) GOTO 1
     END              [10] Marks
```

ii-
```
     Y=5.0
     X=8.0
     DO 10 J=1,7,2
     IF (J*2.GE.13)GOTO 10
     Y=Y+X
     X=X+1.0
10   CONTINUE
     END              [10]
```

[2] Write a FORTRAN program to read the parameters a, b and c which you can read from the screen, then use these parameters to evaluate the given equation

$$F = \frac{1+a}{1+\dfrac{b}{c+6}}$$

[25] Marks

[3] a) Draw a Flow chart, using the Logical IF statement, for the application of the following step function:

$$Y = \begin{cases} 8.92 & if \ 0.0 \le x < 10.9 \\ 17.23 & if \ 10.9 \le x < 18.6 \\ 25.50 & if \ 18.6 \le x < 50.0 \end{cases}$$

[10] Marks

b) Write a Fortran program for the application of the above equation. [15] Marks

P.T.O. ⟶

[4] a- Write the following expressions in FORTRAN FORM: **[12] Marks**

i- $\beta = \dfrac{-1}{2x} + \dfrac{a^2}{4x^2}$ ii- $t = \tan^{-1}(\sqrt{2}\,\tan x)$

iii- $f = \dfrac{\pi}{2}\log|x| + \dfrac{a}{x} - \dfrac{a^3}{9x^3}$ iv- $B = \dfrac{e^{x/\sqrt{2}} + \cos(\sqrt{x/2} + \pi/8)}{\sqrt{2\pi x}}$

b- Determine the correct format expression, and correct the wrong from the following :

  i.   100 FORMAT(5X,10F6,2,3F5.3)

  ii. 200 FORMAT(4F7.2,4E13.8)   **[8] Marks**

 iii. 300 FORMAT(7I2,6F5.3.3E12.5)

 iv. 400 FORMAT(3X,5I2,7F5.3,3E11.6)

c-Sow the order of execution of the given following statement: **[5] Marks**

   Y= EXP(A*B/(C*D)-X**3)+COS(SQRT(X/2.)+PI/8.)/SQRT(2.*PI*X)

Good Luck

Examiners: 1- Prof. Dr. Magdy Tadros Yacoub*   **2-** Dr. Shalabia Badr

Mansoura University Faculty of Science Physics Department Subject: Physics Course : electronic circuits (Phy321)		Second semester **Third level : Physics** Date : 30/5/201 3 Time allowed : 2 hours Full Mark:: 80 Mark

Answer **The Following** Questions

1- a) Derive the condition required for stable biasing of the transistor
   circuit shown in figure (1-a).

figure (1-a)

   b) Determine the overall minimum and maximum gain of the two stage
   amplifier circuit shown in figure (1- b) where $R_1 = 10 K$, $R_2 = 2.2 K$
   , $R_{C1} = 3 K$, $R_E = 650$ ohm & $R_{C2} = 1 K$, $R_{E1} = 100$, $R_{E2} = 0$ To 900 ohm
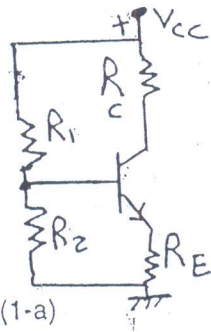   & $\beta_{dc} = \beta = 150$.

figure (1-b)

2-a) Determine the minimum and maximum input voltage V_{in} that can be
   regulated using Zener diode circuit in figure (2) , given that
   $I_{zk} = 1$ mA , $I_{zm} = 15$ mA , $r_z = 10$ ohms and $(V_z = 5.1$ volts at $I_{zk} = 1$ mA)
   , then determine the change in the out put voltage when the input
   voltage varies from the minimum to the maximum value .

   b) Draw a circuit diagram of the internal cicuitry of a basic
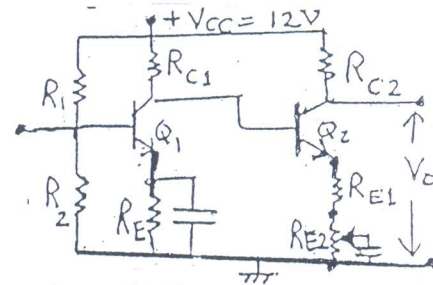   operational   amplifier .
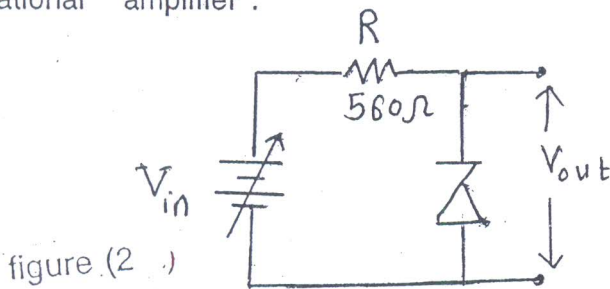

figure (2)

3 - a) Derive an expression for the voltage gain of the non - inverting
   operational amplifier.
   b) Determine the values of R in figure (3) which make the voltage gain
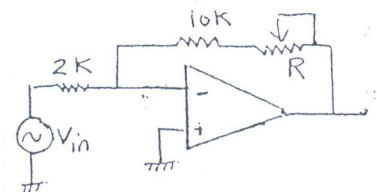   of the inverting - operational amplifier varries from -10 to - 60

figure (3)

4- a) Derive the condition required for stable biasing of the transistor
   circuit shown in figure (4-a).
   b) Derive an expression for the output voltage of the operational
   amplifier circuit in figure (4-b) ,then determine the value of R which
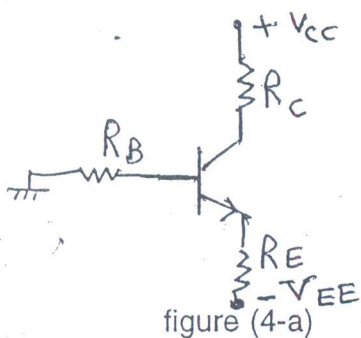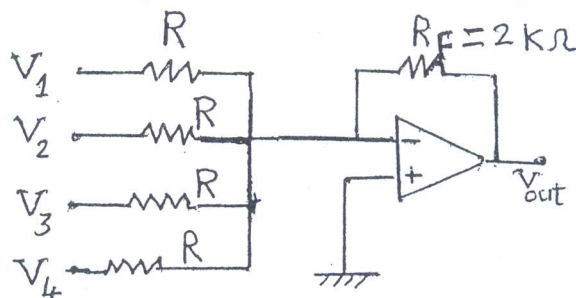   make the output voltage equal the average value of the input voltages

figure (4-a)

figure (4-b)

	بسم الله الرحمن الرحيم Final Exam in Physics (May. –2013) **Third year physics** المسنوى الثالث	Time Allowed :2 hours Subject : PHYSICS (fine Magnetism) **326** ـف (80 Marks)
Mansoura University **Faculty of Science** **Physics Department**		

Answer the following questions

1- a Write the main differences between:

1- Ferri and ferromagnetic materials

2- Resonance phenomenon and chemical shift interaction

3- Ferromagnetic order of both FeO and Fe_2O_3 in magnetite Fe_3O_4

b- Write shortly how NMR spectroscopy could be used to evaluate the structure of silicate network in terms of Q^n notation.

c- Define the following physical quantities, & sketch diagram clarifying the meaning if it possible:

* Cure temperature- * Spontaneous magnetization and
* Magnetization of ferromagnetic material

2-Complete or choose between braktics

a- Tinny magnet means------------(1)--------- while huge one can be considered due to---2----

b- Ferri and Ferro magnets have very different -----3-------------

c- --------4-------govern magnetic properties in matters

d- Macroscopic sample of ferromagnetic materials are (not uniformly - uniformly) magnetized, it may break up into regions called ------5---------
the magnetization of each region has a --6------- orientation.

e-The transition region through magnetic domains is called a ---7-- wall

f-The difference between the applied magnetic field and the field
at the nucleus is termed the---------8----------------

g- If the density of bridging bonds around the measured nucleus
increases, they resonate at ----9----- field strength

h- Shielding means electron density or bridging bonds is high,
therefore it (shield – deshield) the nucleus from the applied
magnetic field. In such a case the chemical shift -----10--------------

i- Deshielding means the electron density around the nucleus is --11----or

the concentration of non-bridging is ---12-- , therefore chemical shift

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Best wishes Prof. G. El-Damrawi

Mansoura University	**Academic Level:** 3rd Level
Faculty of Science	**Program:** Physics
Physics Department	**2nd Term Exam:** 3 June 2013
Subject: Phy. 327	**Time Allow:** 2 hours
Physics: Polymer Physics	**Full Mark:** 80 Marks

<u>Answer (ALL) Questions:</u>

1) A- Define the polymerization? Explain the three steps of chain polymerization.
[8.0 Mark]

  B- Write briefly on: [12 Mark]
        - Ceiling temperature.
        - Electron microscope technique to study polymer structure.
        -Electrical conductivity of polymer.

2) Compare between: [20 Mark]
        a- Anionic and Cationic polymerization.
        b- Thermoplastic and Thermosets polymer.
        c- Cis- and trans- isomerism.
        d- Branched and Crosslinked polymer.

3) A-Explain the physical meaning of glass-transition temperature. [6 Mark]
   B-Discuss two different methods used to determine Tg. [14 Mark]

4) A-What are the physical states of polymer? Discuss in details the first and
      second order phase transitions in polymer. [12 Mark]
    B- Describe Differential Scanning Calorimetry Analysis. [8 Mark]

"With Good Luck"

Examiners:
1- *Dr. Maysa Ismail.*   2- *prof. Dr. E. Sesa.*

Mansoura University Faculty of Science Physics Department	Year: 3th Level Specialization: Physics Program	Second Semester , 2012-2013 June , 2013 Time: 2 Hours
Subject: Nuclear Physics	Thursday : 6/6/2013	9-11 AM

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كود المادة : ف 323   / أسم المادة : فيزياء / أسم المقرر : فيزياء نووية (2)

</div>

	Answer (5) Questions Only (Full Mark : 80)	Mark
1-	To measure the nuclear potential radius, study three phenomena which depend almost wholly on the interaction with the nuclear force and nearly independent of the Coulomb potential.	16
2-	Define the quantum numbers l , j and m$_j$ and give in table the relation between them and their capacities l = 0 to l = j .	16
3a-	Derive an expression of magnetic moment of a particle. Evaluate the Bohr and nuclear magneton in units of J/T. [e = 1.6x10^{-19} C ,ℏ =1.055x10^{-34} J.s , m$_e$ = 9.1x10^{-31} Kg]	10
3b-	The electric quadrupole moment of $_{71}$Lu^{175} is 5.9 barns. Calculate : (a) the deformation parameter η, and (b) the ratio of the axes b/a . Take the mean radius to be given by R = 1.4 A$^{1/3}$ F.	6
4a-	List the evidences for the shell structure and explain the role of the number of stable isotopes with examples.	6

4b-	Study the motion of a nucleon in a infinite square well potential and find the following :
	        The wave number
	        The level energies
	        Calculate the level energies of 1s-state and 3s-state in MeV.
		10

5-	According to the shell model with spin-orbit coupling, draw the energy levels for the nucleus $_{20}$Ca^{43}, show how the levels could be occupied with protons and neutrons and find the angular momentum in the ground state.	16
6-	Discuss theoretically and illustrate schematically the different types of exchange force between a neutron and proton.	16

With our Best Wishes

Examiners : Prof. Dr. Ali H. El-Farrash   Dr. Ahmed Abu El-Ela*

*Corresponding Examiner

Mansoura University		Second Term
Faculty of Science		Third Year : Physics
Physics Department		Date : 10/6/ 2013
Subject : Physics		Time allowed : 2 hours
	Third Year Physics	

Electrodynamics (1)   phys. (324)

Answer the following questions	points

(1) a – Write Maxwell's equations for free linear isotropic dielectric and show that the   (30)
electromagnetic field satisfy the classical wave equation .

   b – Prove that the plane electromagnetic waves are transverse.

(2) a - Prove that the time average energy flow when the electromagnetic field   (30)
vectors vary harmonically with time is given by $\langle \vec{S} \rangle = \frac{1}{2} Re \left(\vec{E} \times \vec{H}^* \right)$

   b- Consider a plane electromagnetic wave propagates in free space where

   $\vec{E} = (30\pi) e^{i\left(\frac{2}{15}z - 4\times 10^7 t\right)} \left(\frac{V}{m}\right)$, find $\langle \vec{S} \rangle$ and $\vec{S}$.

Answer only one of the following

(20)

(3) a- The propagation constant $\hat{k}$ in a conducting medium is complex with real and

imaginary parts given respectively by : $\alpha = \omega \sqrt{\frac{\mu\epsilon}{2}} \left[\sqrt{1 + \left(\frac{\sigma}{\omega\epsilon}\right)^2} + 1 \right]^{\frac{1}{2}}$ and

$\beta = \omega \sqrt{\frac{\mu\epsilon}{2}} \left[\sqrt{1 + \left(\frac{\sigma}{\omega\epsilon}\right)^2} - 1 \right]^{\frac{1}{2}}$. Obtain the relation between $\vec{E}_0$ and $\vec{B}_0$ for good

conductors. Show that in perfect conductors most of the electromagnetic energy is of

magnetic type and the phase difference φ between $\vec{E}$ and $\vec{B}$ equals $\frac{\pi}{4}$.

   b - Find the phase difference between the field vectors $\vec{E}$ and $\vec{H}$ in a region where
   $\mu = \mu_0 , \epsilon = 80 \, \epsilon_0 , \sigma =$ MS/m & $\omega = 200\pi$ MHz.

(4) a- Show that the electromagnetic field is attenuated through the conducting medium (20)
   and the field vectors $\vec{E}$ and $\vec{B}$ are in general out of phase .

   b- Given $\vec{E} = 10^3 e^{i(2z - 6\times 10^8 t)} \hat{e}_y$,find $\vec{H}$ and the direction of propagation.

Note: $\epsilon_0 = 8.85 \times 10^{-12} \, F/m$, $\mu_0 = 4\pi \times 10^{-7} henry/m$

Good luck

Hayam mashaly

Mansoura University Faculty of Science Department of Physics Course Code: Phys. 322 Title: Non-crystalline Solids	(logo)	Second Semester (June 2013) Exam Type (Final): 3rd Year (Physics) Time: Two Hours Full Mark: 80 Mark

Answer **the first one and any other two questions** from the following

1-a: Discuss the effects on the electric conduction that result from introducing a transition metal oxide into a glass. [13 Mark]

b: Write briefly on the structure of silicate and borate glasses. [13 Mark]

2-a: Explain the reason of thermal expansion in solids. [13 Mark]

b: Calculate the concentration (per mole) of each type of structural units in a glass of the composition ($0.25Na_2O \cdot 0.75SiO_2$), (Avogadro number is 6.022×10^{23} mol^{-1}). [14 Mark]

3-a: Many properties of glass can be treated as additive properties. Give an example and explain the basis of this feature. [13 Mark]

b: The density is 2.46 g/cm^3 for the glass $0.25CaO \cdot 0.10Al_2O_3 \cdot 0.65SiO_2$. Calculate the Ca-Ca distance and Al-Al distance. (molecular weight = 56 g/mol for CaO, 102 g/mol for Al_2O_3 and 60 g/mol for SiO_2). [14 Mark]

4-a: Discuss the factors that affect the electric conduction in Li_2O-B_2O_3 glasses. [13 Mark]

b: Give an example for the correlation between the glass density and its structure. [14 Mark]

أطيب التمنيات: أ.د. حمدى دويدار

لجنة التصحيح: م.د. حمدى دويدار ـ م.د. أحمد حمزة عراب