معادلات تفاضلية ٢٠٤ /

المادة : معادلات تفاضلية (204) المستوى : الثاني (فيزياء + فيزياء حيوى) أستاذ المادة :ا.د.على شمندى	كلية العلوم – قسم الرياضيات	دور مايو : ٢٠١٤ الزمن : ساعتان

أجب عن الاسئله التاليه :

السؤال الاول:a) اثبت ان الداله $y = (\sin^{-1}x)^2 + c \sin^{-1}x$ هى حل للمعادلة التفاضلية :

$$(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - 2 = 0$$ (10 marks)

(b اوجد حل المعادله التفاضلية :

$$(9x + 4y - 1)^2 \frac{dx}{dy} = 1$$ (10 marks)

السؤال الثانى : اوجد حل المعادلات التفاضلية التاليه :

(a استخدم اى طريقه لحل المعادله

$$(\frac{x}{\sin y} + 2)\,dx + \frac{(x^2+1)\cos y}{\cos 2y - 1}\,dy = 0$$ (10 marks)

(b

$$[D + 8]\,y = e^{-8x}\,\frac{\sin x}{x^5}$$ (10 marks)

السؤال الثالث :

a) أوجد مجموعه المسارات المتعامدة مع المجموعه $x^2 + (y - c)^2 = c^2$. (8 marks)

b) اوجد حل المعادله التفاضلية

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 7\sin x + e^{2x} + 11$$ (12 marks)

السؤال الرابع : اوجد حل المعادلات التفاضلية التاليه :

(a $\left(\frac{dy}{dx}\right)^2 - \frac{dy}{dx}\left(\sin^{15} x + \frac{\ln x}{x^5}\right) + \sin^{15}x\,\frac{\ln x}{x^5} = 0$ علما بان $x : o \to \frac{\pi}{2}$ (12 marks)

(b $x^2(1 - p^2) = 1.$ حيث ان $(\frac{dy}{dx} = p)$ (8 marks)

ملحوظه : ممنوع استخدام القلم الرصاص .

فيزياء - فيزياء موجات - فيزياء ذرية ف ٢٢٢

Mansoura University
Faculty of Science
Physics Department

2nd Level Exam.
May 2014
Time allowed : 2 hrs

Atomic Physics 222 ف

Answer the following questions.

1-a) Starting with the mass relativistic effect and the general equation of total energy, show how elliptical orbits could explain the fine structure. (15 marks)

b) Deduce the wavelength in A° and the energy in eV of the spectral line of minimum wavelength of the Lyman series. (15 marks)

2-a) Explain the two main concepts of the vector atom model.
The orbital angular momentum vector of an atom **L=1** and the spin angular momentum vector of the atom **S=1** . Calculate the total angular momentum vector of the atom **J**. (15 marks)

b) Draw and study the energy level diagram of beryllium ion (Be^{+++}). (15 marks)

3-a) Study the function of the following items in mass spectrometer
{ two parallel plates & velocity selector } (10 marks)

b) Draw and explain the splitting of the first spectral line of the Paschen series using the elliptical orbits. (10 marks)

($c=3x10^{10}$ cm/s $h=6.625x10^{-34}$ J.s $R=1.097x10^{7}$ m^{-1} $1eV=1.6x10^{-19}$ J)
($e=1.6x10^{-19}$ C $m_e=9.11x10^{-28}$ g)

Best Regards

Prof. A. El-Khodary

Mansoura University Faculty of Science Physics Department	Second term exam May. (2014)	Subject : Thermodynamics (BioPhys. 2014) Second Level students 80 Marks

Answer the following Questions

1-a) Carnot engine operates as refrigerator between two temperatures 27°C and 0°C to convert 5 kg of water at 0°C to ice at the same temperature. If the refrigerator derived by a motor of 300 watt. Calculate:

1) The time needed to complete the process.
2) The quantity of heat delivered to the hot reservoir.

(L. of ice 80 cal/gm)

b) When 50 gram of water at 17°C is mixed with 90 gram of water at 47°C, Find:

i. The final temperature.
ii. The change in entropy. (25 Marks)

2-a) Find the coefficient of volume expansion β , the compressibility K and the Joule-kelvin coefficient μ_J of an ideal gas.

b) A 2 gram mole of a gas C_v= 20.75 Joule/gm mole °k, temperature 27°C and pressure $1x10^5$ N/m^2. The gas is heated at constant volume until its pressure doubled and then expands isothermally until its volume is doubled, (R =8.3 Joule/gm mole), Calculate:

1) The final temp, the change in internal energy and the change in entropy at the end of the first process.
2) The work done, the change in enthalpy and the change in entropy at the end of second process. (30 Marks)

3-a) Using Maxwell's equation, deduce the first and second Tds equations.

3-b) Prove that $(\frac{\partial u}{\partial v})_T = \frac{\beta T}{K} - P$, and find $(\frac{\partial u}{\partial v})_T$ for

i. An ideal gas.
ii. Van der waals gas. (25 Marks)

Best wishes Dr Anwar Meghad

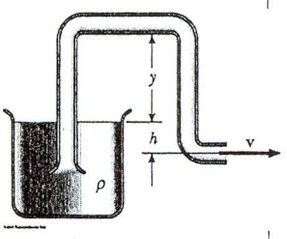
Mansoura University Faculty of Science Physics Department Subject: Physics		Second Term Second Year :Bio-Phys.& Physics Date : June 2014 Time allowed : 2 hours
Course (s): Fluid Mechanics **phys227**		Full Mark:: 60Mark

Answer THE FOLLOWING Questions Only: Each Question (15) Marks

[1] a- Why blood is considered to be Thixotropic? , and how its viscous behavior is partly due to aggregation of the red cell. **[7] Marks**

b- A needle of length 3 cm and radius 0.25 mm supplies blood at 5×10^{-8} $m^3 s^{-1}$ to a person. How long does it take to supply 0.5 litters (5×10^{-4} m^3) of blood? What pressure difference across the needle is required? Knowing that the coefficient of viscosity of blood is $\eta = 2.7\times10^{-3}$ $N.sm^{-2}$. **[8] Marks**

[2] a- Define the following terms: i – Pseudo plastic flow. ii – Dilettante flow. iii- Coefficient of viscosity. iv- Ideal flow v- Viscosity **[9]Marks**



b- A siphon is used to drain water from a tank, as illustrated in Figure. The siphon has a uniform diameter. Assume steady flow without friction. If the distance h = 1.00 m, find the speed of outflow at the end of the siphon.

ρ water $= 10^3$ Kg/m^3 **[6] Marks**

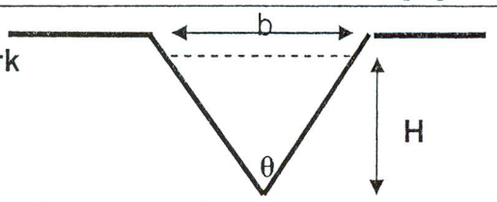
[3] a- - Write briefly on :

i- Air Bubbles get bigger as they come to the surface when released by under water divers.

ii- Visco-elastic materials. **[8] Marks**

b- Prove that the coefficient of viscosity η of a liquid passing through a tube of radius **R** and length **L** under difference in pressure ΔP across the tube, is given by $\eta = \pi \Delta P R^4 / 8LV$,where **V** is the volume of flow per unit time **[7] Marks**

[4] a- determine the total discharge flow over V – notch of height H and width b as shown in figure **[6] Mark**

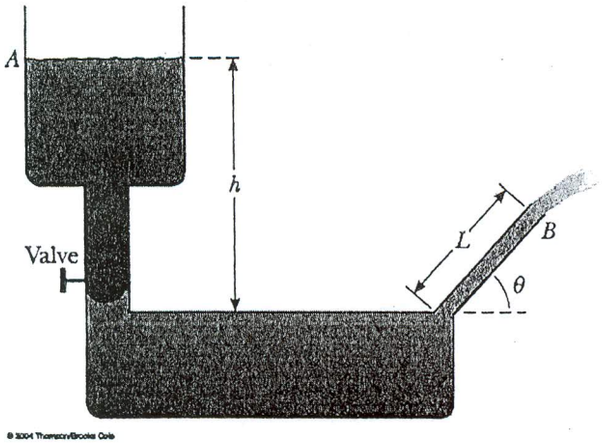


b- The Figure shows a water tank with a valve at the bottom. If this valve is opened,

i) What is the maximum speed attained by the water stream coming out of the right side of the tank (at B)? Assume that h = 12 m, L = 3 m, and θ = 30.0°, and that the cross-sectional area at A is very large compared with that at B.

ii) If the water flows at a rate of 0.0120 m^3/s , find the radius of the tube B **[9] Mark**

ρ water $= 10^3$ Kg/m^3



Examiners: 1- Dr. Nabil Kinawy **2-Prof. Dr. G. El-Damarawy**

المستوى الثانى - فيزياء - قياس كهربية وأجهزة قياس (ف ٢٢٤)
فيزياء حيوى

University of Mansoura Faculty of Science Physics Department Subject: Physics (224)		Second Term Second Level Physics &Biophysics. Date : 19June 2014 Time allowed : 2 hours
Course : Electrical Measurements & Instrumentation		Full Mark:: 80 Mark

Answer the following Questions :

[1] a – Determine the resistor value required to use a 50 μA galvanometer with an internal resistance of 250 Ω for measuring 0 – 50 mA . (10 mark)

b- What are the major components of a cathode ray tube? (5 mark)

c- A set of ten measurements were made to determine the weight of a lead shot. The weights in gram were: 1.570, 1.597, 1.591, 1.562, 1.577, 1.580, 1.564, 1.586, 1.550 and 1.575. Calculate: (i) the arithmetic mean,
(ii) the standard deviation of the readings, (iii) the probable error. (15 mark)
(vi) the variance.

[2] a- A 470 ± 10 % Ω resistor has a potential difference 12 V across its terminal.
If the voltage is measured with accuracy ±6 % .
Determine the power dissipation in the resistor and specify the accuracy of the result. (10 mark)

b- A potentiometer has a slide wire of 200 Ω and its length 200 cm.
A standard cell of 1.018 V is used for standardizing the potentiometer and the rheostat is adjusted so that balance is obtained when the sliding contact is at 100 cm, and when using an unknown voltage source the balance is obtained at 160 cm length.
(i) Find working current of the slid wire and the rheostat setting.
(ii) If the slide wire has divisions marked in mm and each division can be interpolated to one fifth, calculate the resolution of the instrument.
(iii) The maximum voltage can be measured by the potentiometer.
(iv)Find the unknown voltage . (15 mark)

[3] a- 1) What is the difference between accuracy and precision ?
2) List four sources of possible errors in instruments.
3) What are the three general classes of errors.
4) Define: environmental error, random error, and limiting error.

(15 mark)

b- A basic movement galvanometer with internal resistance 100 Ω and full scale current 1mA, is to be converted into a multirange dc voltmeter with voltage ranges of 0-10 V, 0-50 V , 0-250 V, and 0-500 V. The circuit arrangement is shown in Fig. (1).

(10 mark)

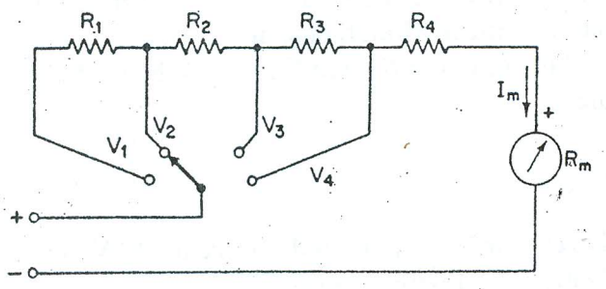


Fig .(1)

Constants: Charge of electron = 1.6×10^{-19} C
Mass of electron = 9.1×10^{-31} Kg

Examiner :

Prof. Dr. A. Oraby