المستوى الثانى - فيزياء - ضوء فيزيائى ف٢٢١

Mansoura University	2nd Term exam.
Faculty of Science	Date: 26 - 5 -2013
Physics Department	Time allowed 2 hours
	Full mark: 80 marks

Subject: Physics	2nd Level	Course:ف٢٢١ Physical optics

Answer the following questions:

1-a) Give a model to describe the intensity distribution in a Fabry-Perot system of interference fringes in transmission when the two coated plate are of same transmission coefficient T and of same reflectivity R.

17 Marks

b) White light illuminates a thin transparent material of thickness 2800 A^{O} at normal incidence. If the refractive index of thin material is 1.35, what colour (wavelength) will appears in the reflective light?

10 Marks

2-a) Discuss Fraunhofer diffraction through multiple slits. Hence give an expression of general condition for the bright fringes.

15 Marks

b) A grating with 8000 rulings/inch is illuminated with white light (4000-7000 A^{O}) at normal incidence. Describe the diffraction pattern for zero and first orders.

12 Marks

3-a) Using Mach-Zehnder interferometer, design optical set up to determine the refractive index of a gas at known temperature and pressure. Derive the necessary theory for this experiment.

16 Marks

b) How can you obtain polarized light by reflection?

10 Marks

Good Luck

Prof. Dr. Taha Sokkar

المستوى الثانى - فيزياء - ميكانيكا تحليلية ف ccx

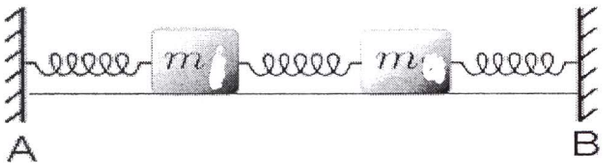
Mansoura University
Faculty of Science
Physics Department

2nd level physics students
Full Mark: 80
Allowed time: 2 hours
Course title: Analytical Mechanics
Course code: Phys 223

Second semester

Date:29-5-2013

Answer the following questions: **Marks**

1-	a-	Two equal masses m are connected by springs as shown in the Fig. The masses are free to slide on table AB. Use Lagrange's equation to set up the differential equation of the vibrating masses. 	10
	b-	Verify the obtained results of the above using Hamiltonian equations.	10
	c-	A particle of mass m moves under the influence of gravity on the inner surface of the paraboloid $x^2+y^2 = az$. Obtain the equations of motion using Lagrange's equation. Discuss the physical significance of Lagrange multiplier	10
2-	a-	Derive Hamilton- Jacobi equation.	10
	b-	Use Hamilton- Jacobi methods to solve Kepler's problem for a particle in an inverse squared central force field.	15
3-	a-	Drive Euler's equations of motion.	10
	b-	A rigid body which is symmetric about an axis has one point fixed axis. Discuss the rotational motion of the body, assuming that there are no forces acting other than the reaction force at the fixed point.	15

Best wishes:

Examiners: * أ.د/ عطاالله الحنبلى

المادة : معادلات تفاضلية (204) المستوى : الثاني (فيزياء + فيزياء حيوى) أستاذ المادة ا.د.على شمندى	كلية العلوم – قسم الرياضيات	دور مايو : ٢٠١٣ الزمن : ساعتان

أجب عن الاسئله التاليه :

السؤال الاول: اوجد حل المعادلات التفاضلية التالية

i) $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + 1 = 0$. (10 marks)

ii) $\frac{d^2y(x)}{dx^2} - y(x) = \sin x + 7$. (10 marks)

السؤال الثانى :

a) أوجد مجموعه المسارات المتعامدة مع المجموعه $y = c_1(\sec x + \tan x)$. (10mars)

b) اوجد حل المعادله التفاضلية $(y' + 1).Ln\left(\frac{y+x}{x+3}\right) = \frac{y+x}{x+3}$. (10mars)

السؤال الثالث:

a) اوجد حل المعادله التفاضلية $\left(\cos^2\left(\frac{x}{y}\right) + \frac{x}{y}\right)\frac{dy}{dx} = 1$ (6mars)

b) اوجد قيمه كل من التحويلات العكسية التاليه :

$$L^{-1}\left\{\frac{s^2}{(s^2 + w^2)^2}\right\}, \quad L^{-1}\left\{Ln\frac{s^2 - 36}{(s+6)^2}\right\}, \quad L^{-1}\left\{\frac{1}{(s+2)^{12}}\right\}$$ (١٢marks)

السؤال الرابع : اوجد حل المعادلات التفاضلية التاليه :

a) $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2 = \frac{1}{1+e^{-x}}$ (10mars)

b) $(\sin^{-1}y).(x^3 - 6x^2 + 11x - 6)\,dy + \sqrt{1-y^2}\,dx = 0$ (10mars)

المستوى الثاني - فيزياء - مقدمة في الاحصاء والاحتمالات

المستوى: الثاني برنامج : فيزياء المادة: **مقدمة في الاحصاء و الاحتمالات** ر 202	كلية العلوم	دورمايو 2013 الزمن : ساعاتان التاريخ: 6/2013/

اجب عما يلي: (درجة الجزء 10 درجات)

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1 –ا- باقة زهور بها 4 زهرات لونها أحمر و 3 لونها أصفر أخذت زهرتين من الباقة بارجاع وكان المتغير العشوائي X يمثل عدد الزهرات الحمراء في العينة اوجد دالتي الاحتمال و التوزيع للمتغير العشوائي .

ب-اذا كانت دالة الكثافة للمتغير العشوائي X هي $f(x)= 1/7 \quad 0<X<7$

فما هي قيم الاحتمالات $p(2<X<4) \quad p(1<X<3)$.

ج- يصوب طفل على قرص دائري نصف قطره 9 سم وكانت اصابته سديدة اوجد احتمال ان تكون الاصابة على بعد اقل من او يساوي ثلثي نصف القطر من ناحية المركز.

2- ا-اوجد خط انحدار Y على X اذا كان (x,y): (4,9), (8,17), (10,21), (6,13), (2,5) واجد قيمة Y عندما X=3.5 .

ب- اذا كان المتغير العشوائي X يمثل عدد مرات اصابه الهدف خلال 10 محاولات من محاولات بيرنولي و كان احتمال اصابة الهدف في كل مرة هو 3/5 فما هو احتمال اصابة الهدف ثلاث مرات على الاقل وكذلك اوجد التوقع الرياضي والتباين لعدد مرات اصابة الهدف.

ج- اذا كانت الفرق الثلاث لمدرسة إعدادية تمثل 35% و 40% و25% من الطلاب و كانت نسب النجاح في احد المقررات في عام ما هي : 50% و 60% و 40% على الترتيب . اختير طالب عشوائيا من المدرسة ووجد انه ناجح ما هو احتمال ان يكون الصف الاول .

3- ا- احسب قيمة الوسيط لمجموعة البيانات التالية :

الفئة	5-	10-	15-	20-	25-	30-	35-	40-
التكرار	4	5	23	58	61	30	4	3

ب- اثبت انه اذا كانت A,B حوادث مستقلة فإن A^c و B ايضا تكون مستقلة.

مع أطيب التمنيات بالتوفيق د. عديله عثمان

المستوى الثاني . فيزياء . ميكانيكا الموائع ف cv
فيزياء حيوية

University of Mansoura Faculty of Science Physics Department Subject: Physics		Educational Year: Second Level Program: Physics & Biophysics Date : 12 June 2013 Time allowed : 2 hours
Course (s) code: Phys. 227 [Fluid Mechanics]		Full Mark: 80 Mark

Answer the following questions: Each Question (20) Mark

[Q1] Choose the correct answer [20] Mark

[Q1-1] A person ride up a lift to a mountaintop, but the person's ears fail to "pop" that is , the pressure of the inner ear doesn't equalize with the outside atmosphere. The radius of each eardrum is 0.40 cm. The pressure of the atmosphere drops from $1.010x10^5$ pa at the bottom of the lift to $0.998x10^5$ pa at the top.

a) The pressure on the inner ear at the top of the mountain is:

1) $1.2x10^3$ Pa 2) $2.1x10^3$ Pa 3) $4.2x10^3$ Pa

b) The net force on each eardrum is:

1) $6.0x10^{-2}$ N 2) $4.0x10^{-2}$ N 3) $12.0x10^{-2}$ N

[Q1-2] A woman wearing snowshoes stands safely in the snow. If she removes her snowshoes, she quickly begins to sink. Is it because:

1) With snowshoes, her weight is applied over a larger area, so the pressure is small and without snowshoes, the force is applied over a small area, so the pressure is large.

2) With snowshoes, her weight is applied over a smaller area, so the pressure is small and without snowshoes, the force is applied over a small area, so the pressure is large.

3) With snowshoes, her weight is applied over a larger area, so the pressure is small and without snowshoes, the force is applied over a large area, so the pressure is small.

[Q1-3] A container is filled with water to a depth of 20 cm. on top of the water float a 30cm thick layer of oil with density of $0.7x10^3$ kg/m^3. The pressure at the surface of the water is:

1) $1.03x10^5$ Pa 2) $3.05x10^5$ Pa 3) $5.07x10^5$ Pa

[Q1-4] Which of the following exerts the most pressure while resting on a floor?

1) a 25 N box while with 1.5m sides

2) a 15 N cylinder with a base radius of 1m

3) a 25 N box while with 2m sides

[Q2] Choose the correct answer [15] Mark

[Q2-1] A room on the first floor of a hospital has a temperature of 20^O c. A room on the top floor has a temperature of 22^O c. In which of these two rooms is the average kinetic energy of the air particles greater? Is it:

1) Room on the top floor 2) Room on the first floor

[Q2-2] Bernoulli's principle says:

1) The pressure in a fluid decreases as its velocity increases.

2) The pressure in a fluid increases as its velocity increases.

3) The pressure in a fluid decreases as its velocity decreases.

[Q2-3] Ideal fluid is:

1) A fluid that has no internal friction or viscosity and is incompressible.

2) A fluid that has internal friction or viscosity and is incompressible.

3) A fluid that has no internal friction or viscosity and is compressible.

[Q2-4] A fluid is said to be Newtonian if:

1) The viscous_stresses that arise from its flow, at every point, are proportional to the local strain rate.

2) The viscous_stresses that arise from its flow, at every point, are proportional to the local stress rate.

3) The viscous_stresses that arise from its flow, at every point, are proportional to the local stress and strain rates.

[Q3] Choose the correct answer [20]Mark

[Q3-1] Non-Newtonian fluid is:

1) A fluid whose viscosity depends on shear_rate.

2) A fluid whose viscosity depends on stress_rate.

3) A fluid whose viscosity do not depend on shear_rate.

[Q3-2] The flow is irrotatinal, this means:
1) The fluid has no angular momentum about any point.
2) The fluid has angular momentum about any point.
3) The fluid has angular momentum and constant speed about any point.
[Q3-3] The Reynold's number is:
1) Dimensionless number which describes the type of flow occurring around the body.
2) Dimensional number which describes the type of flow occurring around the body.
3 Dimensional number which does not describe the type of flow occurring around the body.
[Q3-3] For an open tank, the speed of liquid coming out through a hole a certain distance (say h) below the surface is:
1) Equal to that acquired by an object falling freely through a vertical distance h.
2) Not equal to that acquired by an object falling freely through a vertical distance h.
3) Equal to that acquired by an object falling freely through a vertical distance 2h.

[Q4] Choose the correct answer and give reasons [25] Mark

[Q4-1] You have inverted spacesuit with a straw passing through the faceplate so that you can drink from the glass while on the surface of the planet. Out on the surface of the moon, you attempt to drink through the straw of an open glass of water. The value of g on the moon is about one sixth of that on earth. Compared to the difficulty in drinking through a straw on earth, you find drinking through a straw on the moon to be harder. This is because:
1) There is no atmosphere on the moon, so there is no atmospheric pressure to provide a force to push the water up the straw.
1) There is atmosphere on the moon, so there is no atmospheric pressure to provide a force to push the water up the straw.
1) There is no atmosphere on the moon, so there is atmospheric pressure to provide a force to push the water up the straw.
[Q4-2] An apple is held completely submerged just below the surface of a container of water. The apple is then moved to deeper point in the water. Compared to the force needed to hold the apple just below the surface, the force needed to hold it at a deeper point is
1) The same 2) larger 3) smaller
[Q4-3] You are shipwrecked and floating in the middle of the ocean on a raft. Your cargo on the raft includes a treasure chest full of gold that you found before your ship sank, and the raft is just barely afloat. To keep you floating as a high as possible in the water, should you
1) Secure the treasure chest to the underside of the raft
2) Hang the treasure chest in the water with a rope attached to the raft.
3) Leave the treasure chest on top of the raft
[Q4-4] You tape two different soda straws together end to end to make a longer straw with no leaks. The two straws have radii of 3mm and 5mm. You drink a soda through your combination straw . In which straw is the speed of the liquid is highest?
1) The one of the radius 3mm 2) Whichever one is nearest your mouth
3) The one of the radius 5mm
[Q4-5] You observe two helium balloons floating next to each other at the ends of strings secured to a table the facing surfaces of the balloons separated by 1-2 cm. you blow the small space between the balloons. What happen to the balloons?
1) They move toward each other 2) They move away each other
3) They are unaffected.
With my best wishes
Prof. Dr. A. Elgarayhi

Examiners: 1- Prof. Dr. A. Elgarayhi 2- Prof. Dr. Goma Aldamarawy

المستوى الثانى - فيزياء
فيزياء حيوية - قياسات كهربية وأجهزة قياس ف ٢٢٤

University of Mansoura Faculty of Science Physics Department Subject: Physics (224)		Second Term Second Level Physics and Biophysics Date: June.16, 2013 Time allowed: 2 hours
Course: Electrical Measurements & Instrumentation		Full Mark: 80

Answer the Following Questions

1)

a) Develop a circuit using a movement galvanometer of 1 mA full scale (R_m = 100Ω) for an ammeter having ranges of 1.0 and 10 amperes. (8 marks)

b) What is the sensitivity of the ammeter of problem 1- a? (6 marks)

c) What is the full scale voltage that can be measured with meter of problem 1-a? (6 marks)

2)

a) Six determination of a quantity, as entered on the data sheet and presented to you for analysis, are 12.35, 12.71, 12.48, 10.24, 12.63, and 12.58.

Examine the data and on the basis of your conclusions calculate :

i) The arithmetic mean.

ii) The standard deviation.

iii) The probable error in percent of the average of the readings.

(10 marks)

b) Three resistor have the following ratings:

$R_1 = 200Ω \pm 5\%$, $R_2 = 100Ω \pm 5\%$, $R_3 = 50Ω \pm 5\%$

Determine the magnitude of resultant resistance and the limiting errors in percentage , if the above resistances are connected in :

i) Series.

ii) Parallel. (10 marks)

3)

a) Draw a circuit for measuring an unknown resistance, and then explain the procedure of using it. (5 marks)

b) A slide wire potentiometer has a working battery voltage of 4.0 V with negligible internal resistance. The resistance of slide wire is 100Ω and its length is 200 cm. A standard cell of 1.018 V is used for standardizing the potentiometer and rheostat is adjusted so that balance is obtained when the sliding contact is at 101.8 cm.

i) Find the working current of the slide wire and the rheostat setting.

ii) If the slide wire has divisions marked in mm and each division can interpolate to one fifth, calculate the resolution of the Instrument.

(15 marks)

4)

a) Classify the different sources of error then discuss each of them. (10 marks)

b) A CRT of an oscilloscope has an accelerating voltage of 2000 V and parallel deflecting plates of 1.5 cm long and 5 mm apart. The screen is 50 cm from the center of the plates.

i) Find the beam speed.

ii) Find the deflection sensitivity of the tube.

iii) Find the deflection factor of the tube. (10 Marks)

Constants: Charge of electron = 1.6×10^{-19} C

Mass of electron = 9.1×10^{-31} Kg

Examiners:

1) Prof. Dr. Ahmed H. Oraby

2) Prof. Dr. Alaa Elkhodary

المستوى الثانى - فيزياء - صوتيات وفوق صوتيات ف ٢٢٥

Mansoura University Faculty of Science, Physics Department	بسم الله الرحمن الرحيم 2nd.Term Exam 2012/2013 For the 2nd. Year Students (PHYSICS)	Time Allowed : Two Hours Subject : Sonic &Ultrasonic (225 phys.)

Answer the following questions:

1 – a) Explain the structure and operation of a source and detector of ultrasonic waves referring to the function of the coupling medium. **(8 marks)**

b) Drive an expression for the total energy of a vibrating body. **(10 marks)**

2 – Deduce expressions for the amplitude and phase angle of the resultant wave when two harmonic motions with different frequencies are added. Refer to the phenomenon that associated with this case. **(16 marks)**

3 – a)Explain the resonance state when a body undergoes a forced oscillation? **(6 marks)**

b) What is the Doppler shift recorded by stationary observer when sound source moves toward the observer with a velocity equals to :

(I) half that of the sound **(6 marks)** , and
(ii) speed of sound. **(6 marks)**

Best Wishes from

Prof.Dr. / Maher El-Tonsy

June 2013

المستوى الثانى - فيزياء
فيزياء صوية - فيزياء ذرية ف ccc

Mansoura University
Faculty of Science
Physics Department

2nd Level Exam.
May 2013
Time allowed: 2 hrs

Atomic Physics 222 ف

Answer the following questions

1-a- The application of elliptical orbits as a trial to explain the fine structure leads to degenerate orbits. Discuss. (15 marks)

b- Estimate the wavelength in A° and the energy in eV of the spectral line of minimum wavelength of the Paschen series. (13 marks)

2-a- Deduce the possible j values for $\ell = 0,1,2,3$ and the type of each state for a monovalent element. Explain the spectral series of the emission transition of sodium atom. Discuss the transition of two D lines of sodium atom (D_1 and D_2). (15 marks)

b- Explain briefly the two main concepts of the vector atom model, **L-S** coupling and j-j coupling. Estimate the total angular momentum vector **J** of an atom where the orbital angular momentum vector **L** = 3, and the spin angular momentum vector **S** = 2. (11 marks)

3-a- Discuss and draw the fine structure of the energy level diagram for the characteristic X-ray spectra (only K and L series). (15 marks)

b- The empirical equation describing K_α line derived by Moseley can be compared with the equation of the spectral series of H like ions. Explain. (11 marks)

($c=3\times10^{10}$ cm/s $h=6.625\times10^{-34}$ J.s $R=1.097\times10^{7}$ m^{-1} $1eV=1.6\times10^{-19}$ J)
($e=1.6\times10^{-19}$ C $m_e=9.11\times10^{-28}$ g)

Best Wishes

Prof. A. El-Khodary