Time allowed: 2 h Jan. 2010	first Term Exam For 2nd year physics, biophysics and geology Waves and vibration	Mansoura university Faculty of Science Physics Department

Answer all Questions

1-a)	Find an expression for the apparent frequency at a detector, if the source moves with a velocity U away from the detector.	10 marks
b)	Define the reflectance coefficient of a wave and prove that it depends on the density per unit length.	
2-a)	Prove that the velocity of wave in a gas depends on the pressure and the density per unit length and verify that the propagation of sound wave in air causes adiabatic changes.	
b)	Find the condition to obtain a straight line of negative slope as a result of superposition of two Perpendicular waves.	
3-a)	Prove that the amplitude of the perfect damping oscillation depends on the time.	
b)	Find the normal mode of oscillation of a rod free at one end and fixed at the other when a wave Propagates in this rod.	

الفرقة: الثانية الشعبة: فيزياء برامج المادة:جبر خطى وهندسة	كلية العلـــوم - قسم الرياضيات	دور يناير ٢٠١١ الزمن: ساعتان التاريخ: ٦ /١/ ٢٠١١

أجب عن الأسئلة الآتية:

١-أ) إذا كانت $v_1, v_2, \ldots, v_r$ متجهات فى الفضاء الخطى V فأثبت أن الفئة W المكونة من جميع التركيبات الخطية للمتجهات $v_1, v_2, \ldots, v_r$ هى اصغر فضاء جزئى يحتوى $v_1, v_2, \ldots, v_r$.

ب) إذا كانت $S=\{v_1, v_2, v_3\}$ حيث $v_1=(2,-3,1)$, $v_2=(4,1,1)$, $v_3=(0,-7,1)$ حدد ما إذا كانت S أساس للفضاء R^3 ؟

٢- أ) عرف الفضاء ذو الضرب الداخلى . استخدم عملية جرام شمت لتحويل الأساس (u_1, u_2, u_3) إلى أساس عيارى متعامد $u_1=(1,0,0)$, $u_2=(3,7,-2)$, $u_3=(0,4,1)$

ب) عرف المتجه الذاتى والقيمة الذاتية. أوجد أساسات الفراغات الذاتية للمصفوفة

$$A=\begin{bmatrix} 4 & -3 & 0 \\ -3 & 4 & 0 \\ 0 & 0 & 6 \end{bmatrix}$$

٣-أ) إذا كانت $m_1=(1,-1,2)$, $m_2=(0,1,-1)$, $m_3=(3,-4,1)$ أوجد معادلة المستوى الذى يمر بالنقطة m_2 ويكون عمودياً على m_1m_3 .

ب) أوجد أطوال الأجزاء المقطوعة من المحاور بمستوى يمر بالنقطة $(1,-1,2)$ ويوازى المستوى $3x-4y+5z=0$

٤-أ) أوجد نقطة تقاطع المستقيم $\frac{x-2}{1}=\frac{y-4}{-2}=\frac{z+4}{2}$ مع المستوى $3x+4y+12z+15=0$

أوجد أيضاً الزاوية بين المستقيم والمستوى .

ب) أوجد المستوى المار بخط تقاطع المستويين

$$x+y+z=3 \quad , \quad x-2y+3z+4=0$$

ويكون عمودياً على المستوى الثانى .

Mansoura University **Faculty of Science** **Physics Department** **Subject: Physics**		**First Term** **Credit hours Students: Physics** **Date : January 2011** **Time allowed : 2 hours**
Course: Physics 212, Meteorology & Astronomy		**Full Mark : 80 Mark**

Answer the 1st question then any other two questions

[1] a- Derive the differential equation for the motion of a body in a field of a central force , when $r \neq r(\theta)$ [10] Marks

b- A body moves under the effect of central force in an orbit of radius is given by $r = r_o e^{2k\theta}$, determine:

i- The potential energy V(r), [10] Marks

ii- The force F(r). [5] Marks

c- Calculate the average distance between the sun and Jupiter planet, if it rotates around the sun one complete cycle in 4333 days.
[$G = 6.67 \times 10^{-11}$ N m^2 Kgm^{-2} , $M = 2.0086 \times 10^{30}$ Kgm] [5] Marks

[2] a- State Kepler's 2nd law. [3] Marks

b- Define the Eccentricity. [7] Marks

c- Prove that the planet increases its velocity when it come closer to the sun and slower its velocity when it is far away from the sun [10] Marks

d- The troposphere is unstable layer. Discuss this phrase. [5] Marks

[3] a- For El-Mansoura of latitude 31°N, on 21 of June, Calculate: [12] Marks

i-The declination angle. **ii-**The zenith angle, at 10:00 LAT.

iii-The time of sunrise **iv-**The day length.

b-The atmosphere consists of different layers. Discuss this phrase with illustrating the dependence of temperature on altitude. [6] Marks

c- Study the effect of the latitude angle ϕ and the declination angle δ on the sunrise hours at the following conditions:

i- At the equator, ii- At the poles, iii- At the equinoxes. [7] Marks

[4] a- For Mercury, Earth, and Jupiter, the semi major axis are (0.387, 1.00, 5.203) AU and the eccentricity are (0.206, 0.017, 0.048) respectively. Determine the semi major axis in Km, the periodic time in days, the Aphelion , the Perihelion and the nearest distance from Earth. Tabulate your results [15] Marks

b- Write short notes on main properties of Mars planet. [10] Marks

Good Luck

Examiners: 1- Prof. Dr. Magdy Tadros Yacoub* **2-** Prof. Dr. Mahmoud Abou Zeid

3- Dr. Hamed Ibrahem **4-** Dr. Aziza Atta

University of Mansoura Faculty of Science Physics Department Subject: Physics		First Term Sophomore Students Date :January 2011 Time allowed : 2 hours
Course (s): Phys 213		**Full Mark : 80 Mark**

Answer the Following Questions

1a) Give an idea about the charge distribution on the nucleon. (5 Marks)

b) $_{24}Cr^{51}$ decays by electron capture to $_{23}V^{51}$ with a half life of 27.7 days. Calculate the recoil energy and velocity of the V-nucleus, assuming that the rest mass of the neutrino is zero. (15 Marks)

2a) Draw the scintillation detector and write on its operation. (5 Marks)

b) $_1H^3$ decays by β^- emission to $_2H^3$ with a half-life of 12.3 years. Find the value of r_0 in the expression $R= r_0A^{1/3}$. Neglect the kinetic energy of both the neutrino and recoil nucleus. (15 Marks)

3a) Discuss the natural radioactive series and their common properties. (10 Marks)

b) Sketch the binding energy per nucleon versus the mass number and discuss the prominent features of the curve. (10 Marks)

4a) Discuss the characteristics of beta-ray spectra . (14 Marks)

b) Define the following:

i) The transient and secular equilibrium. (2 Marks)

ii) The internal conversion effect. (2 Marks)

iii) The Auger effect. (2 Marks)

المستوى الثاني - برنامج فيزياء - مادة ميكانيكا كلاسيكية (فصل ١)

Mansoura University		Second level: First Term
Faculty of Science		B.Sc. Degree: Physics
Physics Department		Date: / /2011
Subject: Physics		Time allowed: hours
Course(s): Phys.		Full Mark: 80 Mark

Answer The Following Questions: Each Question (20) Mark

1) a) Derive the velocity and the acceleration for a particle move in an orbital motion.
   b) Find the centroid of a semi-circular region of radius (a).

2) a) Derive the equation of motion of a particle relative to an observer on the earth surface.
   b) Define the following :-
   (i) The condition of equilibrium particle if the force field is conservative.
   (ii) Rigid and elastic bodies.
   (iii) Radius of gyration.
   (vi) Parallel axis theorem.
   (v) Holonomic and non-holonomic constraints.

3) a) Express in spherical coordinates $\vec{\nabla}\psi$ and $\vec{\nabla}^2\psi$.
   b) If $(\vec{F} = -\vec{\nabla}V)$ prove that, the work done in moving a particle from point $P_1(x_1, y_1, z_1)$ in the field to another point $P_2(x_2, y_2, z_2)$ is independent of the path joining the two points.

4) a) Prove that, the element of the volume in general coordinates given by $[dv = h_1 h_2 h_3 du_1 du_2 du_3]$.
   b) Find the moment of inertia of a solid circular cylinder of radius (a), height (h), and mass (m).
   (i) about axis of the cylinder.
   (ii) about an axis passing through its center and perpendicular to its own axis of symmetry.

١) أ.د / محمد توفيق عطية ٢) أ.د /عصام أبو الوفا
٣) أ.د / أبو بكر البديوي ٤) د/ عماد خضر شيوي

المستوى الثاني - فيزياء - تفاضل عالي (٢٠٥ ر)

برنامج : الفيزياء المستوى : الثاني المادة: تفاضل عالي كود المادة : ر 205	كلية العلوم – قسم الرياضيات	الفصل الدراسي الأول : دور يناير2011م التاريخ : 20 / 1 / 2011 الزمن: ساعتان الدرجة الكلية : 80 درجة

أجب عن ألأسئلة التالية:-

السؤال الأول: (30 درجة)

أ- أوجد مجال تعريف الدالة $z=\sqrt{1-x^2-y^2}$ (10 درجات)

ب- اكتب مفكوك تيلور للدالة $f(x,y)=e^x\cos y$ حول النقطة (0, 0) وذلك بأخذ n=2 .(10 درجات)

ج- إذا كانت $\int_0^{\pi}\frac{dx}{\alpha-\cos x}=\frac{\pi}{\sqrt{\alpha^2-1}}$ فأوجد قيمة التكامل $\int_0^{\pi}\frac{dx}{(2-\cos x)^2}$. (10 درجات)

السؤال الثاني: (30 درجة)

أ- أذكر وبرهن نظرية أويلر للدوال المتجانسة. وإذا كانت $Z=\tan^{-1}(\frac{x^3+y^3}{x-y})$

اثبت أن $xz_x+yz_y=\sin 2z$. (15 درجة)

ب- حقق نظرية جرين للتكامل $\oint_c(2xy-x^2)dx+(x+y^2)dy$ حيث c هو المنحنى المغلق المحدود بالمنحنيات $x=y^2$, $y=x^2$. (15 درجة)

السؤال الثالث: (20 درجة)

أ- أوجد النهايات العظمى والصغرى $f(x,y)=x^2+xy+y^2+6x-1$. (10 درجات)

ب- احسب قيمة التكامل $\int_0^1\int_x^{\sqrt{x}}\frac{\sin y}{y}dydx$. (10 درجات)

مع أطيب التمنيات بالنجاح والتوفيق

د/ محمد الدسوقى

Mansoura University Faculty of Science Dept. of Physics	المستوى الثانى -فيزياء	First Semester Exam. January 2011 Time : 2 hrs Thermodynamics Full Mark 80 mark

Answer The Following Questions:

1a) show that the entropy of a perfect gas remains constant in a reversible process but

increases in an irreversible process

b) prove that $\frac{dL}{dT} - \frac{L}{T} = C_2 - C_1$ (25 mark)

C) Calculate the specific heat of saturated steam given that the specific heat of water at boiling point equal 1.01 and latent heat of vaporization decreases with rise temp at the rate of 0.65 cal/k. latent heat of vaporization of steam= 54 cal/gm

2- One gram mol of an ideal gas $C_V = \frac{3}{2}R$ and $\gamma = \frac{5}{3}$ at temp 27 C undergo a cycle consisting of the following processes.

Process12 : the gas heated at a constant volume to a temp. 327C

Process33 : the gas expands adiabatically until its temperature becomes 182 C

Process 31 : the gas compressed at a constant pressure back to its initial condition. (30 mark)

Drow the cycle on P-V curve and find:

1) the efficiency of the cycle
2) 2) the change in quantity of heat and enthalpy during process 23
3) the change in entropy per gram mole for each of the three processes (R= 8.3 J/ gm mole K)

3- a – State Carnot principles.

b- Using Maxwell's equation, deduce the first and second Tds equations and prove that:

$$C_p - C_v = -T\left(\frac{\partial v}{\partial T}\right)^2_p \left(\frac{\partial p}{\partial v}\right)_T$$

show that Cp-Cv is always positive. (25 mark)

Mansoura University Faculty of Science Physics Department Course Title: Elasticity Date: 27-1-2011		May. 2010 Exam Type: Final Second Level : (Physics & Bio) Time: 2 Hours Full Mark: 80 Mark

Answer the following questions:

1- a- Discuss the factors affecting on the fatigue life. [10 Mark]

b- Write on the following:-

1) Elastic moduli- Fracture – Stages of creep [15 Mark]

2) Stress- Strain curve [5 Mark]

2- a- Compared between elastic behavior and viscoelastic behavior? [10 Mark]

b- Write on the following:-

1) Stress- Fatige [10 Mark]

2) Elasticity- Strain [5 Mark]

3- a- Explain what is the meant by creep and Mention the types of creep?. [10 Mark]

b- Write on the following:-

Toughness- Resilience- Dynamic modulus- Effects of temperature on Viscoelastic behaviour- Deformation [15 Mark]

Examiners

أ.د. أبوبكر البديوى د. نبيل قناوى د. أنور مجاهد د.عماد خضر الشيوى