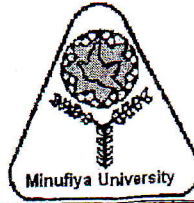


Menoufiya University
Faculty of Engineering
Shebin El-Kom
2nd Semester Examination
Academic Year: 2014-2015



Department: Basic Science Eng.
Year: Design & Production Eng.
Subject : Physics
Time Allowed: 3 hours
Date: 7 / 6 / 2015

Answer All the Following Questions [90Marks]

- Q1 a).** Prove that the total energy of a body moves damping simple harmonic motion is not conserved and compare with the total energy of free SHM. [18 Marks]
- b)** A mass has 2kg attached to a spring of force constant 0.3 N/cm oscillates on a horizontal frictionless track. The spring is compressed 3cm, at time $t=0$, the mass is released from rest at $x= -3\text{cm}$. Determine:(i) Period of SHM, (ii) the maximum velocity and maximum acceleration, (iii) Express the displacement, velocity and acceleration as a function of time.
- Q2 a)** Prove that the energy transmitted along stretched string is directly proportional to the square of its frequency. [18 Marks]
- b)** A wire has length 50 cm emits fundamental note of frequency 300Hz, when under a certain initial tension. If the tension is increased by 10N, the frequency increases to 350Hz. Determine the initial tension and the mass of the wire.
- Q3 a)** Prove that the intensity of periodic sound waves is directly proportional to the square of its amplitude. [18 Marks]
- b)** An ambulance travels down a highway at a speed of 40 m/sec. Its siren emits sound at frequency of 460Hz. What is the frequency heard by a passenger in a car traveling at 35m/sec in the opposite direction as the car approaches the ambulance and as the car moves away from the ambulance?. ($v_{\text{sound}} = 340\text{m/sec}$).
- Q4 a)** Prove that the total energy of electron in an atom is inversely proportional to the square quantum number. [18 Marks]
- b)** (i) Compute the longest two lines and series limit of the Balmer series.
(ii) What is the percentage difference between the wavelength of the tenth line in the Paschen series and series limit, ($R = 1.097 \times 10^5 \text{ cm}^{-1}$).
- Q5 a)** Prove that the maximum intensity in interference light waves is directly proportional to the square of its amplitude. [18 Marks]
- b)** Newton's rings are observed in reflected light $\lambda = 580\text{nm}$. The diameter of the 8th dark ring is 3mm. Find the radius of curvature of the lens and the thickness of the air film.

مع أطيب الأمنيات بالتوفيق والنجاح

أ.د / السيد محمد فرج عبدالرحيم