كلية العلوم- قسم الفيزياء

جامعة أسيوط

Summer Course In "Physics of Vibrations & Waves" (212 P)

Sep , 2019

Time: 3 hours

Answer only five questions:

1. a) Prove that the frequency of vibrating single mass tied at the middle of string depends on the tensile strength.

   b) Let the displacement of the wave obtained as : $y = A\cos(\omega t - kx)$, prove that the refractive index of an absorbed medium can represented by a complex quantity,

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2. a) Discuss the classification of the damped oscillations, find the kinetic energy of the light damped oscillation.

   b) Prove that the distinctive impedance of a tense string depends on its tensile strength in the form; $Z = T / C$

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3. a). Find the phase difference in the LRC- circuit of the electrical forced damped oscillations.

   b) Apply the eqn. of mechanical oscillation: $m\frac{d^2x}{dt^2} + kx = 0$ to find the validity of the low energy conservation.

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4. a) Illustrate with the eqns. the loss energy of the damped oscillations, express the resulting eqn. in terms of the quality factor.

   b) Find the parameter on which the gained potential energy of an element of a tense string depends.

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5. a) Use the eqn. of the electrical forced damped oscillation: $\frac{d^2q}{dt^2} + \frac{R}{L}\frac{dq}{dt} + \frac{1}{LC}q = E_0\, exp(i\omega t)$ to find the amplitude and current flowing through the LRC-circuit.

   b) Apply the eqn. of the propagation wave in one dimension: $y = A\cos(\omega t - kx)$ to express the wave displacement as a function of the phase constant (k) and frequency (ω).

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6. a) Compare between the mechanical and electrical parameters of the forced damped oscillations.

   b) consider a periodic force; $F_0\, exp(i\omega t)$ acts at a certain contact position ($x = 0$) of a tense string, express the incident, reflected, and transmitted wave eqns. Determine the transmitted and reflected factors and find the condition of totally reflections.

انتهت الأسئلة

تمنياتي بالتوفيق والتفوق..... .ا.د.عبد المنعم سلطان .....

Level: II المستوي :الثاني	الفصل الدراسي الصيفي	Assiut University
التاريخ: 3/9/ 2019	العام 2018-2019	Faculty of Science
الزمن: ساعتان "2 hours"	"Modern physics" P 225	Physics Dept.

Question № 1 (20 degrees)

Choose the correct answer:

1. Physics is the science which study the properties of ... *(A) materials (B) sound (C) all of the above*
2. Nature is .....: *(A) material (B) energy (C) all of the above*
3. Electrodynamics, thermodynamics & electromagnetism are *(A) modern phys. (B) classical phys*
4. Physics can ..... time & space *(A) measure (B) define*
5. Relativity deals with ..... : *(A) atoms & nucleus (B) stars & planets (C) all of the above*
6. In Galileo's transformations one observer will measure a time ..... the other observer time *(A) larger than (B) smaller than (C) equal to*
7. Laws of adding and subtracting ..... to sound waves. *(A) does not apply (B) sometimes apply (C) Always apply*
8. The final result of the Michelson-Morley experiment demonstrated that the speed of light in vacuum or air is: *(A) constant (B) variable (C) dependent on observational movement*
9. Reference frame is a set of coordinates that is used to determine.: *(A) position (B) time (C) velocity (D) all the above*
10. Galileo's transformations are valid only for ... velocities: *(A) low (B) high*
11. Electron Volt unit is a unit of: *(A) potential difference (B) Charge (C) Energy*
12. Time is reduced if the speed is approaching the speed of light and this applies to a ..... observer *(A) static (B) moving at high speed (C) moving at regular acceleration*
13. For low speeds, the value of m/m_0 is *(A) >1 (B) <1 (C) =1*
14. From your point of view, ... has the priority *(A) matter (B) Energy (C) none of them*
15. Thermal radiation is an electromagnetic radiation that its ..... *(A) Energy (B) intensity (C) wavelength* ... is dependent on temperature
16. One of the hypotheses of classical physics is that any charged object emits ...radiation: *(A) Electric (B) Magnetic (C) Electromagnetic*
17. Planck succeeded at finding a relationship to interpret the black body spectrum assuming that energy values are ... *A) continuous (B) separate (C) relative*
18. Any absorbed energy can be released as: *(A) absorption (B) emission (C) light*
19. Interaction between radiation and matter is done by *(A) particles (B) waves (C) photons*
20. Light intensity *(A) contribute (B) does not contribute* to electron removal from its orbit

Question № 2 (10 degrees)

Choose and discuss the correct answer:

1. Radiation emitted from sources can be considered as: *(A) energy (B) waves (C) particles (D) all of the above*
2. The type of Interaction depends on the... *(A) energy (B) intensity* of the incident light
3. Photons are fully absorbed and electrons are emitted: *(A) Photoelectric effect (B) Compton effect (C) Pair production*
4. As the photon approaches the nucleus field it disappears, and elementary particles appear. *(A) Photoelectric effect (B) Compton effect (C) Pair production*
5. The rotation of the electron around the nucleus *(A) lead to (B) does not lead to* energy radiation

Question № 3 (10 degrees)

Explain shortly the physical meaning of the following equations:

(1) $E = mC^2$ (2) $E = h\nu$

(3) $h\nu = h\nu_0 + k.E$ (4) $\gamma \Leftrightarrow e^- + e^+$

Question №4 (10 degrees)

Comment shortly on the following images :

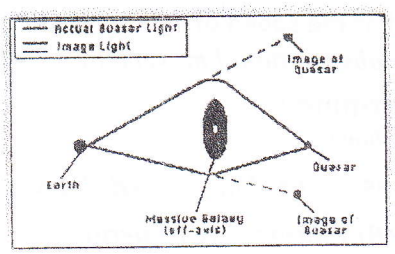

Image (1)

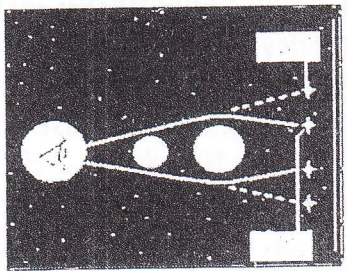

Image (2)

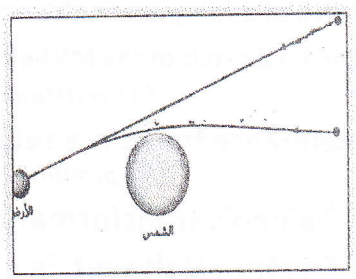

Image (3)

انتهت الأسئلة مع التمنيات بالتوفيق Best Wishes

أ.د. حسام وحيد