1B2A24098 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Physics Degree Examination, April 2024

BPH2B02 – Mechanics - II

(2022 Admission onwards)

Time: 2 hours Max. Marks : 60

(The symbols and notations used in this question papers have their usual meanings)

Section A- Short Answer Type

(Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks)

1. A fast moving truck when suddenly brakes, the load in it tend to move forward. What kind of force acts upon the load? Explain.
2. What is the physical significance of time average energy of an SHM? Give its expression.
3. Give any two properties of bodies moving under the influence of a central force.
4. Give the differential equation of a one-dimensional wave propagating along a rope. Explain each term in it.
5. Explain the properties of nodes and antinodes on a standing wave. Give one physical example.
6. What is the physical origin of Coriolis force? Show relevant mathematical expression. Give any one example.
7. A person stands on the weighing machine placed in a downward accelerating lift. What effect can you note on his apparent weight?
8. What is a energy diagram? What information can you draw from an energy diagram?
9. What is an under damped oscillator? Give its time dependent graphical representation of its oscillation.
10. A glass bottle when exposed to the vibration of certain tuning fork, it explodes suddenly. What is the physics of this phenomenon?
11. Planets, during its course of motion around the sun, its speed varies at different points. Why is this so? Give its relevant laws.
12. Give any two differences between elastic waves and electromagnetic waves.

(Ceiling-20 Marks)

Section B - Paragraph/ Problem Type
(Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks)

13. A function is given by: a) $y(x,t)=(x-vt)^2$, where v is a constant. Verify that whether it represent a real wave function or not.
14. A body of mass m falls down from a height h at the latitude ϕ in the Northern hemisphere. If ω is the angular velocity of rotation of earth, compute the horizontal displacement of the body at the latitude.
15. A body having mass of 4 kg executes SHM. 24N force acts on the body when it got displaced to 8cm from its mean position. Find the period. If the maximum velocity is 500cm/sec, compute the amplitude of oscillation.
16. A mechanical wave on a string represented by $y(x,t)=0.50\sin(2t-3x)\,cm$ is reflected back from a rigid surface and superpose with the original wave. Find the amplitude of the resulting standing wave at a distance 2.0cm from the starting point.
17. With necessary theory prove that "if a moving airplane is inertial, then all airplanes which are in uniform relative motion w.r.t to the first plane are also inertial".
18. A body of mass m is moving in a central force field; prove that its areal velocity is constant.
19. Prepare a brief note on Foucault Pendulum and derive the expression for its time period.

(Ceiling- 30 Marks)

Section C- Essay Type
(Answer any one question. Answer carries 10 marks)

20. With regard to the central force motion of planets, explain the terms 'stability' and 'closure' properties of orbits and obtain the requisite mathematical conditions.
21. What do you mean by quality factor? Obtain the expression for the quality factor of a damped oscillator? Among the vibrating diatomic molecule and a vibrating violin string, which one will have higher quality factor? Why?

(1 x 10 = 10 Marks)

47

1B2A24097 (Pages : 2) Reg. No:.....

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Degree Examination, April 2024

BPH2C02 – Optics, Laser & Electronics

(2022 Admission onwards)

Time: 2 hours Max. Marks : 60

Section A

Short Answer Type

(Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks, Overall Ceiling 20)

1. Can we observe interference fringes with thick film? Why?
2. Distinguish between optical path and geometrical path.
3. Differentiate between interference and diffraction of light.
4. What is the difference between circularly polarized light and elliptically polarized light?
5. Explain any one application of optical activity of plane polarized light.
6. The transverse wave nature of light is exhibited by polarization. Explain
7. Distinguish between polarizer and analyzer.
8. How a Zener diode differ from ordinary diode?
9. Why current amplification factor is less than one in Common Base configuration?
10. What is a tank circuit?
11. Write Boolean expression and truth table for an Exclusive OR gate.
12. What is optical pumping?

(Ceiling-20)

Section B
Paragraph/ Problem Type

(Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks)

13. Explain how coherent sources are produced in Fresnel's two mirror.
14. Explain the formation of Newton's rings.
15. Explain resolving power and dispersive power of a plane transmission grating.
16. Calculate the thickness of a plate which would convert plane polarized into circularly polarized light. Given $\lambda = 5890A^0$, $\mu_o = 1.658$, $\mu_e = 1.486$.
17. A 50 V Zener diode is used to obtain a regulated output voltage across a load 10 kΩ. The series resistor is 5 kΩ. If the input changes from 80 to 120 V, find the maximum Zener current.
18. In Fraunhoffer diffraction pattern due to a narrow slit a screen is placed 2m away from the lens to obtain the pattern. If slit width is 0.2mm and the first minima lie 5mm on either sides of the central maximum , find the wavelength of light.
19. Explain the working of a He-Ne laser.

(Ceiling- 30)

Section C- Essay Type

(Answer any one question. Answer carries 10 marks)

20. What is a grating ?. Derive grating equation. Also explain formation of secondary maxima and minima.
21. Explain amplifying action of a transistor? Draw and explain input and output characteristics of a transistor amplifier in common emitter configuration.

(1x10= 10 Marks)