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Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2019

BPH1C01 - Properties of Matter & Thermodynamics

(2019 Admission onwards)

Time: 2 hours   Max. Marks : 60

The symbols used in this question paper 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. What is elastic hysterisis?

2. Explain the term flexural rigidity.

3. Springs are usually made of steel and not of copper. Why?

4. Distinguish between uniform bending and non-uniform bending.

5. Write down the relations connecting various elastic constants.

6. Explain why liquids possess surface tension.

7. What is Brownian motion?

8. Distinguish between streamline flow and turbulent flow of liquids.

9. What is a reservoir in thermodynamics?

10. Show that adiabatic is steeper than isothermal.

11. What is a Carnot's refrigerator?

12. Explain the principle of degradation of energy.

(Ceiling – 20)

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

13. Define Poisson's ratio. Derive its theoretical limiting values.

14. What happens to a soap bubble when it is electrically charged? Explain

15. What do you mean by entropy? Show that entropy remains constant in reversible proce
but increases in irreversible processes.

16. Show that Kelvin-Planck statement of second law of thermodynamics is equivalent
Clausius statement.

17. Determine the elastic energy stored up in a wire , originally 5m long and 1mm
diameter which has been stretched 0.3mm due to a load of 10Kg.

18. Calculate the change in temperature of boiling water when the pressure is increased
27.12 mm of Hg. The normal boiling point of water at atmospheric pressure is 100^0
Given latent heat of steam = 2.268×10^6 J/K; Specific volume of steam = 1.674 m^3/Kg a
specific volume of water at 100^0C = 1×10^{-3} m^3/Kg.

19. A heat engine working between two temperatures can convert 12.5% of heat to use
work. When the temperature of the sink is reduced by 95^0C, the efficiency is doubl
Find the temperature of source and sink.

(Ceiling– 3

Section C- Essay type
(Answer any one question, each question carries 10 marks)

20. Derive an expression for the rate of flow of liquid through a capillary tube.

21. Explain the concept of reversible and irreversible process. Show that the efficiency
reversible engine is maximum.

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

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Physics Degree Examination, November 2019

BPH1B01 – Methodology of Sciences and Basic Mechanics

(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

The symbols 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. Give the definition of science.

2. What is meant by casuality ?

3. Explain the principle of Ockham's Razor.

4. What are the limitations of Newton's laws?

5. Obtain the equation of motion of a Bola.

6. Obtain an expression for the centre of mass of a system of particles.

7. Explain work- energy theorem.

8. What is meant by escape velocity? What is its value on earth?

9. Define torque. What is its unit?

10. Indicate how a dancer and a driver make use of the principle of conservation of angular momentum.

11. Define Poisson's ratio. What are the limiting values of it?

12. What are I-section girders? What are their advantages?

(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. What do you mean by a paradigm shift? Illustrate with an example.

14. Obtain an expression for the variation of acceleration due to gravity with altitude.

15. Two particles of masses M and 3M undergo uniform circular motion about each other at a separation R under the influence of an attractive force F. The angular velocity is ω radians per second. Show that $R = \dfrac{4F}{3M\omega^2}$

16. What is potential energy? Calculate the potential energy of a uniform force field and a central force field.

17. Derive an expression for the angular momentum and torque acting on a conical pendulum.

18. A uniform drum of radius b and mass M rolls without slipping down a plane inclined at an angle θ. Find its acceleration along the plane. The moment of inertia of the drum about its axis is $I_o = Mb^2/2$.

19. Obtain an expression for the twisting couple of a solid cylinder.

(Ceiling- 30)

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

20. (a) What are contact forces? Explain friction and tension on the basis of atomic forces

    (b) Obtain the equation of motion for a body of mass m moving through a viscous medium. Solve the equation to find the velocity of the object at any time t, if the initial velocity is v_o.

21. Discuss the small oscillations in a bound system. Obtain the vibrational frequency of a diatomic molecule.

(1x10= 10)