

3B1N20085

(Pages : 3)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester B.Sc Physics Degree Examination, November 2020
BPH1B01 – Mechanics – I
(2020 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)

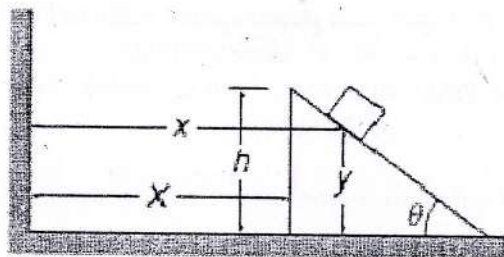
1. What is an isolated body? Define an inertial coordinate system.
2. Explain Inertial and Non-inertial Systems.
3. What are fictitious forces? Give an example.
4. Explain contact forces with examples. What is its origin?
5. State and explain law of conservation of linear momentum.
6. State and explain work energy theorem.
7. What are conservative forces? Give examples.
8. What is the relation between force and potential energy?
9. Define torque. What is its unit?
10. Obtain expression for moment of inertia of a uniform thin stick of mass M and length L , around a perpendicular axis through its midpoint.
11. State and explain the parallel axis theorem.
12. Give an example of the law of conservation of angular momentum.

(Ceiling-20)

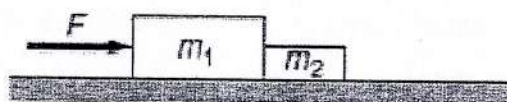
Section B- Paragraph/ Problem Type

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

13. A block slides on a wedge (a planar surface) which in turns slides on a horizontal table, as shown in the sketch. The angle of the wedge is θ and its height is h . How are the accelerations of the block and the wedge related? Neglect friction.



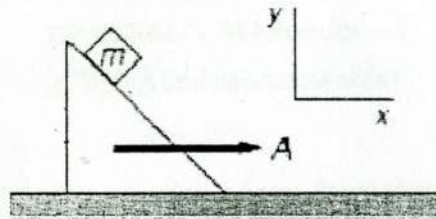
- 14 a) A mass m on the end of a string of length R whirls in free space in a horizontal plane, with constant speed v . Find the force on m .
 b) If you whirl a pebble at the end of a string, you feel an outward force. Discuss.
- 15 Two blocks m_1 and m_2 are in contact on a horizontal table. A horizontal force is applied to one of the blocks, as shown in the drawing. If $m_1 = 2$ kg, $m_2 = 1$ kg, and $F = 3$ N, find the force of contact between the two blocks.



- 16 The Atwood's machine shown in the drawing has a pulley of negligible mass. Find the tension in the rope and the acceleration of M .



- 17 A 45° wedge is pushed along a table with constant acceleration A . A block of mass m slides without friction on the wedge. Find the block's acceleration. Gravity is directed down.



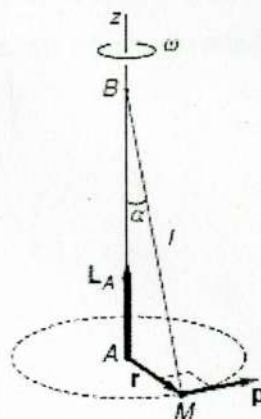
- 18 What are conservative forces? State work energy theorem and arrive at law of conservation of mechanical energy.
- 19 Discuss small oscillations in a bound system

(Ceiling- 30)

Section C- Essay Type

Answer any one question. Answer carries 10 marks

- 20 A block of mass M_1 rests on a block of mass M_2 which lies on a frictionless table. The coefficient of friction between the blocks is μ . What is the maximum horizontal force which can be applied to the blocks for them to accelerate without slipping on one another if the force is applied to (a) block 1 and (b) block 2?
- 21 Derive expression for angular momentum and torque about origin A and B for a conical pendulum which is in steady circular motion with constant angular speed ω .



(1x10= 10 marks)

2B1N20086

(Pages : 2)

Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2020

BPH1C01 - Properties of Matter & Thermodynamics

(2020 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. Define bending moment.
2. Explain neutral surface and neutral axis of a beam.
3. Define torsional rigidity of a wire.
4. What is the reason for I- cross section for girders.
5. Small insects can walk on water surface. Why?
6. Show that surface tension is numerically equal to surface energy.
7. Distinguish between streamline flow and turbulent flow of liquids.
8. What are the limitations of first law of thermodynamics.
9. $C_p > C_v$. Explain.
10. Distinguish between reversible and irreversible process.
11. How is entropy related to disorder.
12. What is a Carnot's refrigerator.

(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. Show that the potential energy stored per unit volume of a strained wire is $\frac{1}{2} \times \text{stress} \times \text{strain}$.
14. Discuss the effects of pressure on melting point and boiling point of liquids.
15. State and explain Carnot's theorem.
16. Show that Kelvin-Planck statement of second law of thermodynamics is equivalent to Clausius statement.
17. There is no change in the volume of a wire during stretching. What is the value of Poisson's ratio for the wire.
18. A cantilever of length 0.4 m is loaded at the free end. If the depression at a distance 10 cm from free end is 1 cm, find the depression at the free end.
19. Calculate the change in entropy when 0.1 kg of water at 15°C is mixed with 0.15 Kg of water at 50°C . Specific heat of water = $4.2 \times 10^3 \text{ J Kg}^{-1} \text{ K}^{-1}$.

(Ceiling – 30)

Section C- Essay type

(Answer any one question, each question carries 10 marks)

20. What is bending moment? Derive an expression for the bending moment of a horizontal beam fixed at one end and loaded at the other end.
21. Explain the working of a Carnot's heat engine. Deduce its efficiency.

(1 x 10 = 10)