MODEL QUESTION PAPER-I FOR 2020-21

(according to reduced syllabus)

Time: 3 Hours 15 min. I PUC PHYSICS (33) Max.Marks:70

General Instructions:

(i) *All parts are compulsory.*
(ii) *Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.*
(iii) Direct answers to Numerical problems without detailed solutions will not carry any marks.

PART-A

I. Answer ALL the following questions. **10 × 1 = 10**

1. Name any one fundamental force in nature.
2. What is limiting friction?
3. How many watts are in 1 HP?
4. Where does the centre of mass of uniform triangular lamina lie?
5. State Hooke's law.
6. Name the SI unit of surface tension.
7. Define absolute zero temperature.
8. Mention the significance of zeroth law of thermodynamics.
9. How does an average kinetic energy of a gas molecule depend on the absolute temperature?
10. What are beats?

PART-B

II. Answer any FIVE of the following questions. **5 × 2 = 10**

11. Mention any two sources of systematic errors.
12. Distinguish between path length and displacement.
13. Define relative velocity. Write the expression for relative velocity between two objects moving in same direction.
14. State and explain the law of parallelogram of vector addition.
15. Mention any two advantages of friction.
16. Mention the general conditions for equilibrium of a rigid body.
17. Distinguish between streamline and turbulent flow of liquid.
18. Define degrees of freedom of a gas molecule. How many degrees of freedom does a monoatomic gas have?

PART-C

III. Answer any FIVE of the following questions. **5 × 3 = 15**

19. Obtain the expression for the period of oscillation of a pendulum assuming that it may depends on mass of the bob, length of the pendulum and acceleration due to gravity at the place using dimensional analysis.
20. Derive the equation $x = v_o t + \frac{1}{2} a t^2$ using *v*-*t* graph.
21. Derive the expression for the magnitude of the resultant of two concurrent vectors.
22. Prove the law of conservation of linear momentum.
23. State and prove work-energy theorem for a constant force.
24. Draw stress-strain graph for metal. Mention yield point and fracture point.
25. State and explain Bernoulli's theorem. Mention any one application of Bernoulli's theorem.
26. Mention any three assumptions of kinetic theory of gases.

PART-D

IV. Answer any TWO of the following questions. **2 × 5 = 10**

27. Show that the trajectory of a projectile is a parabola.
28. State the principle of conservation of mechanical energy and illustrate in case of freely falling body.
29. Define torque and obtain the relation between torque and angular momentum.

V. Answer any TWO of the following questions. **2 × 5 = 10**

30. Explain Carnot's cycle for heat engine with *P*-*V* diagram.
31. Derive the expression for total energy of a particle executing simple harmonic motion.
32. (a) What are mechanical waves? Give example.
    (b) Distinguish between longitudinal and transverse waves.

VI. Answer any THREE of the following questions. **3 × 5=15**

33. A stone is tied to one end of a string and whirled in a horizontal circle of radius 1 m at 20 revolutions per minute. Calculate the angular velocity and linear speed of the stone. Also find the centripetal acceleration.
34. A force of 10 N acts for 20 second on a body of mass 2 kg initially at rest. Calculate the energy required by the body and the work done by the applied force.
35. If the earth has a mass 9 times and radius twice of the planet mars, calculate the minimum speed required by a rocket to pull out of the gravitational force of Mars. Escape speed for an object on the surface of the earth is 11.2 kms^{-1}.
36. Calculate the change in volume of an iron block 10 cm × 20 cm × 5 cm if its temperature is raised from 10 °C to 40 °C. Given, coefficient of linear expansion of iron =1.2 × 10^{-5} $°C^{-1}$.
37. A body of 0.25 kg executes SHM given by $y = 0.4 \sin 0.5\pi t$ m. Calculate the amplitude, angular frequency, maximum velocity and maximum acceleration.

MODEL QUESTION PAPER-II FOR 2020-21

(according to reduced syllabus)

Time: 3 Hours 15 min. I PUC PHYSICS (33) Max.Marks:70

General Instructions:

(i) All parts are compulsory.

(ii) Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.

(iii) Direct answers to Numerical problems without detailed solutions will not carry any marks.

PART-A

VII. Answer ALL the following questions. 10 × 1 = 10

1. Name the weakest force in nature.
2. Which law is used to explain rocket propulsion?
3. What is elastic collision?
4. Give an example for a body whose centre of mass lies outside the body.
5. Name the SI unit of modulus of elasticity.
6. State Pascal's law of transmission of fluid pressure.
7. What is the efficiency of Carnot engine when the temperature of source and sink are equal?
8. Define mean free path of a gas molecule.
9. What is the distance between a node and adjacent antinode?
10. Convert 30 °C into Fahrenheit.

PART-B

I. Answer any FIVE of the following questions. 5 × 2 = 10

11. Write the number of significant figures of the following: (i) 0.010 and (ii)14.00
12. A ball is thrown vertically upwards. What is the direction of acceleration during upward motion? What is the velocity at the highest point of its motion?
13. Distinguish between scalars and vectors.
14. Mention any two factors on which the moment of inertia of a body depends.
15. Define radius of gyration of a body and write the expression for it.
16. Mention any two methods of reducing friction.
17. State and explain first law of thermodynamics.
18. Draw the displacement-time graph for simple harmonic motion.

PART-C

II. Answer any FIVE of the following questions. **5 × 3 = 15**

19. Check the correctness of the equation $F = mv^2/r$ using dimensional analysis, where the symbols have their usual meaning.
20. Distinguish between scalar product and vector product of two vectors.
21. Derive an expression for maximum speed of circular motion of a car on a level road.
22. What are conservative and non-conservative forces. Give example.
23. Obtain the relation between linear velocity and angular velocity of a rotating body.
24. Deduce an expression for Young's modulus of a wire in terms of its radius.
25. Derive an expression for work done by the gas in an isothermal process.
26. Mention any three characteristics of SHM.

PART-D

III. Answer any TWO of the following questions. **2 × 5 = 10**

27. What is velocity-time graph? Derive $v^2 = v_o^2 + 2ax$ using *v*-*t* graph.
28. Obtain the expression for centripetal acceleration of a particle executing uniform circular motion.
29. Derive an expression for the potential energy of an elastic stretched spring.

IV. Answer any TWO of the following questions. **2 × 5 = 10**

30. Define fluid pressure. Derive an expression for pressure at a point inside a liquid.
31. State an explain the law of equipartition of energy of a gas. Show that specific heat of solids $C = 3R$.
32. State Newton's formula for speed of sound in a gas. Discuss the Laplace correction.

V. Answer any THREE of the following questions. **3 × 5 = 15**

33. A body is projected with an initial velocity of 20 ms^{-1} at an angle of 30° with the horizontal. Calculate (a) maximum height, (b) time taken to reach the maximum height and (c) horizontal range.
34. An elevator which can carry a maximum load of 1800 kg (elevator + passengers) is moving up with a constant speed of 2 ms^{-1}. The frictional force opposing the motion is 4000 N. Determine the minimum power delivered by the motor to the elevator in watt and in horsepower.
35. Assuming the earth to be a sphere of uniform mass density, how much would a body weigh half way down to the centre of the earth if it weighed 250 N on the surface?

36. When 0.15 kg of ice at 0 °C is mixed with 0.3 kg of water at 50 °C in a container. The resulting temperature is 6.7 °C. calculate the latent heat of fusion of ice. Given: $S_{w} = 4186$ J kg $^{-1}$K $^{-1}$

37. A spring with a spring constant 1200 Nm^{-1} is mounted on a horizontal table and one end is fixed. A mass of 3 kg is attached to the free end of the spring. The mass is then pulled sideways to a distance of 2 cm and released. Calculate (a) the frequency of oscillation of the mass, (b) the maximum acceleration of the mass and (c) the maximum speed of the mass.

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