

No. of Printed Pages: 4

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11**SECOND REVISION EXAMINATION – FEBRUARY 2023****PART – III
PHYSICS**

Time Allowed : 3.00 Hours]

[Maximum Marks : 70

- Instructions :**
- (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
 - (2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART – I

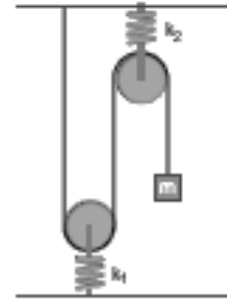
- Note :**
- (i) Answer **all** the questions. **15x1=15**
 - (ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. Which of the following is not a scalar?
 (a) viscosity (b) surface tension (c) pressure (d) stress
2. If a stone of mass 0.5 kg tied to a string executes uniform circular motion with a speed of 2ms^{-1} of radius 2 m, what is the magnitude of tensional force acting on the stone?
 (a) 0.333N (b) 0.666N (c) 1 N (d) 0.5 N
3. Which of the following differential equations represents a damped harmonic oscillator?
 (a) $\frac{d^2y}{dt^2} + y = 0$ (b) $\frac{d^2y}{dt^2} + \gamma \frac{dy}{dt} + y = 0$ (c) $\frac{d^2y}{dt^2} + k^2y = 0$ (d) $\frac{dy}{dt} + y = 0$
4. If the masses of the Earth and Sun suddenly double, the gravitational force between them will
 (a) remain the same (b) increase 2 times
 (c) increase 4 times (d) decrease 2 times
5. A couple produces,
 (a) pure rotation (b) pure translation
 (c) rotation and translation (d) no motion
6. A 100-watt bulb consumes 100 joule of electrical energy in
 (a) 1 hour (b) 1 second (c) 1 minute (d) 1 day

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7. The time period for small vertical oscillations of block of mass m when the masses of the pulleys are negligible and spring constant k_1 and k_2 is
- (a) $T = 4\pi\sqrt{m\left(\frac{1}{k_1} + \frac{1}{k_2}\right)}$ (b) $T = 2\pi\sqrt{m\left(\frac{1}{k_1} + \frac{1}{k_2}\right)}$
 (c) $T = 4\pi\sqrt{m(k_1 + k_2)}$ (d) $T = 2\pi\sqrt{m(k_1 + k_2)}$
8. Which of the following pairs of physical quantities have same dimension?
- (a) force and power (b) torque and energy
 (c) torque and power (d) force and torque
9. The resonance air column apparatus is one of the simplest techniques to measure the in air at room temperature.
- (a) speed of sound (b) speed of waves
 (c) Speed of resonance (d) Speed of air
10. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?
- (a) $\sqrt{2gR}$ (b) $\sqrt{3gR}$ (c) $\sqrt{5gR}$ (d) \sqrt{gR}
11. Which of the following represents a wave?
- (a) $(x - vt)^3$ (b) $x(x + vt)$ (c) $\frac{1}{(x + vt)}$ (d) $\sin(x + vt)$
12. When water is heated from 0°C to 10°C , its volume
- (a) decreases (b) increases
 (c) first increase and then decrease (d) first decreases and then increases
13. If an object is dropped from the top of a building and it reaches the ground at $t = 4$ s then the height of the building is (ignoring air resistance) ($g = 9.8 \text{ ms}^{-2}$)
- (a) 77.3 m (b) 78.4 m (c) 80.5 m (d) 79.2 m
14. A distant star emits radiation with maximum intensity at 300 nm. The temperature of the star is
- (a) 8280 K (b) 5000K (c) 7260 K (d) 9660 K
15. Force acting on the particle moving with constant speed is
- (a) always zero (b) need not be zero
 (c) always non zero (d) cannot be concluded



PART – II

Note : Answer any six questions. Question No. 24 is compulsory.

6x2=12

16. What are Gross errors? How is it minimized?
17. Give some examples for projectile motion.
18. Define impulse.
19. Give any two examples of torque in day-to-day life.
20. Why is there no lunar eclipse and solar eclipse every month?
21. Define Poisson's ratio.
22. State Stefan-Boltzmann law.
23. What are the factors which affect Brownian motion?
24. The average range of frequencies at which human beings can hear sound waves varies from 20 Hz to 20 kHz. Calculate the wavelength of the sound wave in these limits. (Assume the speed of sound to be 340 ms⁻¹.)

PART – III

Note : Answer any six questions. Question No. 33 is compulsory.

6x3=18

25. What are the limitations of dimensional analysis?
26. Compare elastic and inelastic collisions.
27. Deduce the relation between momentum and kinetic energy.
28. Explain in detail the idea of weightlessness using lift as an example.
29. What are the applications of surface tension?
30. Draw the PV diagram for Isothermal process.
31. Discuss the law of transverse vibrations in stretched strings.
32. Explain the principle of moments.
33. The velocity of three particles A, B, C are given below. Which particle travels at the greatest speed?

$$\vec{v}_A = 3\vec{i} - 5\vec{j} + 2\vec{k} ; \vec{v}_B = \vec{i} + 2\vec{j} + 3\vec{k} ; \vec{v}_C = 5\vec{i} + 3\vec{j} + 4\vec{k}$$

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PART – IV

Note : Answer all the questions.

5x5=25

34. Write the rules for determining significant figures.

(OR)

Derive Mayer's relation for an ideal gas.

35. Describe the method of measuring Angle of Repose.

(OR)

Derive an expression for escape speed.

36. State and explain work energy principle. Mention any three examples for it.

(OR)

Derive the expression for mean free path of the gas.

37. Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow.

(OR)

Explain in detail the triangle law of addition.

38. Discuss rolling on inclined plane and arrive at the expression for the acceleration.

(OR)

Explain how overtones are produced in an open organ pipe.

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