



Date: 14/02/22
GRADE: XI

ANNUAL EXAMINATION (2021-22)
PHYSICS [042]

Max marks: 35
Time: 2 hours

General Instructions:

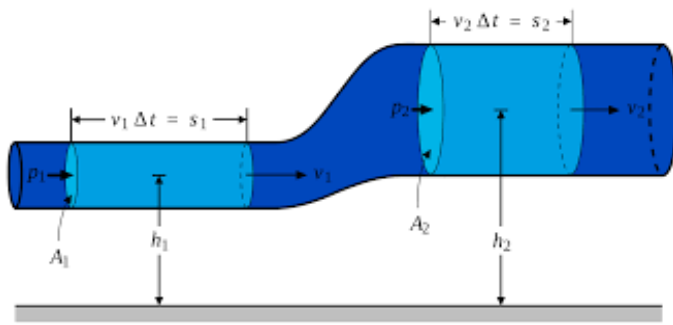
1. This question paper contains FOUR sections.
2. Section A contains 17 questions. Each carries 1 mark.
3. Section B contains 2 questions. Each carries 2 marks.
4. Section C contains 3 questions. Each carries 3 marks.
5. Section D contains 1 case based question which carry 5 marks.

Qn. No	
SECTION-A	
1.	Hydraulic brakes used in automobiles are based on a) Charles law b) Boyles law c) Pascals law d) Bernoulli's principle
2.	Dimensional formula of coefficient of viscosity is a) $[ML^{-1}T^{-1}]$ b) $[ML^{-2}T^{-1}]$ c) $[ML^{-2}T^{-2}]$ d) $[MLT^{-1}]$
3.	A structural steel rod has a radius of 10mm and a length of 1m. A 100KN force stretches its along its length. Calculate its stress. a) $3.18 \times 10^8 \text{ N/m}^2$ b) $8.5 \times 10^8 \text{ N/m}^2$ c) $5.25 \times 10^8 \text{ N/m}^2$ d) $6.2 \times 10^8 \text{ N/m}^2$
4.	If a force of 850 N is applied on a body of length 10m and now the present length of the body is 25m. Calculate the strain on the body. a) 250 b) 150 c) 1.5 d) 2.5

5.	<p>The phenomenon in which ice melts when pressure is increased and again freezes when pressure is removed is</p> <ul style="list-style-type: none"> a) Latent heat of fusion b) Linear expansion c) Regelation d) calorimetry
6.	<p>On heating a glass block of $10,000\text{cm}^3$ from 25°C to 40°C, its volume increases by 4 cm^3. Calculate the coefficient of volume expansion of glass.</p> <ul style="list-style-type: none"> a) $26.67 \times 10^{-6} \text{ }^\circ\text{C}^{-1}$ b) $8.89 \times 10^{-6} \text{ }^\circ\text{C}^{-1}$ c) $3.9 \times 10^{-6} \text{ }^\circ\text{C}^{-1}$ d) $53.9 \times 10^{-6} \text{ }^\circ\text{C}^{-1}$
7.	<p>Wave length corresponding to E_{max} for the Moon is 14 microns. Estimate the surface temperature of the moon if $b = 2.884 \times 10^{-3} \text{mK}$.</p> <ul style="list-style-type: none"> a) 300K b) 550K c) 110K d) 206K
8.	<p>In a cyclic process, work done by the system is</p> <ul style="list-style-type: none"> a) Zero b) More than the heat given to the system. c) Equal to heat given to the system. d) Independent of heat given to the system.
9.	<p>Which of the following is not a thermodynamic coordinate?</p> <ul style="list-style-type: none"> a) Gas constant R b) Pressure P c) Volume V d) Temperature T
10.	<p>The number of degrees of freedom of a rigid body</p> <ul style="list-style-type: none"> a) 8 b) 2 c) 6 d) 4

11.	<p>Average distance travelled by the molecule between two successive collisions</p> <p>a) Mean free path b) Collision path c) Molecular displacement d) Molecular distance</p>
12.	<p>Identify the type of oscillations by a body under the influence of an external periodic force not with its own natural frequency</p> <p>a) Free oscillations b) Forced oscillations c) Damped oscillations d) Natural oscillations</p>
13.	<p>A body oscillates with SHM according to the equation $x = 5 \cos(2\omega t + \omega/4)$. At $t = 1.5$ s, calculate its velocity?</p> <p>a) 139.56 b) 22.22 c) 3.535 d) 92.97</p>
14.	<p>A simple harmonic motion is represented by $x = 10 \cos(20t + 0.5)$. Its amplitude will be</p> <p>a) 20 b) 10 c) 0.5 d) 3.18</p>
15.	<p>Waves in which the individual particles of the medium oscillate perpendicular to the direction of wave propagation.</p> <p>a) Transverse wave b) Longitudinal wave c) Compression wave d) Rarefaction wave</p>
16.	<p>How far does the sound travel in air when a tuning fork of frequency 300Hz makes 100 vibrations? Velocity of sound in air = 320m/s</p> <p>a) 300m b) 106m c) 80m d) 50m</p>

17.	<p>A wave travelling along a string is described by $y = 0.005 \sin(80x - 3t)$. Calculate its wavelength.</p> <p>a) 80cm b) 3cm c) 0.005cm d) 7.85cm</p>
SECTION-B	
18.	State and explain First law of thermodynamics.
19.	Write any four assumptions of Kinetic theory of gases.
SECTION-C	
20.	<p>a) State Hooke's law. b) Define and explain young's modulus c) The length of a suspended wire increases by 10^{-4} of its original length when a stress of 10^7 N/m^2 is applied on it. Calculate the Young's modulus of the material of the wire.</p>
21.	<p>a) Derive the expressions for the kinetic and potential energies of a harmonic oscillator. b) Show that the total energy is conserved in SHM. c) Draw graphs for i) energy versus time. ii) energy versus displacement.</p>
22.	<p>a) What is a plane progressive wave? b) Derive an expression for a plane progressive harmonic wave.</p>
SECTION-D	
<p>Bernoulli's principle formulated by Daniel Bernoulli states that as the speed of a moving fluid increases (liquid or gas), the pressure within the fluid decreases. Although Bernoulli deduced the law, it was Leonhard Euler who derived Bernoulli's equation in its usual form in the year 1752. Bernoulli's equation gives great insight into the balance between pressure, velocity and elevation. Bernoulli's principle is used for studying the unsteady potential flow which is used in the theory of ocean surface waves and acoustics. It is also used for approximation of parameters like pressure and speed of the fluid. Daniel Bernoulli explained how the speed of fluid affects the pressure of the fluid which is known as Bernoulli's effect and also explained the kinetic theory of gases. These two were his greatest contributions to Science and the two concepts made him famous.</p> <p>According to Bernoulli's effect, he tried to explain that when a fluid flows through a region where the speed increases, the pressure will decrease. Bernoulli's effects find many real-life applications such as airplane wings are used for providing a lift to the plane.</p>	



23. Which conservation law is followed by the Bernoulli's Principle?

- a) Law of conservation of energy
- b) Law of conservation of momentum
- c) Law of conservation of charges
- d) Law of conservation of angular momentum.

24. Which is not an application of Bernoulli's principle from the following?

- a) Venturimeter
- b) Magnus effect
- c) Atomizer
- d) Hydraulic lift

25. Pick out the condition in which Bernoulli's principle is applicable.

- a) The fluid should be compressible.
- b) The fluid can be turbulent.
- c) The fluid should be non- viscous.
- d) The fluid flow can be rotational.

26. Pick out the correct Bernoulli's equation.

- a) $P + \frac{1}{2} v^2 + gh = \text{constant}$
- b) $\frac{P}{g} + \frac{1}{2} \frac{v^2}{g} + h = \text{constant}$
- c) Both a and b
- d) Only a

27. Change in kinetic energy at section A and section B in a pipe is given by the expression

- a) $\frac{1}{2} a_1 v_1 \Delta t (v_2^2 - v_1^2)$
- b) $a_1 v_1 \Delta t g (h_2 - h_1)$
- c) $a_1 v_1 \Delta t (P_1 - P_2)$

	d) all are correct
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