

PHYSICS (NEW COURSE)

GROUP FIRST

ACADEMIC SESSION : 2015 - 17 TO 2017 - 19

TIME: 20 MINUTES

MARKS: 17

OBJECTIVE

NOTE: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

QUESTION NO. 1

1. Which of the following is a derived quantity?
(A) Mass (B) Velocity (C) Length (D) Time
2. Error in the measurement of radius of sphere is 1 %. The error in the calculated value of its volume is
(A) 7 % (B) 5 % (C) 3 % (D) 1 %
3. Magnitude of resultant vector of 6N and 8N which are perpendicular to each other is
(A) 14 N (B) 10 N (C) 20 N (D) 2N
4. If magnitudes of scalar product and vector products are same then the angle between the two vectors is
(A) 30° (B) 45° (C) 60° (D) 180°
5. Distance covered by a freely falling body in 2 seconds will be
(A) 9.8 m (B) 19.2 m (C) 19.4 m (D) 19.6 m
6. Kilowatt hour is the unit of
(A) Work (B) Force (C) Power (D) Momentum
7. The weight of an object in an elevator moving down with an acceleration of 9.8 m/s^2 will become
(A) Half (B) Double (C) Unchanged (D) Zero
8. Artificial gravity can be created in the spaceship by
(A) Revolving around the earth (B) Spinning around its own axis
(C) Increasing its velocity (D) Decreasing its velocity
9. The systolic pressure of normal healthy person is
(A) 110 torr (B) 115 torr (C) 120 torr (D) 130 torr
10. When the amplitude of oscillation is doubled then its energy becomes
(A) Double (B) Four times (C) One half (D) Six times
11. The distance between two consecutive troughs is called
(A) Displacement (B) Amplitude (C) Wavelength (D) Wave-front
12. In the stretched string, if speed of the wave is doubled, the tension will be.
(A) 2 (B) 4 (C) 8 (D) 6
13. When light enters glass, it suffers a change in
(A) Frequency (B) Wavelength (C) Velocity (D) Both velocity and wavelength
14. In a Michelson interferometer by moving the mirror through a distance of $\lambda/4$. The path difference changes by
(A) $\lambda/2$ (B) λ (C) $\lambda/4$ (D) 2λ
15. For normal adjustment, what is the length of astronomical telescope if focal lengths of objective and eye piece are 100 cm and 20 cm respectively
(A) 100 cm (B) 20 cm (C) 5 cm (D) 120 cm
16. If the temperature of sink is absolute zero then the efficiency of heat engine should be
(A) 100 % (B) 50 % (C) Zero (D) Infinite
17. The difference between two molar heat capacities is equal to
(A) Temperature (B) Pressure (C) Volume (D) Universal gas constant

SECTION-I

PAK-41-11-18

QUESTION NO. 2 Write short answers any Eight (8) questions of the following

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- (1) How many seconds are there in one year?
- (2) Time period is measured by a stopwatch. What types of errors are possible in time period?
- (3) Give drawbacks to use period of pendulum as a time standard ?
- (4) Define the units of angle; the radian and the steradian.
- (5) Can the magnitude of a vector have negative value? Explain.
- (6) Under what condition would a vector have components that are equal in magnitude?
- (7) Define null vector and component of a vector.
- (8) Show that range of a projectile is maximum at angle of 45° .
- (9) Discuss the condition when acceleration \vec{a} of a car is zero but velocity \vec{v} is not zero.
- (10) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss
- (11) Why fog droplet appears to be suspended in air?
- (12) Give two applications of the Bernoulli's equation?

QUESTION NO. 3 Write short answers any Eight (8) questions of the following

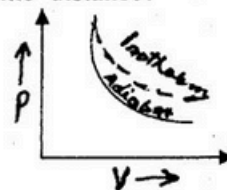
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- (1) A boy uses a catapult to throw a stone, which accidentally smashes a green house window. List the possible energy changes.
- (2) What are renewable and non-renewable energy sources. Give one example of each
- (3) What is solar constant? Give its value.
- (4) Why does a diver change his body position before and after the diving in the pool? Briefly explain with figure.
- (5) State right hand rule how would you apply it to find the direction of angular velocity.
- (6) What are banked tracks? Explain briefly
- (7) Does the frequency of simple pendulum depends on amplitude or length of simple pendulum? Explain briefly
- (8) If a mass spring, system is hung vertically and set into oscillations. Why does the motion eventually stops.
- (9) Differentiate between damped and un-damped oscillations.
- (10) Write down two applications of Doppler's effect.
- (11) What is the difference between transverse and longitudinal waves ? Draw their diagrams also.
- (12) Why does sound travel faster in solids than in gasses?

QUESTION NO. 4 Write short answers any Six (6) questions of the following

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- (1) The centre of Newton's rings is dark although the thickness of air film is effectively zero at the centre. Explain
- (2) Why x-rays cannot be diffracted by ordinary glass grating?
- (3) An oil film spreading over a wet footpath shows colours. Explain, how does it happen?
- (4) An astronomical telescope of long focal length and large aperture is considered to be a good telescope. Why ?
- (5) How the light signal is transmitted through the optical fiber?
- (6) Is it possible to convert internal energy into mechanical energy? Explain with an example.
- (7) Why does the pressure of a gas in a car tyre increases when it is driven through some distance?
- (8) How can the efficiency of real heat engine be increased?
- (9) Solid line represents adiabatic and dotted line isothermal process. In which process more work is done?



SECTION-II

Note: Attempt any Three questions from this section**8 x 3 = 24**

- 5.(a) • Define cross product of two vectors. Also, write down four characteristics of cross product. 5
- (b) • A 100 g golf ball is moving to the right with a velocity of 20 ms^{-1} , it makes a head on collision with 8kg steel ball initial at rest. Compute velocities of balls after collision. 3
- 6.(a) • Define the absolute potential energy. Derive its mathematical expression 5
- (b) • What should be the orbiting speed to launch a satellite in circular orbit 900 Km above the surface of earth? (Take mass of the earth as $6 \times 10^{24} \text{ Kg}$ and its radius as 6400 Km) 3
- 7.(a) • Define terminal velocity. Show that the terminal velocity is directly proportional to the square of the radius. 5
- (b) • Find the average speed of oxygen molecule in the air at STP. 3
- 8.(a) • Prove that the total energy of the vibrating mass-spring system remains constant. 5
- (b) • A pipe has length of one meter. Determine the frequencies of the fundamental and the first two harmonics If the pipe is open at both ends. (Speed of sound in air = 340 ms^{-1}) 3
- 9.(a) • What is telescope? Discuss its construction and magnification with ray diagram. 5
- (b) • A second order spectrum is formed at an angle of 38.0° . When light falls normally on a diffraction grating having 5400 lines per centimeter. Determine wavelength of the light used. 3