

Roll No. of Candidate : \_\_\_\_\_

**PHYSICS**

**(Intermediate Part-I, Class 11<sup>th</sup>) 322 - (I) Paper I (Group - I)**

**Time: 20 Minutes**

**OBJECTIVE - - - - - Code : 6471 *C47-G1-22* Marks: 17**

**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. Attempt as many questions as given in objective type question paper and leave others blank.

1. 1 - The unit of solid angle is \_\_\_\_\_.  
(A) radian (B) degree (C) steradian (D) revolution
- 2 - Light year is the unit of \_\_\_\_\_.  
(A) speed (B) intensity (C) time (D) distance
- 3 - What is the angle between  $\hat{i} + \hat{j}$  and  $\hat{i} - \hat{j}$  vectors?  
(A)  $0^\circ$  (B)  $45^\circ$  (C)  $90^\circ$  (D)  $180^\circ$
- 4 - \_\_\_\_\_ is not scalar.  
(A) work (B) power (C) wavelength (D) torque
- 5 - When rocket moves upward its acceleration \_\_\_\_\_.  
(A) increases (B) decreases (C) becomes zero (D) remains constant
- 6 - Shape of trajectory of projectile is \_\_\_\_\_.  
(A) parabola (B) hyperbola (C) circle (D) straight line
- 7 - The rocks containing hot water are called \_\_\_\_\_.  
(A) geyser (B) aquifer (C) magma (D) tor
- 8 - The angular displacement for daily rotation of the earth is \_\_\_\_\_.  
(A) 0 rad (B)  $\pi$  rad (C)  $2\pi$  rad (D)  $4\pi$  rad
- 9 - A body of 1 kg moving up with  $a = g$  then its apparent weight is \_\_\_\_\_.  
(A) 19.6 N (B) 9.8 N (C) 0 N (D) 10 N
- 10 - Pressure is high where speed is \_\_\_\_\_.  
(A) high (B) low (C) constant (D) zero
- 11 - Frequency of second's pendulum is \_\_\_\_\_.  
(A) 0.5 Hz (B) 5.0 Hz (C) 0.2 Hz (D) 2.0 Hz
- 12 - Distance between two consecutive nodes is \_\_\_\_\_.  
(A)  $2\lambda$  (B)  $\frac{\lambda}{2}$  (C)  $4\lambda$  (D)  $\frac{\lambda}{4}$
- 13 - Speed of sound is independent of \_\_\_\_\_.  
(A) density (B) temperature (C) elasticity (D) pressure
- 14 - \_\_\_\_\_ proves that light waves are transverse.  
(A) reflection (B) polarization (C) diffraction (D) interference
- 15 - Single mode step index fibre can transmit T.V channels more than \_\_\_\_\_.  
(A) 3 (B) 5 (C) 7 (D) 14
- 16 - If the temperature of sink decreases then efficiency of engine \_\_\_\_\_.  
(A) increases (B) decreases (C) remains same (D) becomes zero
- 17 - One Pascal is the unit of \_\_\_\_\_.  
(A) volume (B) pressure (C) force (D) power

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION - I)

Q. No. Q1-22

2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. How the accuracy is increased by decreasing the limit of precision?
- ii. How many expected number of significant figures are in 8000 kg?
- iii. Check the homogeneity of the relation  $V = \sqrt{\frac{F \times \ell}{m}}$ .
- iv. Name the several repetitive phenomena occurring in nature which could serve as reasonable time standards.
- v. Is it necessary, when the acceleration of a body is zero then its velocity is also zero?
- vi. Find angle of projection of a projectile for which its max. height and horizontal range are equal.
- vii. Write down two significance of velocity-time graph.
- viii. Define impulse and show how it is related to linear momentum?
- ix. How can we differentiate between reversible and irreversible processes on the basis of entropy?
- x. Why molar specific heat at constant pressure is greater than molar specific heat at constant volume?
- xi. Why the curve of adiabatic process is steeper than isothermal process?
- xii. If  $PV^r = \text{constant}$ ; prove that  $TV^{r-1} = \text{constant}$ .

3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. How a vector can be determined when rectangular components are known?
- ii. Is it possible to add a vector quantity to a scalar quantity? Explain.
- iii. Describe the method to find the direction of cross product?
- iv. When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
- v. What sort of energy is in the following:  
(a) Compressed Spring (b) Water in high dam.
- vi. Point out the positions where gravitational potential energy is taken as zero.
- vii. Derive relation between linear and angular velocity.
- viii. Explain how many minimum number of geostationary satellites are required for global coverage of T.V. transmission?
- ix. A disc without slipping rolls down a hill of height 10 meters. If the disc starts from rest at the top of the hill, then what is its speed at the bottom?
- x. Can the visible light produce interference fringes? Explain.
- xi. How would you distinguish between un-polarized and plane polarized light?
- xii. What are Newton's rings? Why is the centre of Newton's rings dark?

4. Write short answers to any SIX questions.

(2 x 6 = 12)

- i. Explain the working of carburetor of a motor car using Bernoulli's principle.
- ii. What are free, forced and damped oscillations?
- iii. Does frequency depend on amplitude for harmonic oscillator?
- iv. Describe some common phenomena in which resonance plays an important role.
- v. State principle of superposition.

(Turn Over)

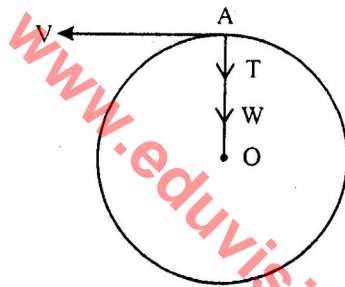
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- vi. Differentiate between in phase and out of phase points in transverse periodic waves with the help of a diagram.
- vii. How beats are useful in tuning the musical instruments?
- viii. Why it be advantageous to use blue light with a compound microscope?
- ix. If a person was looking through a telescope at full moon, how would the appearance of the moon be changed by covering half of the objective lens.

**(SECTION – II)**

**Note: Attempt any THREE (3) questions from Section II.**

- 5. (a) Define vector product and write down its four characteristics. (5)
- (b) A force of 400 N is required to overcome road friction and air resistance in propelling an automobile at  $80 \text{ kmh}^{-1}$ . What power (KW) must the engine develop? (3)
- 6. (a) Explain velocity-time graph and how would you figure out the slope and distance covered from the graphs. (5)
- (b) A ball tied to the end of a string, is swung in a vertical circle of radius ' r ' under the action of gravity as shown in the fig. What will be the tension in the string when the ball is at the point ' A ' of the path and speed is ' V ' at this point. (3)



- 7. (a) How would you elaborate the effects of pressure and density on the speed of sound in air. Also, derive a relation for the effect of temperature on the speed of sound in air. (5)
- (b) Water flows through a hose, whose internal diameter is 1 cm at a speed of  $1 \text{ m/s}$ . What should be the diameter of the nozzle if the water is to emerge at  $21 \text{ m/s}$ . (3)
- 8. (a) What is simple pendulum? Show that motion of simple pendulum is SHM. Also find relation for its time period and frequency. (5)
- (b) A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wavelength of the spectral line for which the deviation in second order is  $15^\circ$ . (3)
- 9. (a) What is spectrometer? Discuss its different parts. Write down its uses. (5)
- (b) The turbine in a steam power plant takes steam from boiler at  $427^\circ$  and exhausts into low temperature reservoir at  $77^\circ \text{C}$ . What is maximum possible efficiency? (3)

168  
Roll No. of Candidate : \_\_\_\_\_

**PHYSICS**

(Intermediate Part-I, Class 11<sup>th</sup>) 322 - (III) Paper I (Group - II)

Time: 20 Minutes

**OBJECTIVE** ----- Code : 6476 *405-422* Marks: 17

**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. Attempt as many questions as given in objective type question paper and leave others blank.

1. 1 - Carnot engine is a \_\_\_\_\_.  
(A) real (B) ideal (C) both (A) & (B) (D) none of these
- 2 - The slope at any point on the velocity-time graph gives \_\_\_\_\_.  
(A) distance (B) acceleration (C) average velocity (D) average speed
- 3 - If the initial phase is  $\frac{\pi}{2}$ , the displacement of SHM is \_\_\_\_\_.  
(A)  $x = x_0 \sin \omega t$  (B)  $x = \sin \omega t$  (C)  $x = x_0 \cos \omega t$  (D) zero
- 4 - Radius of Geo-stationary satellite is \_\_\_\_\_.  
(A)  $4.23 \times 10^4$  m (B)  $4.23 \times 10^4$  km (C)  $4.23 \times 10^7$  m (D)  $4.23 \times 10^3$  m
- 5 - The speed of light in different medium is always \_\_\_\_\_.  
(A) equal to 'c' (B) different (C) greater than c (D) becomes zero
- 6 - Intensity of light depends upon \_\_\_\_\_.  
(A) wavelength (B) amplitude (C) velocity (D) frequency
- 7 - The value of 'g' at the centre of the earth is \_\_\_\_\_.  
(A) infinite (B) 2 g (C) 3 g (D) zero
- 8 - Dimensions of  $\sqrt{\frac{F \times \ell}{m}}$  are \_\_\_\_\_.  
(A)  $[M^0 L T^{-1}]$  (B)  $[M L^{-1} T]$  (C)  $[M L^2 T^{-3}]$  (D)  $[M L^{-1} T^{-1}]$
- 9 - SI unit of molar specific heat are \_\_\_\_\_.  
(A)  $J \text{ mol}^{-1} \text{ K}^{-1}$  (B)  $J \text{ mol} \text{ K}^{-1}$  (C)  $J \text{ mol} \text{ K}$  (D)  $J \text{ mol}^{-1}$
- 10 - The ballistic missiles are only for \_\_\_\_\_.  
(A) short range (B) long range (C) zero range (D) none of these
- 11 - The value of constant 'γ' for mono-atomic gas is \_\_\_\_\_.  
(A) 1.67 (B) 1.40 (C) 1.0 (D) 1.2
- 12 - If least count is 10 kg then  $8.00 \times 10^3$  has significant digit \_\_\_\_\_.  
(A) 1 (B) 2 (C) 3 (D) 4
- 13 - The angle between rectangular components is \_\_\_\_\_.  
(A)  $60^\circ$  (B)  $90^\circ$  (C)  $180^\circ$  (D) Zero
- 14 - Projection of  $\vec{B}$  on  $\vec{A}$  is \_\_\_\_\_.  
(A)  $A \cos \theta$  (B)  $B \cos \theta$  (C)  $A \sin \theta$  (D)  $B \sin \theta$
- 15 - Gravity performs no work, if the body moves \_\_\_\_\_.  
(A) vertically (B) horizontally (C)  $60^\circ$  vertical (D) none of these
- 16 - The droplet of water has terminal velocity the acceleration is \_\_\_\_\_.  
(A) maximum (B) minimum (C) zero (D) changed
- 17 - Speed of sound in copper is \_\_\_\_\_.  
(A)  $38000 \text{ mS}^{-1}$  (B)  $3600 \text{ mS}^{-1}$  (C)  $3500 \text{ mS}^{-1}$  (D)  $3400 \text{ mS}^{-1}$

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION – I)

GUTG2-22

2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. Give the drawbacks to use period of a simple pendulum as a time standard.
- ii. What are the dimensions and units of gravitational constant  $G$  in the formula  $F = G \frac{m_1 m_2}{r^2}$  ?
- iii. What are the three main frontiers of fundamental science?
- iv. Differentiate between precise measurement and accurate measurement.
- v. Can the velocity of an object reverse the direction when acceleration is constant?  
If so, give an example.
- vi. An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.
- vii. What is velocity-time graph? What does its slope represent?
- viii. A projectile is thrown horizontally from a height with velocity of  $10 \text{ m s}^{-1}$  and reaches the ground after 2 sec. Find the horizontal distance covered by the projectile.
- ix. Calculate the entropy change when 1.0 kg of ice at  $0^\circ\text{C}$  melts into water at  $0^\circ\text{C}$ .  
Latent heat of fusion of ice is  $L_f = 3.36 \times 10^5 \text{ J kg}^{-1}$ .
- x. What happens to the temperature of the room, when an air conditioner is left running on a table in the middle of the room?
- xi. Give an example of a natural process that involves an increase in entropy.
- xii. 100 J of heat is supplied to a gas which increases its internal energy by 20 J.  
Find the work done by the system.

3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i. Define null vectors and equal vectors.
- ii. Explain right hand rule to find the direction of vector product.
- iii. Can a body rotate about its centre of gravity under the action of its weight?
- iv. When rocket re-enters the atmosphere, its nose cone becomes very hot.  
Where does this heat energy come from?
- v. A girl drops a cup from certain height, which breaks into pieces.  
What energy changes are involved?
- vi. Name different sources of geothermal energy with brief discussion.
- vii. What is meant by moment of inertia? Explain its significance.
- viii. Show that orbital angular momentum  $L_0 = mvr$ .
- ix. What is the minimum orbital velocity for close orbiting satellite?
- x. Write down the postulates of Huygens's principle.
- xi. Can visible light produce interference fringes? Explain.
- xii. Explain whether the Young's experiment is an experiment for studying interference or diffraction effects of light.

(Turn Over)

4. Write short answers to any SIX questions.

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(2 x 6 = 12)

- i. Explain, how the swing is produced in a fast moving cricket ball?
- ii. Show that in SHM the acceleration is zero when the velocity is greatest and the velocity is zero when the acceleration is greatest.
- iii. What are damping devices? Give at least one example.
- iv. If length of simple pendulum is increased four times, then what will be effect on its time period?
- v. How are beats useful in tuning musical instruments?
- vi. What features do longitudinal waves have in common with transverse waves?
- vii. What is the frequency and wavelength of 3<sup>rd</sup> mode of stationary waves in closed organ pipe?
- viii. Why would it be advantageous to use blue light with a compound microscope?
- ix. How the light signal is transmitted through the optical fibre?

**(SECTION – II)**

**Note: Attempt any THREE (3) questions from Section II.**

5. (a) What is gravitational field? Show that gravitational field is conservative field. (5)  
(b) The magnitude of dot and cross products of two vectors are  $6\sqrt{3}$  and 6 respectively. (3)  
Find the angle between the vectors.
6. (a) State and explain law of conservation of linear momentum. (5)  
(b) The earth rotates on its axis once a day. Suppose by some process the earth contracts so that its radius is only half as large as at present. How fast will it be rotating then? (3)
7. (a) What is meant by Doppler's effect? Discuss this effect for these two cases. (5)  
i) An observer moving towards a stationary source of sound.  
ii) Source of sound moving away from a stationary observer.  
(b) What gauge pressure is required in the city mains for a stream from a fire hose connected to the mains to reach a vertical height of 15.0 meter? (3)
8. (a) What is simple pendulum? Show that its motion is SHM. Derive an expression for its time period. Also find its frequency. (5)  
(b) A mono-chromatic light of  $\lambda = 588$  nm is allowed to fall on a half silvered glass plate  $G_1$  in Michelson interferometer. If mirror M is moving through 0.233 mm. How many fringes will be observed to shift? (3)
9. (a) State and explain carnot engine and carnot theorem in detail and how would you determine which fact makes carnot engine a superior one? (5)  
(b) A telescope is made of an objective of focal length 20 cm and an eye piece of 5.0 cm, both convex lenses. Find the angular magnification. (3)