

9th Class 2018

Physics	Group-I	Paper-I
Time: 15 Minutes	(Objective Type)	Marks: 12

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

- 1-1- Coefficient of volume expansion of aluminium is:
- (a) $4.2 \times 10^{-5} \text{ K}^{-1}$ (b) $7.2 \times 10^{-5} \text{ K}^{-1}$ ✓
(c) $2.4 \times 10^{-5} \text{ K}^{-1}$ (d) $6 \times 10^{-5} \text{ K}^{-1}$
- 2- The SI unit of thermal conductivity is:
- (a) $\text{J m}^{-1} \text{ K}^{-1}$ (b) $\text{W m}^{-1} \text{ K}^{-1}$ ✓
(c) W m K^{-1} (d) $\text{W m}^{-1} \text{ K}$
- 3- In SI unit of density is:
- (a) Kg m^{-1} (b) Kg m^2
(c) Kg m^{-3} ✓ (d) Kg m^{-2}
- 4- A ball is thrown vertically upward, its velocity at the highest point is:
- (a) -10 ms^{-1} (b) Zero ✓
(c) 10 ms^{-2} (d) None of these
- 5- Coefficient of friction is equal to:
- (a) $F_s R$ (b) $\frac{R}{F_s}$
(c) $F_s + R$ (d) $\frac{F_s}{R}$ ✓
- 6- The value of 'g' on sun is:
- (a) 8.87 ms^{-2} (b) 25.94 ms^{-2}
(c) 274.2 ms^{-2} ✓ (d) 9.8 ms^{-2}

- 7- One horse power is equal to:
(a) 674 watt (b) 647 watt
(c) 746 watt ✓ (d) 100 watt
- 8- The coefficient of linear expansion and volume expansion are related by:
(a) $\beta = \alpha$ (b) $\beta = 2\alpha$
(c) $\beta = 3\alpha$ ✓ (d) $\beta = \frac{\alpha}{3}$
- 9- The least count of screw gauge is:
(a) 1 mm (b) 0.1 mm
(c) 0.01 mm ✓ (d) 0.001 mm
- 10- Power is equal to:
(a) $\frac{W}{t^2}$ (b) $\frac{W^2}{t}$
(c) $\frac{W}{t}$ ✓ (d) $W \times t$
- 11- The number of forces that can be added by head to tail rule:
(a) 2 (b) 3
(c) 4 (d) Any number ✓
- 12- Rate of change of momentum is equal to:
(a) Torque (b) Force ✓
(c) Work (d) Distance

State Newton's first law of motion.

(vi) **Ans** The Newton's first law of motion states that:

"A body continues its state of rest or of uniform motion in a straight line provided no net force acts on it."

(vii) **Why rolling friction is less than sliding friction?**

Ans When the axle of a wheel is pushed, the force of friction between the wheel and the ground at the point of contact provides the reaction force. The reaction force acts at the contact points of the wheel in a direction opposite to the applied force. The wheel rolls without rupturing the cold welds. That is why, wheel's rolling friction is extremely smaller than sliding friction.

(viii) **When a gun is fired, it recoils. Why?**

Ans According to law of conservation of momentum, the momentum gained by fired bullet is neutralized by equal and opposite momentum given to the gun. Which recoils back.

3. Write short answers to any FIVE (5) questions: 10

(i) **What is second condition of equilibrium? Write its formula.**

Ans According to this, a body satisfies second condition for equilibrium when the resultant torque acting on it is zero.

Mathematically, $\Sigma\tau = 0$.

(ii) **Define resolution of forces.**

Ans Splitting up of a force into two mutually perpendicular components is called resolution of that force.

(iii) **State Newton's law of gravitation.**

Ans According to Newton's law of gravitation:

Everybody in the universe attracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres.

9th Class 2018

Physics	Group-I	Paper-I
Time: 1.45 Hours	(Subjective Type)	Marks: 48

(Part-I)

2. Write short answers to any FIVE (5) questions: 10

(i) Define Plasma Physics and Geophysics.

Ans Plasma Physics:

It is the study of production, properties of the ionic state of matter -- the fourth state of matter.

Geo-physics:

It is the study of the internal structure of the Earth.

(ii) What do you mean by scientific notation? Give its one example.

Ans A simple but scientific way to write large or small numbers is to express them in some power of ten. The Moon is 38,40,00,000 meters away from the Earth. Distance of the moon from the Earth can also be expressed as 3.84×10^8 m. This form of expressing a number is called the scientific notation.

(iii) Change 15 years age into seconds.

Ans $= 15 \times 365 \times 24 \times 60 \times 60$
 $= 47,30,40,000$ seconds

(iv) Define translatory motion and give an example.

Ans In translatory motion, a body moves along a line without any rotation. The line may be straight or curved.

Example:

A car moving in a straight line has translatory motion.

(v) Define acceleration and write its unit.

Ans Acceleration is defined as the rate of change of velocity of a body.

SI Unit:

SI unit of acceleration is ms^{-2} .

(iv) Why we cannot feel gravitational force around us?

Ans As we know that the G is the proportionality constant of gravitational force. Its value in SI unit is $6.673 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$. Due to small value of G , the gravitational force of attraction between objects around us is very small. That is why, we do not feel it.

(v) Define field force and gravitational field strength.

Ans Field force:

The velocity of a body, thrown up, goes on decreasing while, in return, its velocity goes on increasing. This is due to gravitational pull of the Earth acting on the body whether the body is in contact with Earth or not. Such a force is called the field force.

Gravitational field strength:

The gravitational force per unit mass is called the gravitational field strength of the Earth.

(vi) Define power and write its SI unit.

Ans Rate of doing work is called power.

SI unit:

SI unit of power is watt (W).

(vii) A body of mass 50 kg is raised to a height of 3 m. What is its potential energy? ($g = 10 \text{ ms}^{-2}$)

Ans

$$\text{Mass } m = 50 \text{ kg}$$

$$\text{Height } h = 3 \text{ m}$$

$$g = 10 \text{ ms}^{-2}$$

$$\text{as } \text{P.E.} = m g h$$

$$\therefore \text{P.E.} = 50 \text{ kg} \times 10 \text{ ms}^{-2} \times 3 \text{ m}$$

$$= 50 \times 10 \times 3 \text{ J}$$

$$= 1500 \text{ J}$$

The potential energy of the body is 1500 J.

(viii) What is meant by nuclear energy?

Ans Nuclear energy is the energy released in the form of nuclear radiations in addition to heat and light during nuclear reactions such as fission and fusion reactions.

4. Write short answers to any FIVE (5) questions: 10

(i) Define pressure and write its SI unit.

Ans The force acting normally per unit area on the surface of a body is called pressure.

Pressure is a scalar quantity. In SI units, the unit of pressure is Nm^{-2} also called pascal (Pa). Thus

$$1 \text{ Nm}^{-2} = 1 \text{ Pa}$$

(ii) The mass of 200 cm^3 of stone is 500 g. Find its density.

Ans $V = 200 \text{ cm}^3 = 0.02 \text{ m}^3$

$$m = 500 \text{ g} = 0.5 \text{ kg}$$

$$d = ?$$

$$d = \frac{m}{V}$$

$$d = \frac{0.5}{0.02} = 25 \text{ kgm}^{-3}$$

(iii) What is barometer? Explain it.

Ans Barometer is a device used to measure the atmospheric pressure of air.

(iv) Convert 100°F into the temperature on Celsius scale.

Ans Conversion of 100°F into the temperature on Celsius scale:

$$F = 100^\circ\text{F}$$

$$\text{Since } 1.8\text{C} = F - 32$$

$$\therefore = 100 - 32$$

$$\text{or } 1.8\text{C} = 68$$

$$\text{or } \text{C} = \frac{68}{1.8}$$

$$\text{or } \text{C} = 37.8^\circ\text{C}$$

Thus, 100°F is equal to 37.8°C .

(v) Define specific heat and write its mathematical formula.

Ans Specific heat of a substance is the amount of heat required to raise the temperature of 1 kg mass of that substance through 1 K.

Its mathematical formula is:

Since Total area OABD = $\frac{1}{2} t \times at$
 = area of rectangle OACD
 + area of triangle ABC

Putting values in the above equation, we get

$$S = v_i t + \frac{1}{2} t \times at$$

$$S = v_i t + \frac{1}{2} at^2$$

- (b) How much centripetal force is needed to make a body of mass 0.5 kg to move in a circle of radius 50 cm with a speed 3 ms^{-1} ? (5)

Ans Data: $m = 0.5 \text{ kg}$
 $r = 50 \text{ cm} = 0.5 \text{ m}$
 $v = 3 \text{ ms}^{-1}$

Formula: $F = \frac{mv^2}{r}$

$$F = \frac{0.5 \times (3)^2}{0.5}$$

$$F = 9 \text{ N}$$

- Q.6.(a) Write the four uses of solar energy. (4)

Ans Following are the four uses of solar energy:

- (i) Solar energy is used to generate electricity with solar cells or heat engines.
- (ii) Solar energy is used as heat for making hot water, heating buildings and cooking.
- (iii) Solar energy is used by plants for the process of photosynthesis.
- (iv) Solar energy is used to take the salt away from sea water.

- (b) Find the perpendicular components of a force of 50 N making an angle of 30° with x-axis. (5)

Ans Data: $F = 50 \text{ N}$
 $\theta = 30^\circ$

$$F_x = ?$$

$$F_y = ?$$

Formula: $F_x = F \cos \theta$

$$F_x = 50 \times 0.866$$

$$F_x = 43.3 \text{ N}$$

Formula: $F_y = F \sin \theta$

$$F_y = (50) \sin 30$$

$$F_y = (50)(0.5)$$

$$F_y = 25 \text{ N}$$

Q.7.(a) Define linear thermal expansion in solids. Derive its formula: $L = L_0 (1 + \alpha \Delta T)$ (4)

Ans **Linear Thermal Expansion in Solids:**

It has been observed that solids expand on heating and their expansion is nearly uniform over a wide range of temperature. Consider a metal rod of length L_0 at certain temperature T_0 . Let its length on heating to a temperature T becomes L . Thus

$$\text{Increase in length of the rod} = \Delta L = L - L_0$$

$$\text{Increase in temperature} = \Delta T = T - T_0$$

It is found that change in length ΔL of a solid is directly proportional to its original length L_0 , and the change in temperature ΔT . That is:

$$\Delta L \propto L_0 \Delta T$$

or $\Delta L = \alpha L_0 \Delta T$

or $L - L_0 = \alpha L_0 \Delta T$

or $L = L_0 (1 + \alpha \Delta T)$

Hence given equation is proved.

- (b) The head of a pin is a square of side 10 mm. Find pressure on it due to a force of 20 N. (5)

Ans Data: $A = (10 \times 10^{-3})(10 \times 10^{-3}) \text{ m}^2$

$$F = 20 \text{ N}$$

$$P = ?$$

Formula: $P = \frac{F}{A}$

Putting values, we get

$$P = \frac{20}{(10 \times 10^{-3})(10 \times 10^{-3})}$$

$$P = \frac{20}{(10 \times 10)(10^{-6})}$$

$$= \frac{20}{100} \times 10^6$$

$$= \frac{1}{5} \times 10^6$$

$$= 2 \times 10^6$$

$$= 2 \times 10^{6-1}$$

$$= 2 \times 10^5 \text{ Nm}^{-2}$$