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 marks in that question.

QUESTION NO. 1   DGK-2-24

1. Open end of an organ pipe act as :

   (A) Node   (B) Antinode   (C) Crest   (D) Trough

2. The wavelength of X – rays is of the order of :

   (A) 10^{-10} mm   (B) 10^{-10} cm   (C) 10^{-10} m   (D) 10^{-10} dm

3. Optical fibre is covered for the protection with :

   (A) Glass   (B) Plastic jacket   (C) Copper   (D) Aluminum

4. The value of triple point of water is :

   (A) 273.16 $^{\circ}$C   (B) 273.16 F   (C) 273.16 K   (D) 273.16 K^{-1}

5. When hot and cold water are mixed, the entropy :

   (A) Decreases   (B) Increases   (C) Remains constant   (D) Zero

6. Unit used for the factor $\sqrt{\frac{l}{g}}$ may be :

   (A) Meter   (B) Second   (C) Kilogram   (D) Radian

7. Solid angle is :

   (A) One dimensional   (B) Two dimensional   (C) Three dimensional   (D) Four dimensional

8. If the magnitude of $\bar{A} . \bar{B} = \frac{1}{2}AB$ then an angle between $\bar{A}$ and $\bar{B}$ is

   (A) 30° (B) 45° (C) 60° (D) 90°

9. $\hat{i} . (\hat{k} \times \hat{i})$ is equal to :

   (A) 0   (B) 1   (C) $\hat{i}$ (D) $\hat{j}$

10. Impulse has the same unit as that of :

    (A) Force   (B) Energy   (C) Mass   (D) Momentum

11. When an object moves with constant acceleration, the velocity – time graph is

    (A) Parabola   (B) Hyperbola   (C) Straight line   (D) Semi circle

12. 1 Kilowatt is the unit of :

    (A) Power   (B) Work   (C) Energy   (D) Weight

13. The value of ' g ' at the center of earth is :

    (A) infinite   (B) 2 g   (C) 3 g   (D) Zero

14. The expression for the angular momentum is :

    (A) $\bar{L} = \bar{p} . \bar{r}$ (B) $\bar{L} = -\bar{p} . \bar{r}$ (C) $\bar{L} = \bar{r} \times \bar{p}$ (D) $\bar{L} = \bar{p} \times \bar{r}.$

15. The diastolic pressure of a normal healthy person in torr is :

    (A) 70 - 75   (B) 75 - 80   (C) 90 - 95   (D) 95 - 100

16. If time period of a simple pendulum is double, its length will be

    (A) Eight times   (B) Four times   (C) Three times   (D) Two times

17. The value of ' r ' for diatomic gas is :

    (A) 1.4   (B) 1.67   (C) 1.29   (D) 1.73

SECTION-I

QUESTION NO. 2 Write short answers to any Eight (8) of the following   DGK-2-24   16

i	The length of a floor tile is 0.233 m while its breadth is 0.178 m. Find its area in significant figures.
ii	What is the difference between random error and systematic error ?
iii	Why do we find it useful to have two units for the amount of substance, the Kilogram and the mole ?
iv	Write the dimensions of (i) Pressure (ii) Density
v	If force $\vec{F}$ of magnitude 10 N makes an angle of 30^{0} with y – axis then find its x – component.
vi	What does $\frac{\vec{A} \times \vec{B}}{AB \sin \theta}$ represent ?
vii	Can a vector have a component greater than the vector's magnitude
viii	If a squash ball comes back to its starting point after bouncing several times, then what would be its average velocity ?
ix	What is velocity time graph ?
x	Define impulse and show how it is related to linear momentum.
xi	A 60 kg man runs up a long flight of stairs in 40 sec. The vertical height of the stairs is 4.5 m. Calculate his power output in watts .
xii	What sort of energy is in the following (a) Compressed spring (b) A moving car

QUESTION NO. 3 Write short answers to any Eight (8) of the following   16

i	Describe what should be the minimum velocity, for a satellite to orbit close to the Earth around it.
ii	Show that orbital angular momentum $L_o = mvr$
iii	Show that how many minimum number of geostationary satellites are required for global coverage of T.V transmission.
iv	Orbital speed of a satellite is 7.9 Kms^{-1}. Calculate its period.
v	What are dimensions of AV , where ' A ' is area and ' V ' is velocity.
vi	A person is standing near a fast moving train. Is there any danger that he will fall towards it ?
vii	Why can we not realize an ideal simple pendulum ?
viii	Explain a relation between total energy, potential energy and kinetic energy of a body oscillating with SHM.
ix	Does frequency depend on amplitude for harmonic oscillator ?
x	Why does sound travel faster in solids than in gases ?
xi	How stationary waves are produced ?
xii	How do bats navigate food ?

QUESTION NO. 4 Write short answers to any Six (6) of the following   12

i	An oil film spreading over a wet footpath shows colours.. Explain how does it happen ?
ii	What is the difference between " Spherical wave front " and " plane wavefront " ?
iii	What are the conditions to observe the interference of light waves ?
iv	If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens.
v	What will be the speed of light in water ? (refractive index of water is 1.33)
vi	One can buy a cheap microscope for use of children. The images seen in such a microscope have coloured edges. Why is this so ?
vii	Why the entropy of the system increases due to friction ?
viii	Why does the pressure of a gas in a car tyre increase when it is driven through some distance ?
ix	The oceans and our atmosphere contain large amount of heat energy but we cannot convert this energy into useful work. Why ?

SECTION-II

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

Q.5.(A)	Explain the addition of vector by rectangular components. Also write the main steps for addition.	5
(B)	A truck weighing 2500 Kg and moving with a velocity of 21 ms^{-1} collides with a stationary car weighing 1000 Kg. The truck and the car move together after the impact. Calculate their common velocity.	3
Q.6.(A)	What are stationary waves ? How they generate in an air column ?	5
(B)	A car of mass 800 kg at 54 km h^{-1} is brought to rest in 60 m. Find the average retarding force on the car. What has happened to its original kinetic energy ?	3
Q.7.(A)	How would you Differentiate real weight with apparent weight on the basis of frame of reference, also elaborate the reading of the scale as apparent weight in case of movement of lift.	2+1+1+1
(B)	A block of mass 4.0 Kg is dropped from a height of 0.80 m on to a spring of spring constant K = 1960 N/m, find the maximum distance through which the spring will be compressed ?	3
Q.8.(A)	What is terminal velocity ? Show that terminal velocity of fog droplet is directly proportional to the square of its radius.	5
(B)	A heat engine performs 100 J of work and at the same time rejects 400 J of heat energy to the cold reservoirs. What is the efficiency of the engine ?	3
Q.9.(A)	Explain the diffraction of X – rays by crystal and derive Bragg's law. What are the uses of diffraction of X – rays ?	5
(B)	An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal lengths of these lenses.	3