

Note: There are three sections in the paper i.e. A, B & C. Attempt Section-A and return it to the Superintendent within the given time. No mark will be awarded to cutting, erasing & overwriting. Mobile phones are strictly prohibited.

Time: 20 mins

SECTION-A

Marks: 18

QNo: There are four possible answers (A, B, C, D) for each question. Select the correct one and write it in the answer box.

- i. An angle of π radians is equivalent to _____
 a) 360° b) 180° c) 90° d) 45° B
- ii. What is the ratio $1\mu\text{m}/1\text{Gm}$?
 a) 10^{-3} b) 10^{-9} c) 10^{-12} d) 10^{-15} D
- iii. The sum of magnitudes of two forces is 16N. If the resultant force is 8N and its direction is perpendicular to minimum force then the forces are _____
 a) 6N and 10N b) 8N and 8N c) 4N and 12N d) 2N and 14N A
- iv. Area under velocity-time graph is called _____
 a) Acceleration b) Speed c) Distance d) Momentum C
- v. The rate of change of linear momentum is equal to _____
 a) Acceleration b) Force c) Torque d) Energy B
- vi. One Kwh energy is equivalent to _____
 a) 3.6J b) 3.6KJ c) 3.6MJ d) 3.6GJ C
- vii. Numerical value of escape velocity from the moon surface is _____
 a) $2.3 \times 10^3 \text{ ms}^{-1}$ b) $2.3 \times 10^2 \text{ ms}^{-1}$ c) $2.3 \times 10^1 \text{ ms}^{-1}$ d) 2.3 ms^{-1} A
- viii. The minimum needed velocity to put a satellite into the orbit is known as _____
 a) Escape velocity b) Orbital velocity c) Critical velocity d) None of these C
- ix. Which one is constant for a satellite in orbit?
 a) Velocity b) Kinetic Energy c) Angular momentum d) Potential Energy C
- x. The drag force increases as the speed of the object _____
 a) Decreases b) Increases c) Remains constant d) None of these B
- xi. The quantity which shows the state of motion of an oscillator is known as _____
 a) Phase b) Phase constant c) Angular velocity d) Angular acceleration A
- xii. The time period of a simple pendulum is 2 seconds. If its length is increased by 9 times, then its period becomes _____
 a) 2s b) 4s c) 6s d) 8s C
- xiii. The frequency of second's pendulum is _____
 a) 2HZ b) 0.2HZ c) 0.4HZ d) 0.5HZ D
- xiv. The speed of sound in air at 10°C is almost _____
 a) 336 ms^{-1} b) 332 ms^{-1} c) 334 ms^{-1} d) 338 ms^{-1} D
- xv. For destructive interference the two waves must be out of phase by an angle of _____
 a) 30° b) 90° c) 180° d) 360° C
- xvi. The principle of Michelson interferometer is based on the division of _____
 a) Amplitude b) Wave length c) Frequency d) Distance B
- xvii. The currently accepted value of mechanical equivalent of heat in Joule per calorie is _____
 a) 4.00 b) 4.12 c) 4.18 d) 4.16 C
- xviii. The device in which the working substance performs cycle in a direction opposite to that of a heat engine is _____
 a) Carnot heat engine b) Petrol heat engine c) Refrigerator d) Diesel engine C

Note: Time allowed for Section – B & C is 2:40 hours.

SECTION – B

Marks: 40

Q2: Answer any TEN parts of the following. All carry equal marks.

- i. Show that one radian is equal to 57.3° .
- ii. What does dimension of a physical quantity mean? Explain what are its applications?
- iii. Explain with the help of an example, what is the range of possible values of the resultant of two vectors?
- iv. Define torque. Explain why it is equal to the vector product of force and moment arm?
- v. Explain Newton's second law of motion and show that $\vec{F} = \frac{\Delta \vec{p}}{\Delta t}$.
- vi. What is meant by range of a projectile? Explain.
- vii. When an arrow is shot from its bow, it has Kinetic Energy. From where does it get Kinetic Energy?
- viii. Show that for a geostationary orbit $r_0 = 4.23 \times 10^7 \text{ m}$.
- ix. How do the pulsations in pulse show the heart beat?
- x. Give two applications in which resonance plays an important role.
- xi. Why does the speed of a sound wave in a gas changes with temperature?
- xii. How you can explain Brewster's law of Polarization?
- xiii. Why does the pressure of the air in automobile tyre increase if the automobile is driven for a while?

SECTION – C

Marks: 27

Note: Attempt any THREE of the following questions. All questions carry equal marks.

- Q3.** (a) What does rectangular components of a vector means? Explain addition of vectors by rectangular components.
(b) A ship leaves a port P and travels 30km due north. Then it changes course and travels 20km in a direction 30° east of north to reach port R. calculate the displacement from P to R.
- Q4.** (a) Show that role playing by mass in linear motion is playing by moment of inertia in rotatory motion.
(b) What is the moment of inertia of a 100kg sphere whose radius is 50cm?
- Q5.** (a) Define S.H.M. Show that motion of simple pendulum is S.H.M.
(b) What should be the length of simple pendulum, whose time period is one second? What is its frequency?
- Q6.** (a) What is meant by polarized light? Explain phenomenon of polarization by selective absorption method.
(b) Find the angle of polarization for a glass of refractive index of 1.55.