

MODEL PAPER PHYSICS GRADE XI

NOTE: Attempt all questions from Section A by filling the corresponding bubble on the MCQs RESPONSE SHEET. It is mandatory to return the attempted MCQs sheet to the Superintendent within given time.

SECTION –A

Time: 20 minutes

Marks:18

1. In scientific notation, $(5 \times 10^9) \times (3 \times 10^{24})$ is expressed as:
A) 1.5×10^{32} B) 1.5×10^{34} C) 15×10^{32} D) 15×10^{34}
2. The Y-component of a force of magnitude 10N lying along X-axis is:
A) 0N B) 5N C) 10N D) 15N
3. The torque due to the gravitational force of the sun on the earth is:
A) mgd B) $mgd\cos\theta$ C) $mgd\sin\theta$ D) Zero
4. A body is displaced from a point (2,2) to a point (5,6), the magnitude of displacement is:
A) 2m B) 4m C) 5m D) 11m
5. The minimum number of forces of unequal magnitude required to keep a body in equilibrium is:
A) 2 B) 3 C) 4 D) 5
6. The velocity-time graph of a body moving with uniform velocity is:
A) Parallel to X-axis B) Parallel to Y-axis
C) Parabolic D) Hyperbolic
7. The gravitational pull of the earth on a unit mass of a body is:
A) 9.8N B) 9.8kg C) 9.8m/s^2 D) 9.8J
8. A body is thrown vertically upward, the work done by gravity on it is:
A) Maximum B) Zero C) Positive D) Negative
9. If the force and displacement of a body in the direction of force are halved, the work would change by factor:
A) 2 B) $\frac{1}{2}$ C) 4 D) $\frac{1}{4}$
10. The angular speed of the Earth's daily rotation in rad/minute is:
A) $\frac{\pi}{120}$ B) $\frac{\pi}{180}$ C) $\frac{\pi}{270}$ D) $\frac{\pi}{720}$
11. The minimum velocity required to put a satellite into orbit is called:
A) Escape velocity B) Critical velocity C) Terminal velocity D) Orbital velocity
12. When a satellite falls from high altitude to lower altitude its speed:
A) Increases B) Decreases C) Remains Same D) Becomes zero
13. The product of frequency and time period is equal to:
A) 1 B) -1 C) ∞ D) 0
14. If 40 waves pass through a point in one second with a wavelength of 5cm, the wave speed is:
A) 2m/s B) 5m/s C) 20m/s D) 40m/s
15. In a filter pump, when water flows out from the jet section, the pressure nearby:
A) Increases B) Decreases
C) Remains same D) Becomes zero

16. The principle of Young's Double Slits experiment is based on the division of:

A) Amplitude B) Frequency C) Wavelength D) Velocity

17. The quantity that remains constant during a heat engine cycle is:

A) Heat B) Pressure C) Work done D) Internal energy

18. N/kg is equivalent to:

A) m/s B) m/s^2 C) kgm/s D) kgm/s^2

SECTION –B

Time: 2 Hours 40 Minutes

Marks: 40

1. Attempt any ten of the following questions, each carry 4 marks.
 - i. Explain how does precision differ from accuracy in a measurement.
 - ii. Prove that (a) $\vec{F} = \frac{\Delta P}{\Delta t}$ (b) $\vec{a}_c = \frac{v^2}{r}$ are dimensionally homogeneous.
 - iii. Explain the scalar product of two vectors and what it indicates about the relationship when the product is zero, positive and negative.
 - iv. Two forces of 15N and 20N are applied on an object at 60° to each other, find the resultant force using head to tail rule.
 - v. Explain how the escape velocity relates to the Pgravitational constant (G) and radius (Re) of the earth.
 - vi. Differentiate conservative and non-conservative forces by giving two examples of each.
 - vii. If aerofoil lift the aeroplane upright position, how do the pilots make the aeroplane fly upside down?
 - viii. Define laminar flow and explain the transition of flow of viscous fluid from laminar to turbulence condition.
 - ix. Describe the effect of pressure and moisture on speed of sound in air.
 - x. Differentiate between transverse and compressional waves by giving two examples.
 - xi. Describe two applications of Doppler effect to electromagnetic waves.
 - xii. Define interference of light and state the necessary conditions to observe it.
 - xiii. Determine the angle at which first-order Bragg diffraction occurs for X-rays with a 4nm wavelength incident on a crystal with a 6nm lattice spacing.

SECTION –C

Marks:27

Note:Attempt any THREE of the following questions, each carry 9 marks.

- 2.a)What is projectile motion? Describe the range of projectile and explain how the angle of projection influences the maximum range.
b)Calculate the horizontal range of a ball thrown at 40 m/s at an angle of 30° to the horizontal.
- 3.a)Describe centripetal acceleration and prove that $\vec{a}_c = \frac{v^2}{r}$
b)Find the centripetal acceleration of the Moon as it orbits the Earth in a circle of radius 382,400 km and a period of 27.3 days.
- 4.a)Show that a simple pendulum executes simple harmonic motion.
b)Calculate the length of a pendulum with a period of 2 seconds at the surface of moon . ($g_m = 1.63 \text{ m/s}^2$).
- 5.Prove that for an ideal gas, $C_p - C_v = R$.
b)Determine the change in internal energy of the system given that 37,200J of heat is supplied to the system and it performs 5,000 J of work.