MODEL PAPER OF PHYSICS FOR GRADE-11
(For Annual Exam-2027)

OBJECTIVE TYPE

Max. Marks: 17 **Time: 20 mins**

Q.1. Four possible answers A, B, C & D to each question are given. The choice which you think is correct, fill the circle in front of the question (on bubble sheet) with Marker or Pen ink. Cutting or filling two or more circles will result in zero mark in that question. **(1×17=17)**

1. The ratio of the dimensions of force and energy is:

   (A) T (B) T^{-1} (C) L (D) L^{-1}

2. The projectile gains its maximum height at an angle of:

   (A) 0° (B) 45° (C) 60° (D) 90°

3. An object in uniform circular motion makes 10 revolutions in 2 seconds. Which of the following statement is true?

   (A) Its period is 2.0 s (B) Its period is 20 s

   (C) Its frequency is 5 Hz (D) Its frequency is 0.2 Hz

4. If an athlete uses 500 J of energy to lift a load in 2 s, his muscular power is:

   (A) 125 watt (B) 250 watt (C) 500 watt (D) 1000 watt

5. A solid float in water with half of its volume submerged. The density of the solid is:

   (A) equal to the density of water (B) half the density of water
   (C) twice the density of water (D) zero

6. The pressure will be low when speed of a fluid is:

   (A) zero (B) high (C) low (D) constant

7. First law of thermodynamics is based upon law of conservation of:

   (A) mass (B) energy (C) momentum (D) charge

8. The bending of waves around an obstacle is called as:

   (A) refraction (B) reflection

   (C) diffraction (D) interference

9. If the amplitude of the wave is tripled, then the amount of energy is increased by:

   (A) 3 times (B) 6 times (C) 9 times (D) 12 times

10. The mathematical representation of Malus's law is:

(A) $I = I_{\circ}cos^2\theta$ (B) $I = I_{\circ}sin^2\theta$

(C) $I = I_{\circ}tan^2\theta$ (D) $I = I_{\circ}cot^2\theta$

11. What is the work done on an electron by potential difference of 100 volts?

(A) 1.6×10^{-19} eV (B) 1.6×10^{-17} eV (C) 6.25×10^{-17} eV (D) 100 eV

12. When a wire of resistance R is cut into two equal parts, its resistance becomes R/2. What happens to resistivity?

(A) It becomes double (B) It remains the same

(C) It becomes half (D) It becomes one fourth

13. The unit $NA^{-1}\ m^{-1}$ is called:

(A) weber (B) tesla (C) coulomb (D) none of these

14. According to Faraday's law, what causes an emf (voltage) to be generated in a coil?

(A) A constant magnetic field (B) A changing magnetic flux linkage
(C) Heat applied to the coil (D) Increasing the wire thickness

15. If the rest mass m_o of a particle increases to m due to its high speed, then its kinetic energy is:

(A) 1/2 mc^2 (B) 1/2 mv^2 (C) $(m - m_{\circ})c^2$ (D) 1/2 $(m - m_{\circ})c^2$

16. Baryon is formed by combination of:

(A) 2 quarks (B) 3 quarks (C) 4 quarks (D) a quark and an anti-quark

17. Which one of the following forces has negligible effect between the elementary particles?

(A) Strong nuclear force (B) Weak nuclear force

(C) Gravitational force (D) Electromagnetic force

SUBJECTIVE TYPE (Part-1)

Max. Marks: 68 **Time: 2:40 hours**

Q. 2 Write short answers of any Eight (08) of the following questions: (2 × 8 = 16)

(i) How many significant figures are there in the following measurements?

(a) 37 km (b) 0.002953 m (c) 7.50034 cm (d) 200.0 m

(ii) What is meant by a dimensionless quantity? Give one example.

(iii) Differentiate between an elastic and an inelastic collision.

(iv) Show that rate of change in momentum is equal to force applied. Also state Newton's second law of motion in terms of momentum.

(v) Mass is a measure of inertia in linear motion. What is its analogue in rotational motion? Describe briefly.

(vi) Prove the relation; 1 rad = 57.3°

(vii) How does an astronaut feel weightlessness while orbiting from the Earth in a spaceship?

(viii) When a moving car turns around a corner to the left, in what direction do the occupants tend to fall? Explain briefly.

(ix) What is a conservative force? Give examples.

(x) Calculate power of a crane in kilowatt which lifts a mass of 1000 kg to a height of

100 m in 20 seconds.

(xi) Why work done against friction is non-conservative in nature? Explain briefly.

(xii) Differentiate between P.E and absolute P.E.

Q. 3 Write short answers of any Eight (08) of the following questions: (2 × 8 = 16)

(i) Explain the working of a carburetor of a motorcar using Bernoulli's principle.

(ii) Differentiate between laminar flow and turbulent flow.

(iii) Why must speed of an object be minimum against drag force?

(iv) Why wings of an aero plane are rounded outward while flattened inward?

(v) Why adiabat is steeper than isotherm? Explain briefly.

(vi) Explain how thermodynamics relates to the concept of energy conservation.

(vii) Analyze the relationship between intensity of a wave, area and amplitude.

(viii) How should a sound source move with respect to an observer so that the frequency of its sound does not change?

(ix) What conditions must be satisfied is order that two-source interference fringes may be observed?

(x) Can you apply Doppler effect to light waves? Explain briefly.

(xi) Compare Brewster's law and Malus's law.

(xii) How do the properties of a system, such as masses, orbital period, and eccentricity, affect the characteristics of gravitational waves?

Q. 4 Write short answers of any Six (06) of the following questions: (2 × 6 = 12)

(i) Is electron-volt a unit of potential difference or energy? Explain.

(ii) What is conventional current? Explain briefly.

(iii) Why does the terminal potential difference of a battery decrease when the current drawn from it is increased?

(iv) Does the induced emf always act to decrease the magnetic flux through a circuit?

(v) Distinguish between magnetic flux and flux density.

(vi) How does an electric heater work on the principle of electromagnetic induction?

(vii) Why is it impossible for a material particle to move with speed of light? Explain briefly.

(viii) What is the difference between beta particle and an electron?

(ix) Why neutrino must be released in the positron emission?

Part – 2

(3×8 = 24)

Note: Attempt any Three (03) questions. Each question carries eight (08) marks.

Q. No 5 (a) Give the dimensions of velocity. Explain elastic collision in one dimension and derive the final velocities. (5)

(b) A car is moving with a speed of 108 km h^{-1}. If its wheel has a diameter of 60 cm, find its angular speed in rad s^{-1} and rev s^{-1}. (3)

Q. No 6 (a) State and explain the work–energy theorem. How is the mechanical work expressed in terms of pressure and volume for a gas? Derive the equation. (5)

(b) A spring with a spring constant 200 N m^{-1} is stretched by 0.5 m. Find the elastic *P.E.* stored in the spring. (3)

Q. No 7 (a). What are gravitational waves? How they can be predicted and detected? Also, give their four basic types. (5)

(b) Two trucks P and Q are travelling along a motorway in the same direction. The leading truck 'P' travels at a steady speed of 12 ms^{-1}, the other truck Q, travelling at a steady speed of 20 ms^{-1}, sounds its horn to emit a steady note which P's driver estimate, has a frequency of 830 Hz. What frequency does Q's own driver hear? (Speed of sound = 340 ms^{-1}). (3)

Q. No 8 (a) What are ferrofluids. Give their working, uses and applications in detail. (5)

(b) A particle of charge $+20\ \mu C$ is placed between two parallel plates, 10 cm apart and having a potential difference of 0.5 kV between them. Calculate the electric field between the plates, and the electric force exerted on the charged particle. (3)

Q. No 9 (a) What is meant by radioactivity? Compare the properties and behaviour of three types of radiations. (5)

(b) A bar 1.0 m in length and located along x-axis moves with a speed of 0.75 c with respect to a stationary observer. What is the length of the bar as measured by the stationary observer? (3)