Model Set (A) *Sub. Code:* **1021**

NEB - GRADE XII
2080 (2023)
Physics

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Time: 3 Hrs. **Full Marks: 75**

Attempt all the questions

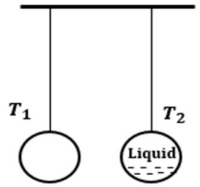
[GROUP A] $[11 \times 1 = 11]$

Rewrite the correct options of each questions in your answer sheet.

1. A ring, a disc, a hollow sphere, and a solid sphere of equal mass and equal radius are made to roll down an inclined plane from the same place. The body that reach the bottom fastest is

a. Ring b. Disc c. Hollow sphere d. Solid sphere

2. The figure shows two simple pendulum having strings of same length. The relation between time period T_1 and T_2 is:



a. $T_1 = T_2$ b. $T_1 > T_2$

c. $T_1 < T_2$ d. Cannot be determined

3. A liquid does not wet the surface of a solid if the angle of contact is,

a. 90^o b. $< 90^o$ c. $> 90^o$ d. 0^o

4. The change in internal energy of one mole of gas when the volume changes from V to $2V$ at constant pressure P is,

a. $\frac{R}{\gamma-1}$ b. $\frac{PV}{\gamma-1}$ c. $\frac{\gamma PV}{\gamma-1}$ d. PV

5. The coefficient of performance of an ideal refrigerator working between ice point and room temperature (27^oC) is

a. 0 b. 0.1 c. 1 d. 10

6. The quality of sound depends upon

a. $Amplitude$ b. $wavelength$

c. $frequency$ d. $Number\ of\ overtones$

7. A source of sound (with frequency f) is moving away from a stationary observer with a speed equal to the speed of sound. The apparent frequency heard by the observer is

a. f^2 b. $2f$ c. $f/_2$ d. $3f$

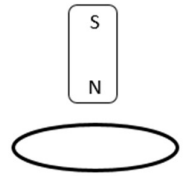
8. One junction of a thermocouple is maintained at 10^oC and no Thermo emf is developed when the other junction is maintained at 530^oC, then the neutral temperature is

a. 265^oC b. 270^oC c. 520^oC d. 540^oC

9. The self-inductance of the motor of an electric fan is $10H$. In order to import maximum power at $50Hz$, it should be connected to a capacitance of,

a. $1\mu F$ b. $2\mu F$ c. $4\mu F$ d. $8\mu F$

10. In the given figure, a bar magnet falls freely through the metal ring. The acceleration (a) of the bar magnet is, $(g = accln\ due\ to\ gravity)$



a. $a = g$ b. $a < g$

c. $a > g$ d. $a = 0$

11. The first seismic wave to be recorded in seismograph is,

a. P wave b. S wave c. Surface wave d. love wave

[GROUP B] $[8 \times 5 = 40]$

1. It is easier to study the rotational dynamics of a rigid body comparing with analogous terms in linear motion.

a. Write the total kinetic Energy of a rolling object. 1

b. Obtain an expression for the moment of inertia of a thin and uniform rod about an axis passing through the Centre and perpendicular to its length. 2

c. A constant torque of $500Nm$ turns a wheel of moment of inertia 100k.g m^2 about an axis through its center. Find the gain in angular velocity in two seconds. 2

2. a. Define simple harmonic motion. 1

b. Giving an example of each type, compare between periodic and simple harmonic motions. 2

c. A certain simple pendulum has a period on the earth of 1.60 s. What is its period on the surface of Mars, where g = 3.71 ms^{-2} ? 2

OR

a. State and explain the equation of continuity in fluid dynamics. 2

b. There is a 1 mm thick layer of glycerin between a flat plate of area $100cm^2$ and a big plate. If the coefficient of viscosity of glycerin is 1 $Kg/(ms)$, then how much force is required to move the plate with a velocity of 7 cm/S? 2

c. State Bernoulli's principle. 1

3. a. In an adiabatic process, no heat is exchanged between the system and the surroundings but work is done. Does it mean that the adiabatic process violates the principle of conservation of energy? Explain. 2

b. The density of an ideal gas is 1.60 Kgm^{-3} at 27^oC and $1.10 \times 10^5 Pa$. If the specific heat capacity at constant volume is 312 $JKg^{-1}K^{-1}$, find the ratio of the specific heat capacity at constant pressure to that at constant volume. 3