

## JEE Main 1 February 2024 Shift 1 Answer Key

### Physics

Q.1: Determine the lowest energy of a photon emitted in the Balmer Series of a hydrogen atom.  
A.1: 1.88 eV

Q.2: De Broglie wavelength of a proton is  $\lambda$  and that of an  $\alpha$  particle is  $2\lambda$ . Find the ratio of the velocity of the proton to that of  $\alpha$  particle.  
A.1: 1:8

Q.3: What are the dimensions of an angular impulse?  
A.3:  $[ML^2T^{-1}]$

Q.4: A vernier calliper has 10 main scale divisions coinciding with 11 vernier scale divisions equals 5 mm. What is the least count of the device?  
A.4:  $5/11$  mm

Q.5: On increasing temperature, the elasticity of a material will:  
i. Increase  
ii. Decrease  
iii. Remain constant  
iv. May increase or decrease

A.5: Decreases

Q.6: 2 moles of a monoatomic gas and 6 moles of a diatomic gas are mixed. Find the molar-specific heat for a constant volume of the mixture if R represents the universal gas constant.

A.6: 2.25 R

Q.7: A gas undergoes a thermodynamic process from state  $(P_1, V_1, T_1)$  to state  $(P_2, V_2, T_2)$ . If for the given process  $PV^{3/2} = \text{constant}$ , find the work done by the gas.

A.7:  $2(P_1V_1 - P_2V_2)$

Q.8: Two particles, each of mass 2 kg are placed in the x - y plane such that  $m_x$  is 4 m on the negative x-axis and  $m_y$  is 4 m on the positive y-axis. If the distance of the centre of mass from the origin is  $[(4\sqrt{2})/x]$ , find x.

A.8: 2

Q.9: If a bullet of mass  $10^{-2}$  kg and velocity 200 m/s gets embedded inside the bob of mass 1 kg of a simple pendulum, then what will be the maximum height that the system rises by in cm?

A.9: 20 cm

Q.10: The length of a seconds pendulum, if it is placed at height  $2R$  (where  $R$  = the radius of the earth) from the surface of the earth, is  $[10/x\pi^2]$  m. Find x.

A.10: 9