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## NET, IAS, State-SET (KSET, WBSET, MPSET, etc.), GATE, CUET, Olympiads etc.: Physics MCQs (Practice\_Test 21 of 35)

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1. A single slit is used to observe diffraction pattern with red light. On replacing the red light with violet light the diffraction pattern would be
  - a. remain unchanged
  - b. become narrower
  - c. become broader
  - d. disappear
2. The thickness of a quarter-wave plate made of quartz for wavelength  $\lambda = 5000 \text{ \AA}$ , refractive indices  $m_E = 1.553$  and  $m_0 = 1.543$  is
  - a.  $5.00 \times 10^{-3} \text{ cm}$
  - b.  $3.75 \times 10^{-3} \text{ cm}$
  - c.  $2.50 \times 10^{-3} \text{ cm}$
  - d.  $1.25 \times 10^{-3} \text{ cm}$
3. When unpolarised light gets reflected from a plane glass surface, it becomes partly polarized because glass
  - a. is optically active
  - b. rotates the components in the plane of incidence and those perpendicular to the plane of incidence by different amounts
  - c. reflects the components of light parallel to the plane of incidence and those perpendicular to it by different amounts
  - d. is a stereoisomer
4. If a quarter wave-plate with its fast axis vertical is inserted into a beam of linearly polarized light oscillating at  $45^\circ$ , then the emerging light will be
  - a. linearly polarized
  - b. vertically polarized
  - c. left circularly polarized
  - d. left elliptically polarized
5. In a Fabry-Perot interferometer the circular fringes formed are referred to as fringes of

- a. equal thickness
  - b. equal inclination
  - c. equal chromatic order
  - d. None of the above
6. Scattering intensity of pure carbon tetrachloride is 6 units for 500. The scattering intensity for 4000 is
- a. 4.5 units
  - b. 6.0 units
  - c. 7.5 units
  - d. 14.6 units
7. A substance shows a Raman frequency shift of  $4000\text{ cm}^{-1}$ . If this mode is active in the infra-red, then the corresponding infrared adsorption band will be at
- a. 0.5  $\mu\text{m}$
  - b. 1.0  $\mu\text{m}$
  - c. 1.5  $\mu\text{m}$
  - d. 2.5  $\mu\text{m}$
8. The population inversion necessary for laser action used in solid state lasers is
- a. electrical discharge
  - b. inelastic atom-atom collision
  - c. direct conversion
  - d. optical pumping
9. A given amount of heat cannot be completely converted into work. However it is possible to convert a given amount of work completely into heat. This apparently contradictory statement results from the
- a. zero th law of thermodynamics
  - b. first law of thermodynamics
  - c. second law of thermodynamics
  - d. third law of thermodynamics
10. The work done,  $W$ , during an isothermal process in which the gas expands from an initial volume  $V_1$  to a final volume  $V_2$  is given by ( $R$ : Gas constant,  $T$ : Temperature)
- a.  $R (V_2 - V_1) \log_e (T_1/T_2)$
  - b.  $R (T_2 - T_1) \log_e (V_1/V_2)$
  - c.  $R T \log_e (V_2/V_1)$
  - d.  $2 R T \log_e (V_1/V_2)$
11. The combined form of first and second law of thermodynamics is given by ( $P$ : Pressure,  $V$ : Volume,  $T$ : Temperature,  $U$ : Internal energy,  $S$ : Entropy,  $Q$ : Quantity of heat)

- a.  $TdS = dU + PdV$
  - b.  $dQ = TdS + PdV$
  - c.  $dU = TdS + dQ$
  - d.  $TdS = dU - PdV$
12. The temperature of water (mass,  $m$ ) increases from  $T_1$  to  $T_2$ . If  $C$  is the specific heat capacity of water, then the total increase in entropy of water is given by
- a.  $mC (T_2 - T_1)$
  - b.  $MC \log_e T_1/T_2$
  - c.  $mC (T_1 - T_2)$
  - d.  $mC \log_e T_2/T_1$
13. Which one of the following Maxwell's relations leads to Clausius-Clapeyron equation?
- a.  $(T/V) S = - (p/S) V$
  - b.  $(T/P) S = (V/S) P$
  - c.  $(V/T) P = - (S/P) T$
  - d.  $(S/V) T = (P/T) V$
14. A perfect gas at 27 degree C is heated at constant pressure so as to double its volume. The temperature of the gas will now be
- a. 600 degree C
  - b. 327 degree C
  - c. 300 degree C
  - d. 54 degree C
15. Consider the following processes that take place in a Carnot cycle:
- a. Adiabatic expansion
  - b. Adiabatic compression
  - c. Isothermal expansion
  - d. Isothermal compression
- The correct sequence of the above process is
    - a. 1,3, 4,2
    - b. 3,1, 2,4
    - c. 3,1, 4,2
    - d. 1,3, 2,4