WEEKLY TEST – 2080/10/28
XII (SCIENCE)

Subject: Physics **F. M.: 40** **P. M.: 20** **Time: 1.30 hrs.** **Set : 'A'**

Attempt all the Questions

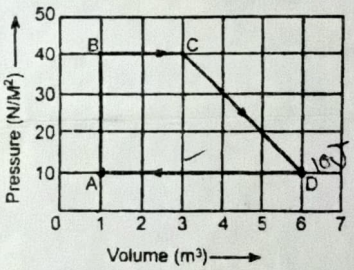
Group-A [7x1=7]

1. In sonometer wire, the waves are (A) longitudinal (B) transverse (C) longitudinal and transverse alternatively (C) neither longitudinal nor transverse
2. The fundamental frequency of a closed pipe is equal to the frequency of the second harmonic of an open pipe. The ratio of their lengths is (a) 1:2 (b) 1:4 (c) 1:8 (d) 1:16
3. If heat given to a system is 6 kcal and work done is 6 kJ. Then change in internal energy is (a) 19.1 kJ (b) 12.5 kJ (c) 25 kJ (d) zero
4. The instantaneous current in a circuit is $I = \sin(\omega t + \phi)$ ampere. What is the rms value of the current? (a) 2A (b) 5A (c) 1 A (d) 1 A
5. The rate of decay of a radioactive element (a) increases with increase in time (b) decreases with increase in time (c) remains constant with increases time (d) decreases exponentially with time
6. On increasing the temperature, the viscosity of liquid (a) increases (b) decreases (c) Remain constant (d) none of above
7. A current carrying wire produces: (a) Only electric field (b) Only magnetic field (c) Both electric and magnetic field (d) No field

Group-B [5x5=25]

8. (a) Why adiabatic curve is more steeper than the isothermal curve? [2]

   (b) In the given diagram, the graph of thermodynamic process is shown. In the state D, the internal energy of the system is 100 J. Determine

   (i) The internal energy of the system in state A, if the heat given to the system from the state D to the state A is 10 J. [1]

   (ii) The total work done by the system in coming back to the state after starting from state A and going through the states B, C and D. [2]

9. a) Explain the working of diesel engine with the help of a P-V diagram. [3]

   b) A diesel engine perform 2200 J of mechanical work and discards 4300 J of heat in each cycle. What is the thermal efficiency of the engine? [2]

10. a) What are harmonics? [1]

    b) With necessary diagrams, discuss the modes of vibration in the open organ pipe. [3]

    c) Show that both types of harmonics odd and even can be produced in the organ pipe open at both ends [1].

11. a) Find an expression for torque on rectangular coil in a uniform magnetic field. [2]

    b) A rectangular coil of 100 turns and dimensions 10 cm by 4 cm is suspended with its plane and longer side vertical in a horizontal field of flux density 0.1 T. If a current of 0.1 A flows in the coil, calculate the torque acting on the coil when its plane is (i) parallel to the field (ii) inclined at 30° to the field. [3]

12. a) State Bernoulli's Principle. [1]

    b) Derive Bernoulli's equation from the work energy theorem. [3]

    c) Explain why the equation is valid only for steady, non viscous and incompressible fluid. [1]

Group-C [8x1=8]

13. a) What is the cause of radioactivity? [1]

    b) Write down the laws of radioactive decay . [1]

    c) Derive the relation , $N=N_o e^{-\lambda t}$, where the symbols have their usual meanings [2]

    d) Sketch the nature of graph between N and t. [1]

    e) A particular rock sample contains ^{206}pb and ^{238}U in the ratio of 1:5 by weight. Uranium has half-life of 4500 million years. Calculate (i) the number of ^{206}pb atoms and of ^{238}U atoms in sample containing 1.0gm of ^{238}U. (ii) The original number of ^{238}U atoms in this sample (iii) The age of the rock. [3]

Good Luck