Khyber Pakhtoon Khwa, Public Service Commission, Peshawar

Competitive Examination for the Posts of Provincial Management Service (BPS-17)

PHYSICS PAPER II

Time Allowed: 03 hours   Max. Marks: 100

Attempt any FIVE questions

Q1:

   a) State and prove Gauss's Law in electrostatic.   2, 10

   b) Find the electric field due to a uniformly charged non-conducting sphere on which charge is distributed spherically symmetric at a point

      i)   Outside the sphere.   3

      ii)   On the surface of the sphere.   2

      iii) Inside the sphere.   3

Q2:

   a) State and prove Ampere's circuital Law?   2, 6

   b) Show that line integral $\oint \vec{B} \cdot dl$ is independent of the shape of the path?   5

   c) Calculate the magnetic induction field due to an infinite hollow tube carrying a steady current at points inside and outside the tube?   7

Q3:

   a) What is electromagnetic induction? State and explain Faraday's and Lenz's Law of electromagnetic induction.   2,4,4

   b) Derive the equations for growth and decay of an electric current in a circuit with resistor and inductor?   10

Q4:

   a) Explain the movement of electrons and holes in a semiconductor. In what respect N-type and P-type semiconductors differ from each other?   4, 4

   b) Explain the characteristics of PN junction under reverse and forward bias?   4,4

   c) Can we use diode as switch? Explain.   4

Q5:

   a) Explain the term modulation. What are various circuits for amplitude modulations? Explain one of them.   3, 6, 4

   b) How can triode be used as a detector/receiver?   7

Q6:

   a) What is Compton Effect? Derive an expression for Compton Shift and   4, 12

P.T.O.

wavelength of scattered photon.

b) Why Compton Effect cannot be observed with visible light? 4

Q7:

a) What do you understand by the wave function Ψ of a moving particle? Give the 2,2

physical significance of wave function.

b) Derive the Schrodinger wave equation. 10

c) Obtain an expression for the energy levels of the one dimensional harmonic 6 oscillator.

Q8:

a) What is meant by the Binding Energy of a nucleus? Discuss the variation of 3,7 binding energy per nucleon as a function of mass number.

b) Calculate the binding energy of deuteron $_1H^2$ when the mass of $_1H^2$ is 2.01412 u, 7 mass of neutron is 1.008665 u and mass of proton is 1.007825 u.

c) Differentiate between natural and artificial radioactivity. . 3