**Sample Paper – 2013
Class – XII
Subject –PHYSICS**

TIME: 3 hrs MAX. MARKS: 70

**INSTRUCTIONS:**

* Attempting all questions is compulsory.
* The question paper consists of 5 pages.
* Diagrams/graphs are to be drawn only with a PENCIL.
* The paper consists of 30 questions with following marks distribution:
* Questions 1 to 8 of 1 mark each.
* Questions 9 to 18 of 2 marks each.
* Questions 19 to 27 of 3 marks each.
* Questions 28 to 30 of 5 marks each.

Q.1: Define SI Unit of current. (1)

Q.2: Draw a graph of V vs I for a material that doesn’t obey Ohm’s Law. Name the material. (1)

Q.3: Explain the significance of the expression:  = . (1)

Q.4: What focal length should the reading spectacles have for a person for whom the least distance of

 distinct vision is 50 cm? (1)

Q.5: C, Si and Ge have same lattice structure. Why is C an insulator while the other two are

 intrinsic semiconductors? (1)

Q.6 Calculate the power developed in an ideal inductor of L = 4H and ω = 100 rad/sec. [01]

Q.7 How does the thickness of a deplection layer in a p-n diode vary with increase in reverse bias? [01]

Q.8 Why is the conductivity of n-type semiconductor is more than the p-type semiconductor even both of them have same level of doping. [01]

Q.9 A parallel combination of three resistors draws a current of 7.5A from a 30V supply. If two resistors are 10Ω and 12Ω. Find the resistance of third one. ---------------- Q.10: Derive the lens maker formula for two interfaces of radii R1 and R2 to make a concave lens.(2)

Q.11: A 100 W sodium lamp radiates energy uniformly in all directions. The lamp is located at the centre

 of a large sphere that absorbs all the sodium light which is incident on it. The wavelength of sodium

 light is 589 nm.

1. What is the energy per photon associated with the sodium light? (1)
2. At what rate are the photons delivered to the sphere? (1)

Q.12: Explain briefly the generation of emf by a solar cell. (2)

Q.13: A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in

 which R = 3Ω, l = 25.48 mH and C = 796 µ. Find

1. the impedance of the circuit
2. the power dissipated in the circuit. (1 + 1 = 2)

Q.14: The ground state energy of hydrogen atom is -13.6 eV. What are the kinetic and potential energies

 of the electron in this state. (2)

 OR

 A hydrogen atom initially at the ground level absorbs a photon which excites it to the n=4 level.

 Determine the wavelength and frequency of photon. (2)

 

Q.15. In an electromagnetic wave propagating along +x-axis electric field vector is Ey=4x103 Cos (3x108t-1.5x) v/m. what is

(i) the frequency of em wave (ii) amplitude of magnetic field

Q.16. A and B are two concentric metallic spherical shell of radii a & b having charge q & Q respectively. How much work will be done in moving a test charge q0 from A to B (a<b).

Q.17. What is the SI unit of radio activity. Express curie in SI unit. The mean life of radio active substance is 2400yrs. What is its half life.

Q.18. What is meant by modulation? Draw a block diagram of a simple modulator for obtaining an AM signal.

Q.19. In interference pattern obtained in young’s double slit experiment, explain how will the angular width of fringe be affected if

 (a) Slits separation is increased

 (b) Screen is moved away

 (c) Experiment is performed in a denser medium

Q.20. State Gauss’s law in electrostatics. Find (i) net electric flux (ii) charge enclosed by the cube of side ‘a’. Give E=E0xt-1

Q.21. In an atom energy of electron in nth orbit is En = -13.6z2/n2ev, where zis atomic number.

 What is the shortest & longest wave length of emitted radiation n in singly ionized He+.

Q.22. With the help of a schematic diagram explain the principle & working of a cyclotron.

 A bar magnet of magnetic moment Nv held in magnetic field of strength B what is

 (a) Maximum torque on the magnet

 (b) Work done in turning it from stable equilibrium to unstable equilibrium.

through the analyzer. [03]

Q.23 The following graph shows the variation of stopping potential Vo with frequency ν of the incident for two photosensitive metals P and Q. [03]

 a) Which metal has smaller threshold wavelength. P Q

 b) Explain which metal emits photoelectrons having Vo

 smaller K.E. for same wavelength of incident radiation.

c) If the distance between the light source and

 metal P is doubled, how will the stopping potential charge? ν

Q.24 Derive the relationship between the half life and decay constant of a radioactive substance. The half life of radium is 1600 years. After how many years 25% of a radium block remains undecayed? [03]

Q.25 The energy levels of an atom are as shown below. [03]

B

A

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 0 ev

C

D

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ −2 ev

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ − 4.5ev

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ − 10ev

 a) Which of them will result in transition of a photon of wave length 275 nm.

 b) Which transition corresponds to emission of radiator of maximum wavelength.

OR

 What are nuclear forces. State any two properties of nuclear force. Draw a graph between the P.E of a pair of nucleons as a function of their separation.

- Q.26. State Huygen’s postulates. Draw diagrams to show the refracted wave front from a convex lens if paint source is (i) at 2F (b) at F.

Q.27. Photons of certain frequency and intensity are incident on a surface of work function W0. Kinetic energy of emitted electrons & photo electric current are Ek and I respectively. For photons of 50% higher frequency, find (i) Kinetic energy of, emitted electrons (ii) photo electric current.

Q.28. State the principle of a potentiometer. In the following figure find the length. P√ where √ is null deflection position. Given PQ =400cm, Resistance of PQ is 20Ω, driver cell emf E =4v & E1=40mv.

Q.29. Derive the relationship b/w the peak & rims value of current in an ac circuit. For circuits used for transmission of electric power a law power factor implies large power lass in the transmission explain.

Q.30. With the help of a labeled diagram show image formed by a compound microscope. Derive expression for its magnifying power when final images is at near point. How is magnifying power changed on increasing

 (a) Diameter of objective lens

 (b) The focal length of the objective lens?

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