15. Explain the laws of photo electric emission on the basis of Einstein's photo electric equation.

16. The values of ground state energy of Hydrogen atom is - 13.6 ev.
    (a) What does the negative sign signify?
    (b) How much energy required to take an electron in the atom from the ground state to the excited state?

17. Define magnetic susceptibility of a material. Name two elements one having negative value.

18. Define capacitance of a capacitor. Prove that the total electrostatic energy stored in a parallel plate capacitor is $\frac{1}{2} cv^2$.

SECTION – C

19. Using Gauss theorem, deduce an expression for the electric field intensity at any point due to a thin infinity long wire of charge per unit length is λ.

20. With the help of circuit diagram explain in brief the use of potentiometer for comparision of emf of two cells.

21. A metallic rod of length 'L' and resistance 'R' is moving normal to a uniform magnetic field 'B' with a velocity 'V'. Deduce expression for (i) the emf induced (ii) the induced current in the metallic rod.

22. Explain with help of a neat and labeled diagram, the principle and working of a transformer.

23. Draw a labeled ray diagram shown the formation of image of a distant object using as Astronomical telescope in normal adjustment position. Also write the expression for magnifying power of telescope for normal adjustment.

SECTION – D

24. Define polarizing angle. Derive the relation connecting polarizing angle and the refractive index of a medium.

SECTION – E

25. (a) The activity of a radioactive element drops to $\frac{1}{16}$ th of its initial value in 32 years. Find the mean life of the sample.
    (b) Write the nuclear equation for α decay of $_{92}Pu^{242}$.

26. Kumaran wanted to pay electricity bill that day. He realized that the consumption shown by the Meter was unbelievably low. He thought that the meter must have been faulty. He wanted to check the meter, But unfortunately he did not have any idea as to how to do this. There came his friend Subhas to help him. He told Kumaran to run only the electric heater rated 1kWin his house for some time keeping other appliances switch off. He also calculated the power consumed in Kilowatt hour and compared the value with the meter. Kumaran was happy and thanked Subhash for his timely help and the knowledge.

(i) What are the values displayed by the friends?
(ii) Express kwh in joules. Find the resistance of appliance of 1kw.

27. Draw a neat and labeled diagram if cyclotron. State the underlying principle and explain how a positively charged particle gets accelerated in a cyclotron. Show mathematically that the cyclotron frequency does not depend on speed of particle.

OR,

State the Biot-Scavart law for the magnetic field due to a current carrying element. Using this law obtains a formula for magnetic field at the centre of circular loop radius R carrying a steady current (I).

28. What is interference of light? In Young's double slit experiment deduce the conditions for:
    (i) Constructive and   (ii) destructive interference.
    Draw a graph shown in the variation of resultant intensity in the interference pattern against position 'x' on the screen.

29. (a) With the help of a circuit diagram explain the working of transistor as oscillation.
    (b) If a change of 100 µA in the base current of n-p-n transistor causes a change of 10 µA in its collector current. What is it's a.c. current gain.

OR,

Explain the formation of p-n junction with the help of circuit diagram, explain the working of a p-n junction diode as half wave rectifier. Show the input and output wave form.

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CLASS-XII   SUBJECT-**PHYSICS**

DURATION- 3hrs   **FULL MARKS-70**

General Instructions: i) There are total 29 questions and five sections in the question paper. All questions are compulsory.
ii) Section A contains number 1 to 8, very short answer type question of 1 mark each.
iii) Section B contain question number 9 to 18, short answer type-I questions of 2 marks each.
iv) Section C contains question number 19 to 25, short answer type-II questions of 3 marks each.
v) Section D contains question number 24, value based question of 4 marks.
vi) Section E contains question number 25 to 29, long answer type question of 5 marks each.

SECTION – A

1. An electron moving though a magnetic field does not experiences a force. Under what condition is this possible?
2. The instaneous value of voltage from an A.C source is given by E= 300 sin 314t. What is the rms voltage of the source?
3. A bulb and a capacitor are connected in series to an A.C. source of variable frequency. How will the brightness of the bulb change on increasing the frequency of the A.C. source?
4. Name the part of electromagnetic spectrum that has largest penetrating power.
5. When light undergone refraction. What happens to its frequency?
6. Two nuclei have mass number in the ratio 1:2. What is the ratio of their nuclear density?
7. In the given diagram is the diode D forward or reverse biased?
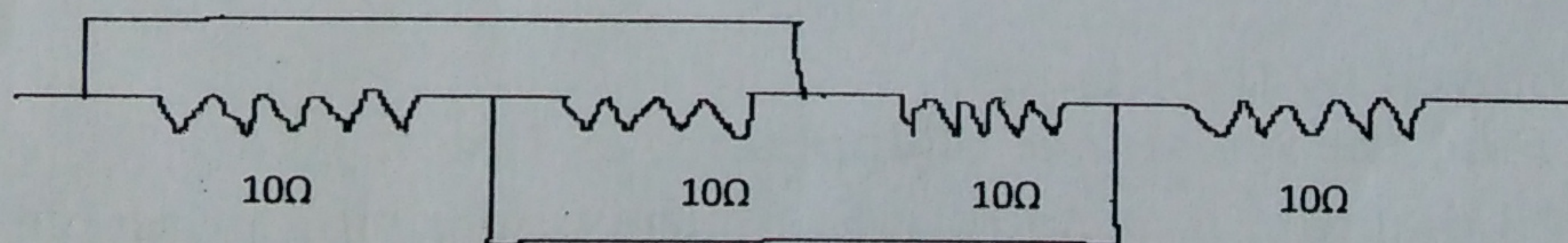
$$-10_v \longrightarrow \blacktriangleright\!\!|_D \quad\dashv| \; \text{t.}$$
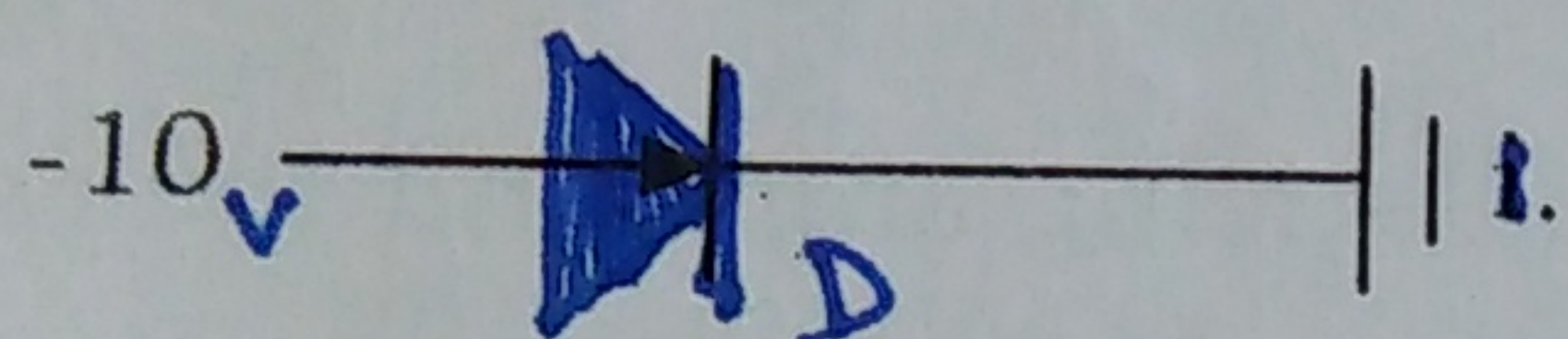
8. Write the truth table for the gate shown below.

A ────┐
      ├─Do─ C.
B ────┘
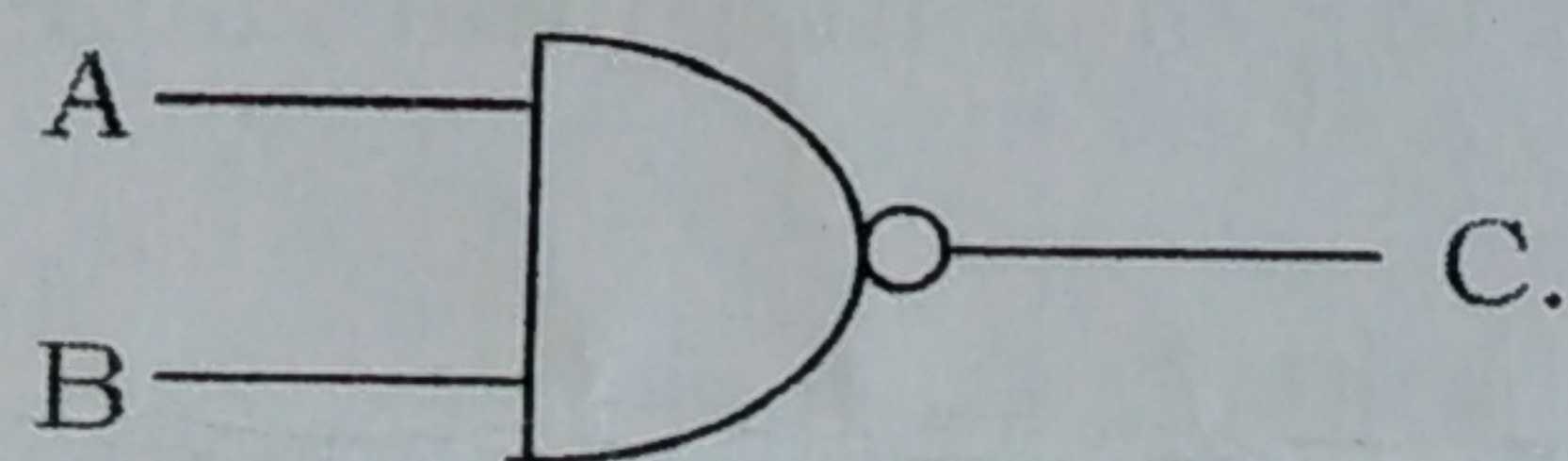
SECTION – B

9. Two point charges 4µc and -2µc are separated by a distance of 1m in air. At what point on the line joining the two charges is the electric potential zero?
10. Four resistors of resistance each of 10Ω is connected as given below.

$$\text{10}\Omega \quad \text{10}\Omega \quad \text{10}\Omega \quad \text{10}\Omega$$

Calculate the equivalent resistance between x and y.
11. A battery of emf 10v and internal resistance 3Ω connected to a resistor R.
 (i) If the current in the circuit is 0.5A. Calculate the value of R.
 (ii) What is the terminal voltage of the battery when the circuit is closed?
12. The electric field of e.m. wave in vacuum is given:-
 (a) What is the direction of propagation of the wave? $* \quad E_y = E_0 \sin(\omega t - kn)$
 (b) What is its wave length? $E_y = 10^5 \sin(100t - 314n)$
 (c) What is the frequency?
 (d) What is the direction of magnetic field?
13. A concave lens has the same radii of curvature for both sides and has a refracture index 1.6 in air. In the second case it is immersed inside a liquid of refractive index 1.4. Calculate the ratio if total length of the lens in the two cases.
14. In the photo electric experiment, the graph between the stopping potential and frequency of incident radiators on two metal plates P and Q are shown in fig.
 (a) Which has greater work function?
 (b) What does the slope of the line depict?

(V_0)