

CAREERS 360

MANIPUR BOARD 12TH

PHYSICS

Question Papers

2018

2018

PHYSICS
(Theory)

Full Marks : 70

Pass Marks : 21

Time : Three hours

Attempt all questions.

The figures in the right margin indicate full marks for the questions.

Question Nos. 1 to 10, are "Very Short Answer" type questions carrying 1 mark each.

1. Define an electric dipole. 1
2. There are only 2Ω carbon resistors in stock. A circuit needs 3Ω resistance. How will you connect the resistors to get the required resistance using minimum numbers ? 1
3. What is r.m.s. value of a.c. ? 1
4. Name the part of electromagnetic waves which is used in radiography ? 1
5. What is the effect on the magnifying power of a telescope if the aperture of its objective lens is increased ? 1

6. Light has dual nature. Which nature is supported by photoelectric effect ? 1

7. Write *one* drawback of Rutherford's atomic model. 1

8. What is potential barrier in p-n junction diode ? 1

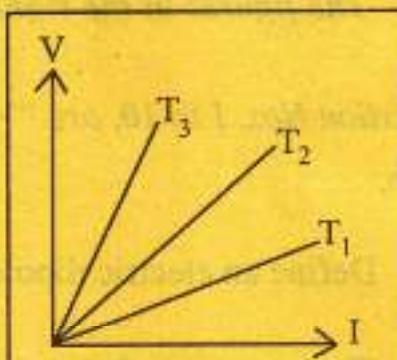
9. Write the truth table of two inputs NAND gate. 1

10. Calculate the wavelength of a signal of frequency 10 KHz. 1

Question Nos. 11 to 20 are 'Short Answer Type-II' questions carrying 2 marks each.

11. Derive an expression of equivalent capacitance for 2 parallel plate capacitors connected in parallel. 2

12. The figure shows graphs between potential difference (V) and current (I) of a metallic wire at three different temperatures T_1 , T_2 and T_3 . Which of them will have the least value of temperature ? 2



13. An applied e.m.f. signal consists of superposition of a d.c. source and an a.c. source of high frequency. The circuit consists of an inductor L and a capacitor C in series. Show that d.c. signal appears across C and a.c. signal appears across L. 2

14. Draw a neat labelled diagram of an a.c. generator. 2

15. Arrange the given *four* electromagnetic waves in ascending order of their wavelengths. 2

1. Light ray 2. γ -ray 3. Ultraviolet ray 4. X-ray

16. Draw a neat labelled ray diagram of a reflecting telescope of any type. 2

17. Light of 5000 \AA falls on a photo-sensitive plate with photoelectric work function of 1.9 eV . Calculate the kinetic energy of the emitted photoelectrons. [$h=6.6 \times 10^{-34} \text{ Js}$; $1 \text{ eV}=1.6 \times 10^{-19} \text{ J}$] 2

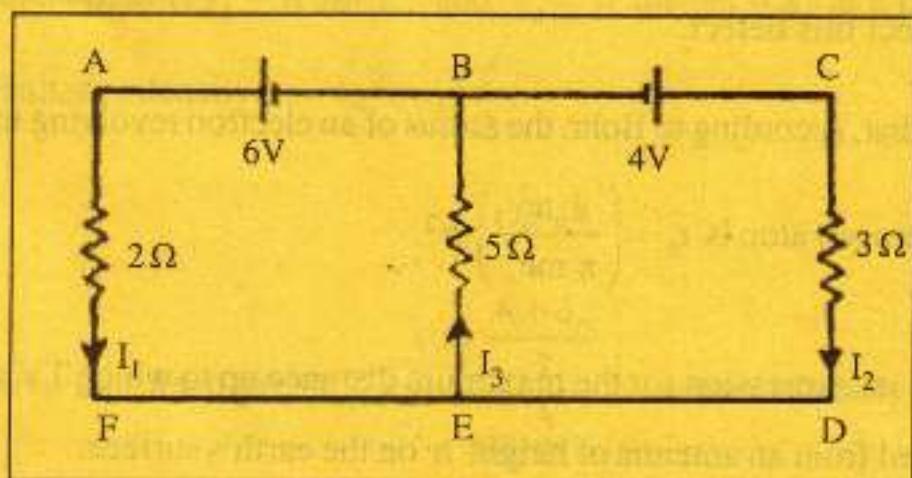
18. Calculate the shortest wavelength of Balmer series. [$R_H=1.097 \times 10^7 \text{ m}^{-1}$] 2

19. What are the basic conditions of biasing the emitter-base and collector-base junctions of a transistor for its proper functioning ? 2

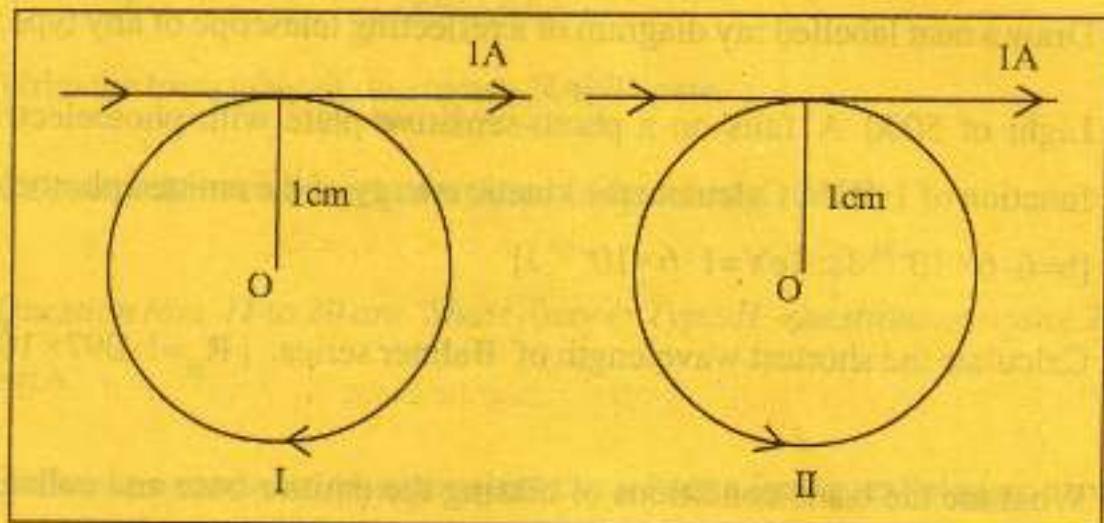
20. Differentiate between n-type and p-type extrinsic semiconductors by giving *two* points. 2

Question Nos. 21 to 27 are 'Short Answer Type-I' questions carrying 3 marks each.

21. In the given figure, find the values of I_1 , I_2 , and I_3 using Kirchhoff's law. 3



22. Two similar insulated wires are bent in the form of a circle of radius 1cm carrying 1A current each in the direction shown as in fig-I and Fig.-II. Which one will have stronger magnetic field at the centre O ? Justify. 3



23. How does the L-C circuit produce oscillation ? Explain. 3

24. Discuss the difference between a refracting telescope and reflecting telescope by giving *three* points. 3

25. A man suffering from defective vision cannot see objects clearly which is kept within 50cm from his eye. Predict, by calculation, the power of lens required to correct this defect. 3

26. Show that, according to Bohr, the radius of an electron revolving in the n^{th} orbit of Hydrogen atom is $r_n = \left(\frac{\epsilon_0 h^2}{\pi m e^2} \right) n^2$ 3

27. Derive an expression for the maximum distance up to which TV signal can be received from an antenna of height h on the earth's surface. 3

Question Nos. 28 to 30 are 'Long Answer Type' questions carrying 5 marks each.

28. What is an electric field ? Derive an expression for electric field due to an electric dipole at any point along its equatorial line. 1+4=5

OR

What is electric potential ? Derive an expression for electric potential at a point due to an electric dipole such that the line joining the point from the centre of dipole makes a certain angle from the axis of dipole. 1+4=5

29. What is magnetic dipole moment ? Derive the expression for torque on a bar magnet placed in a uniform magnetic field. 1+4=5

OR

What is a solenoid ? Derive the expression for magnetic field due to a long current carrying solenoid by using Ampere's circuital law. 1+4=5

30. Prove that the superposition of two waves from two coherent sources having displacements $y_1 = a \sin \omega t$ and $y_2 = a \sin (\omega t + \phi)$ at a point produce the resultant intensity $I = 4a^2 \cos^2 \frac{\phi}{2}$. 5

OR

Prove that for a prism $\mu = \frac{\sin\left(\frac{A + \delta_m}{2}\right)}{\sin\frac{A}{2}}$ where symbols have their usual meaning. 5

Question Nos. 31 to 34 are 'Multiple Choice Type' questions carrying 1 mark each. Choose the correct answer out of the four alternatives and rewrite the correct answer.

31. Potentiometer is preferred to voltmeter to measure e.m.f. of a cell because 1

- A. both draws same current from the source
- B. potentiometer draws more current than voltmeter from the source
- C. potentiometer draws less current than voltmeter from the source
- D. potentiometer draws no current but voltmeter draws current from the source

32. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. If the frequency is halved and intensity is doubled, the photoelectric current becomes 1

- A. quadrupled
- B. doubled
- C. halved
- D. zero

33. For a transistor the emitter current is 0.505 mA and the base current is 5.0 μ A. The collector is 1

- A. 0.25 mA
- B. 0.5 mA
- C. 0.52 mA
- D. 0.55 mA

34. The device fitted in the satellite which receives signals from the earth station and transmits them in the different directions is called 1

- A. transmitter
- B. amplifier
- C. transponder
- D. transformer
