

MODEL EXAMINATION (DECEMBER – 2017)

CLASS: XII

PHYSICS

Time: 3 hrs.

Date.....

MAX. MARKS :70

Name.....

Roll No.....

GENERAL INSTRUCTION

- i. All questions are compulsory. There are 28 questions in all
- ii. There is no overall choice. However an internal choice has been provided. You have to attempt only one of the choices in such questions.
- iii. This question paper has four sections Section A, Section B, Section C, Section D
- iv. Questions **1 to 5** are very short answer type and carry **one** mark each.
- v. Questions **6 to 15** are short answer type and carry **two** marks each.
- vi. Questions **16 to 24** are short answer type and carry **three** marks each.
- vii. Question **25** is a **value based question** and carry **three** marks
- viii. Questions **25 to 28** are long answer type and carry **five** marks each.
- ix. Use of calculator is not permitted
- x. You may use the following values of physical constants wherever necessary:

$$\text{Mass of neutron } m_n = 1.675 \times 10^{-27} \text{ kg}$$

$$\text{Boltzmann's constant } k = 1.381 \times 10^{-23} \text{ JK}^{-1}$$

$$\text{Avogadro's number } N_A = 6.022 \times 10^{23} \text{ /mol}^{-1}$$

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$e = 1.602 \times 10^{-19} \text{ C}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$$

SECTION A

- 1 Name and state the law, which gives the direction of induced e. m. f. in electromagnetic induction. 1
- 2 A piece of wire is redrawn by pulling it until its length is doubled. Compare the new resistance with the original value? 1
- 3 A 60W bulb is connected to 220 V supply. How much current does it draw? 1
- 4 The horizontal component of earth magnetic field is B at a place and angle of dip is 60. Find the value of horizontal component of earth magnetic field at equator? 1
- 5 Name the physical quantity whose SI unit is weber /metre². Is it a scalar or a vector quantity? 1

SECTION B

- 6 Find the expression for cyclotron frequency? 2
- 7 Draw the logic symbol of a 2-input NOR gate. Write down its truth table? 2
- 8 Write two limitations of Rutherford model of atom? 2
- 9 Derive the expression for torque, acting on the dipole, placed in a uniform electric field? 2
- 10 How does the Ampere Maxwell's law explain the flow of current through a capacitor when it is being charged by a battery? 2
- 11 (i) Define activity of a radioactive material and write its S.I unit. 2
(ii) The sequence of step wise decay of a radioactive nucleus
 $D \xrightarrow{\alpha} D_1 \xrightarrow{\beta} D_2$ If the atomic number and mass number of D_2 are 71 and 176 respectively, what are their corresponding values for D?
- 12 Why should the objectives of telescope have larger focal length and larger Aperture? Justify? 2
- 13 An electron and an alpha particle have the same de Broglie wavelength associated with them. How are their kinetic energies related to each other? 2
- 14 Find the value of phase difference between current and voltage in LCR series circuit? 2
- 15 A 10pF capacitor is connected to 50V battery. How much electrostatic energy is stored in the capacitor? If another capacitor of 6pF is connected in series with it with the same battery connected across the combination find the charge stored and potential difference across each capacitor? 2

SECTION C

- 16 Draw a labeled circuit diagram of n-p-n transistor amplifier in CE-configuration. Explain its working? 3
- 17 Derive the expression for Bohr magneton? 3
- 18 Derive the expression for electric field at a point on the equatorial line of electric dipole? 3
- 19 Find the wavelength of electromagnetic waves of frequency 5×10^{19} Hz in free space. Give its two applications 3
- 20 Derive Snell's law on the basis of Huygen's wave theory. 3
- 21 Explain with reason, how the resolving power of a compound microscope will change when 3
(i) Frequency of the incident light on the objective lens is increased?
(ii) Focal length of the objective lens is increased.
(iii) Aperture of objective lens is increased.

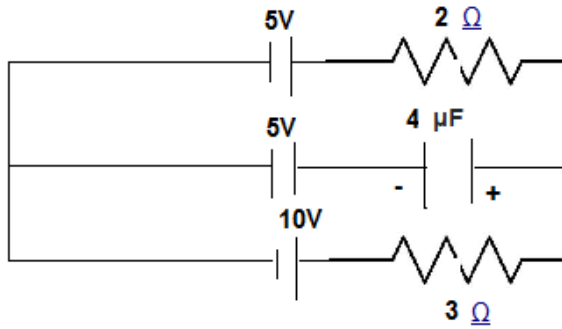
- 22 Obtain a relation for total energy of the electron in terms of orbital radius. Show that total energy is negative of K.E. and half of potential energy? 3
- 23 Draw a curve between mass number and average binding energy per nucleon. On the basis of this curve, explain fusion and fission reactions. 3
- 24 a. With the help of Block Diagram explain how an amplitude modulated wave can be demodulated? 3
- OR
- b. Describe the working of moving coil galvanometer. why it is necessary to have radial magnetic field?
- 25 Sunil and his parents were travelling to their village in car. On the way his mother noticed some gray colored panels installed on the roof of low building .she enquired from Sunil what those panels were and Sunil told her that those were solar panels ? 3
- a. What were the values displayed by Sunil and his mother?
- b. In what way the use of solar panels proved to be useful?
- c. Name the semiconductor device used in solar panel. With the help of diagram how the device works?

SECTION D

- 26 I. A. State the principle on which potentiometer works .How can a given potentiometer be made more sensitive? 5
- B. In the graph shown below for two potentiometer State with reason which of the potentiometer A or B is more sensitive?
- OR
- II. Explain the principle, construction and working of a PN junction as
1. light emitting diode
 2. photodiode
- 27 I a. Define diffraction. Deduce an expression for fringe width of the central maxima of the diffraction pattern, produced by single slit illuminated with monochromatic light source.? 5
- b. Explain two features to distinguish between the interference pattern in Young's double slit experiment with the diffraction pattern obtained due to single slit?

OR

- II. Derive the expression for capacitance of parallel plate capacitor. Calculate the potential drop across the capacitor in terms of V



- 28 I. a. With the help of circuit diagram of an npn transistor in common emitter mode, explain its use as an amplifier. 5
- b. Draw the output versus input voltage curve and mark the region in which the transistor is used as amplifier.

OR

- II. Draw forward and reverse characteristic curves of a PN junction diode. Explain briefly with the help of a circuit diagram, how a PN junction diode works as a full wave rectifier. What is the action of filters in full wave rectifier? If frequency of input ac signal is 'f' what is the frequency of output. Explain with the help of diagram?

