

HALF YEARLY EXAMINATION-2019-20

CLASS - XII

PHYSICS

(Theory)

(Time allowed :Three hours)

(Maximum marks:70)

(Candidates are allowed additional 15 minutes for only reading the paper.They must NOT start writing during this time)

All questions are compulsory

This question paper is divided into 4 sections,A,B,C and D as follows

Section A

Question number 1 is of twelve marks.All parts of this question are compulsory

Section B

Question number 2 to 12 carry 2 marks each with two questions having internal choice

Section C

Question number 13 to 19 carry 3 marks each with two questions having internal choice

Section D

Question number 20 to 22 are long-answer type questions and carry 5 marks each. Each questions having internal choice.

The intended marks for questions are given in brackets[].

All working,including rough work,should be done on the same sheet as and adjacent to the rest of the answer.

Answer to sub parts of the same question must be given in one place only.A list of useful physical constants is given at the end of this paper.

A simple scientific calculator without a programmable memory may be used for calculations

Section A

Answer all questions

Questions 1

(a)Choose the correct alternative (A),(B),(C) or D for each of questions given below. [5]

(i) The dielectric constant K of an insulator can be:

[a] -1 [b] 0 [c] 0.5 [d] 5

(ii) By Charging a capacitor which has capacity $100\mu\text{F}$, upto 100 volt, the energy stored in it is:

[a] 0.5 J [b] 5 J [c] 50 J [d] 100 J

(iii) Kirchoff's current law is a consequence of the conservation of:

[a] energy [b] momentum [c] charge [d] mass

(iv) The path of charged particle moving in a direction perpendicular to a magnetic field is:

[a] elliptical [b] circular [c] parabolic [d] linear

(v) Power factor is maximum in alternating circuit when circuit is:

[a] inductive only [b] capacitive only

[c] L-C [d] resistive only

[B] Answer all question. [7]

(i) Sketch the electric field lines around a system of two equal and opposite point charges.

(ii) What do you mean by surface density of charge ?

(iii) Write the relation between current in a wire and the drift velocity of free electrons in the wire.

(iv) Define emf of a cell.

(v) Write the expression for the magnetic field at an axial point inside a long current carrying solenoid.

(vi) State Fleming's right hand rule.

(vii) Why is the core of a transformer laminated ?

SECTION-B

QUESTION-2

[2]

A polythene piece is rubbed with wool and is found to have a negative charge of 3.6×10^{-7} C . Calculate the numbers of electrons on the polythene piece.

QUESTION-3 [2]

Define electric flux and state Gauss' law.

QUESTION-4 [2]

Find the potential at a point due to charge of $100 \mu\text{C}$ at a distance of 9m.

QUESTION-5 [2]

How many electrons can pass through a lamp in one minute if the current is 300mA ?

QUESTION-6 [2]

Explain the difference between ohmic and non-ohmic resistances and give examples.

QUESTION-7 [2]

An electric current of 15A flows in a wire of area of cross section 10^{-5}m^2 . Calculate the drift velocity of electrons if the number of electrons per m^3 of the wire of electric conduction is 8.4×10^{22} .

QUESTION-8 [2]

State Kirchhoff's voltage law.

OR

Specific resistance of the wire is 44×10^{-8} ohm-m. If the resistance of the wire is 14 ohm and its diameter is 10^{-3} m.

Calculate length of the wire.

QUESTION-9

[2]

What do you mean by electric power? Write down various expressions for electric power in a circuit.

QUESTION-10

[2]

Calculate the Magnetic flux density at a point distant 2m from a long straight wire carrying a current of 3A.

OR

State Biot-Savart law.

QUESTION-11

[2]

Write Faraday's laws of electromagnetic induction.

OR

State Lenz's law of electromagnetic induction.

QUESTION-12

[2]

Draw graphs to show the variation of inductive and capacitive reactances with the frequency of applied voltage in a.c. circuits.

SECTION-C

QUESTION-13

[3]

The potential at a certain distance from a point charge is 600V and electric field is 200 N/C Find:

- a) The distance of the point from the charge.
- b) Magnitude of the charge.

QUESTION-14

[3]

Find out the expression for the potential energy of an electric dipole placed in a uniform electric field .

OR

A capacitor of capacitance 20μ is charged to a potential of 500 volt . Calculate the charge and energy stored in capacitor.

QUESTION-15

[3]

How does the resistivity of a) a metallic conductor and b) a semiconductor vary with temperature ? Give reason for each case.

QUESTION-16

[3]

State Ampere's circuital law. Write expression for the magnetic field at the centre of a circular coil of radius a and carrying a current I . Draw the magnetic field lines due to this coil.

QUESTION-17

[3]

Explain Photoelectric effect and write down Einstein's Photo electric equation also.

QUESTION-18**[3]**

What is meant by mutual inductance? Define coefficient of mutual induction and give one example of it.

QUESTION-19**[3]**

An Alternating voltage represented by $V = 200 \sin 300t$ is applied across a coil of resistance 10Ω and inductance 800mH . Calculate the peak current and power factor of coil.

SECTION-D**QUESTION-20****[5]**

What do you mean by electric dipole moment? Derive an expression for the electric field intensity due to an electric dipole at a point on its perpendicular bisecting axis (broad side on position).

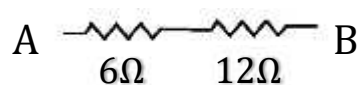
OR

[a] Two electrons are placed, one at north pole and other at south pole of earth. Find the force between them if the diameter of the earth is 12800km .

[b] Find out the expression for the torque acting on the dipole placed in a uniform electric field.

QUESTION-21**[5]**

[a] Find the equivalent resistance between A and B.



[b] Two resistances 5Ω and 10Ω are connected in parallel. Eight such sets are connected in series. Calculate the total resistance.

[c] Draw the circuit diagram of Wheatstone bridge and obtain its balance condition.

OR

[a] A Wheatstone bridge is assemble with resistance in arms AB,BC and AD as 5Ω , 15Ω and 3Ω respectively. What Resistance should be inserted in arms CD to Make it balanced?

[b] A cell in open circuit has emf $1.5V$, in closed circuit when the current is $0.5 A$, the potential difference between the poles of cell is $1.2V$. Calculate the internal resistance of the cell.

[c] The emf of a battery is 4 volt and internal resistance 1.5 ohm. Its potential difference is measured by a voltmeter of resistance 1000 ohm. Find current in the circuit.

QUESTION-22

[5]

Obtain an expression for the magnetic field at the centre of a current carrying circular coil using Biot-Savart law.

OR

Find the induced potential difference ' V ' between the ends of a bar of length ' l ' and moving with velocity ' v ' in a uniform magnetic field ' B ', perpendicular to l and \vec{B} .