PRE BOARD 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
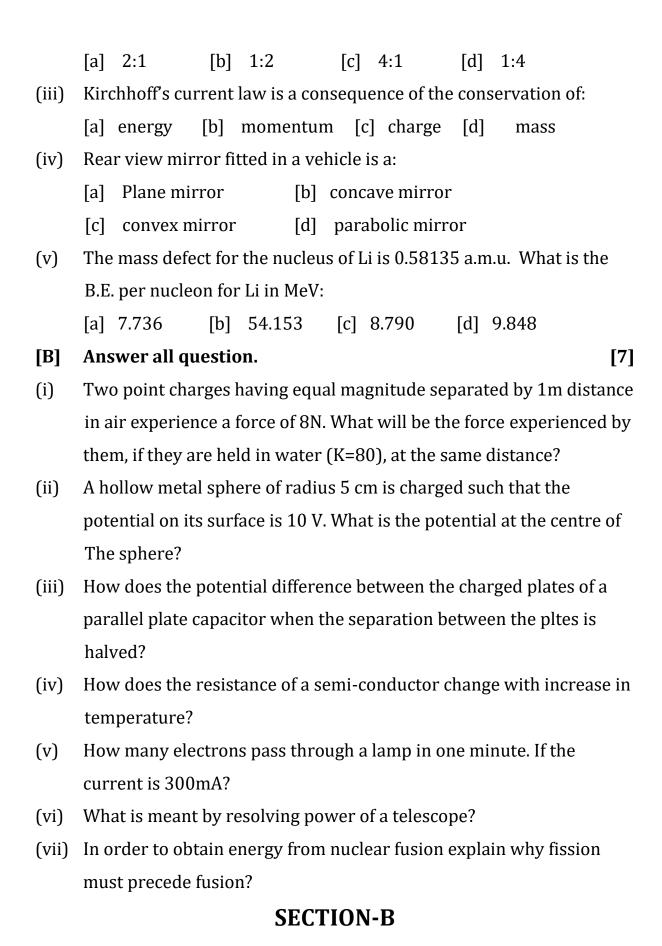

Section A
Answer all questions

Questions 1

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

(i)   A point charge is placed at the centre of a cubical Gaussian Surface of side a. The electric flux through each square Surface of the cube is:

     [a] $\dfrac{q}{\epsilon_0}$ [b] $\dfrac{q}{6\epsilon_0}$ [c] $\dfrac{q}{\pi\epsilon_0}$ [d] 0.

(ii)   Two resistances R and 2R are connected in parallel in an electric circuit. The thermal energy developed in R and 2R within the same time are in the ratio:

[a]   2:1   [b]   1:2   [c]   4:1   [d]   1:4

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

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

(iv)   Rear view mirror fitted in a vehicle is a:

[a]   Plane mirror   [b]   concave mirror

[c]   convex mirror   [d]   parabolic mirror

(v)   The mass defect for the nucleus of Li is 0.58135 a.m.u. What is the B.E. per nucleon for Li in MeV:

[a]   7.736   [b]   54.153   [c]   8.790   [d]   9.848

[B]   Answer all question. **[7]**

(i)   Two point charges having equal magnitude separated by 1m distance in air experience a force of 8N. What will be the force experienced by them, if they are held in water (K=80), at the same distance?

(ii)   A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. What is the potential at the centre of The sphere?

(iii)   How does the potential difference between the charged plates of a parallel plate capacitor when the separation between the pltes is halved?

(iv)   How does the resistance of a semi-conductor change with increase in temperature?

(v)   How many electrons pass through a lamp in one minute. If the current is 300mA?

(vi)   What is meant by resolving power of a telescope?

(vii)   In order to obtain energy from nuclear fusion explain why fission must precede fusion?

SECTION-B

QUESTION-2 **[2]**

Write an expression for the intensity of electric field at any point in:

i) axial position   ii) equitorial position

QUESTION-3 [2]

Two point A and B having potentials 600V and 750V respectively. Calculate the work done in transporting $3\times 10^{-3}\mu C$ of charge from B to A.

QUESTION-4 [2]

A $10\mu F$ parallel plate capacitor has a charge of $2\times 10^{-4}C$. What will be the work done in doubling the distance between the plates keeping the charge unchanged?

QUESTION-5 [2]

A galvanometer with a coil of resistance 12.0Ω shows a full scale deflection for a current of 2.5mA. How will you covert it into an ammeter of range 0 to 5.0 A?

QUESTION-6 [2]

The resistance of a tungsten filament at 0°C is 79Ω. What will be its resistance at 500°C? The temperature coefficient of resistance of tungsten is 0.0045 per °C.

QUESTION-7 [2]

Express 'henry' in terms of basic units of S.I.

QUESTION-8 [2]

State Kirchhoff's voltage law.

<div align="center">OR</div>

Draw a neat sketch of a cycle of magnetization and explain the terms Coercive force and Hysteresis.

QUESTION-9 [2]

A concave mirror of focal length 20cm produces a real and inverted image 1.5 times taller than the object. Find the position of the object with respect to the mirror.

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

Calculate the series limit of Balmer lines.

QUESTION-12 [2]

Explain the difficulties in practical application of nuclear fusion process.

SECTION-C

QUESTION-13 [3]

State Gauss theorem in electrostatics and use it to derive an expression for electric field at any point due to a point charge.

QUESTION-14 [3]

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

OR

You are provided with 8μF capacitors. How will you arrange a minimum number of them to get a resultant capacitance of 20μF? Justify your answer with a suitable calculation.

QUESTION-15 [3]

A charged particle of mass 4.8×10^{-1} gm is held stationary in a

Vertically downward electric field of 2.94×10^{6} NC^{-1}. Find the magnitude and sign of the charge on the particle.

QUESTION-16 [3]

Derive an expression for magnetic field at a point on the axis of a current carrying circular coil of N turns.

QUESTION-17 [3]

Explain with a neat circuit diagram, how a potentiometer is used to find out internal resistance of a cell. Write the formula of internal resistance to be used.

QUESTION-18 [3]

State Huygens's principle in the wave theory of light.

QUESTION-19 [3]

Draw a graph between the frequency of light used for photoelectric effect and the maximum K.E. of the emitted electrons.

i) What does the slope of the graph represent?

ii) How is the work function of the metal surface obtained from the graph?
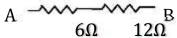
SECTION-D

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.

A ⎓ㅅㅅ⎓ㅅㅅ⎓ B
        6Ω   12Ω

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

    [c]   Draw circuit diagram of a full wave rectifier. Also draw graphs of input voltage and output current.

OR

    [a]   A Wheatstone bridge is assemble with resistance in arms AB,BC and AD as 5 Ω,15 Ω and 3 Ω 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]**

    [a]   i) Using the relation for refraction at a curved surface derive the lens makers formula.

          ii) Why does sun appear reddish at sunrise or sunset?

OR

    [a]   i) What is modulated wave?

          ii) What is the purpose of modulation a signal in transmission?

    [b]   Draw a neat and clean diagram to show that how a NAND gate can be used as the following gate:

       i) NOT   ii) OR   iii) AND