Central Board of Secondary Education

Test II – August 2019

SUBJECT - PHYSICS

Degree Program: PHYSICS
Date of Examination: 30.08.2019
Teacher's name: ABDUL AZIZ
Course Title: EM THEORY

Class: XII
Time duration: 1.0 hour
Total Marks: 30
Student's name: Sangbed Pal
Roll No:

Instructions:
1. **All** questions are compulsory. There are **17** questions in all.
2. It contains **Ten** questions of **one** mark each, **three** questions of **two** marks each, **three** questions of **three** marks each and **one** questions of **five** marks each.

Q.1) Current passing through a wire decreases linearly from 10 A to 0 in 4 s. Find total charge flowing the wire in the given time interval. 1 mark

Q.2) Does the attraction between the comb and the piece of papers last for longer period of time? 1 mark

Q.3) No charge will flow when two conductors having the same charge are connected to each other. Is this statement true or false?

Q.4) If a beam of electrons travels in a straight line in a certain region. Can we say there is no magnetic field? 1 mark

Q.5) A metallic loop is placed in a non-uniform steady magnetic field. Will an emf be induced in the loop? 1 mark

Q.6) Find the product of resistivity and conductivity of a conductor? 1 mark

Q.7) A charge $q = -2.0\ \mu C$ is placed at origin. Find the electric field at (3 m, 4 m, 0). 1 mark

Q.8) What is the dimension of capacitance? 1 mark

Q.9) Can a charged particle be accelerated by a magnetic field? 1 mark

Q.10) Write the unit of $\frac{L}{R}$ where L is inductance and R is resistance. 1 mark

Q.11) Two copper wires of the same length have got different diameters.
(a) Which wire has greater resistance?
(b) Which wire has greater specific resistance? 2 marks

Q.12) A charge $q = 1\ \mu C$ is placed at point (1 m, 2 m, 4 m). Find the electric field at point P (0, -4 m, 3 m). 2 marks

Q.13) Using the concept of energy density, find the total energy stored in a parallel plate capacitor. 2 marks

Q.14) A wire of length l carries i along the x axis. A magnetic field $\vec{B} = B_0(\mathbf{j} + \mathbf{k})$ exists in the space. Find the magnitude of the magnetic force acting on the wire. In the above problem will the answer change if magnetic field becomes $\vec{B} = B_0(\mathbf{i} + \mathbf{j} + \mathbf{k})$ 3 marks

Q.15) A horizontal wire 0.8 m long is falling at a speed of 5 m/s perpendicular to a uniform magnetic field of 1.1 T, which is directed from east to west. Calculate the magnitude of the induced emf. Is the north or south end of the wire positive? 3 marks

Q.16) Draw electric lines of forces due to an electric dipole. At a far away distance r along the axis from an electric dipole electric field is $\vec{E}$. Find the electric field at distance $2r$ along the perpendicular bisector.

3 marks

Q.17) (a) Two capacitors A and B are connected in series across a 100 V supply and it is observed that the potential difference across them are 60 V and 40 V. A capacitor of 2 μF capacitance is now connected in parallel with A and the potential difference across B rises to 90 V. Determine the capacitance of A and B.
(b) Three infinitely long thin wires, each carrying current i in the same direction, are in the xy-plane of gravity free space. The central wire is along the y-axis while the other two are along $x = \pm d$. Find the locus of the points for which the magnetic field B is zero.

5 marks
