

# JIYA LAL MITTAL DAV PUBLIC SCHOOL

GRADE – XII SA-I (SEPT, 2015)

SUBJECT – PHYSICS

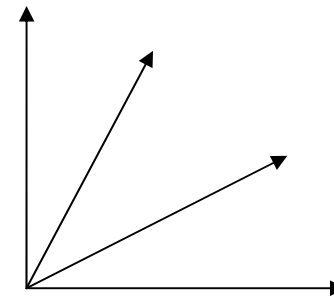
TIME: 3hrs.

M.M-70

## General Instructions:

1. All questions are compulsory.
2. There are 26 questions in total.
3. Questions 1 to 5 are very short answer questions and carry 1 mark each.
4. Questions 6 to 10 carry 2 marks each.
5. Questions 11 to 22 carry 3 marks each.
6. Questions 23 is value based question and carry 4 marks.
7. Questions 24 to 26 carry 5 marks each.
8. Use of calculator is not permitted. However, you may use log tables if necessary.

- 1) How does one explain increase in resistivity of a metal with increase of temperature?
- 2) Write the condition under which an electron will move undeflected in the presence of magnetic field.
- 3) The given graph shows variation of charge 'q' versus potential 'V' for two capacitors  $C_1$  and  $C_2$ . Both have same plate separation but plate area of  $C_2$  is greater than  $C_1$ , which line corresponding to  $C_1$  and why?



- 4) Predict the polarity of plate A of the capacitor when magnet is moved towards it.

- 5) Name the colours corresponding to digit 4 and 7 in colour code scheme for carbon resistor.
- 6) State which of the two capacitor and inductor tends to become SHORT when the frequency of applied A.C. voltage has a very high value.
- 7) The emf of a cell is generally greater than its terminal voltage. Why? Also write the condition in which emf is less than terminal voltage.
- 8) Two charges  $q$  and  $-2q$  are kept 'd' distance apart. Find the location of the point relative to charge ' $q$ ' at which potential due to this system of charges is zero.
- 9) How the electromagnet different from a permanent magnet? Give 3 differences.
- 10) Explain the cause of jumping disc over a solenoid.
- 11) Calculate the value of unknown potential  $V$  for given potentiometer circuit. The total length (400cm) of potentiometer wire has resistance  $10\ \Omega$  and the balance pt. is obtained at a length of 240cm.
- 12) How the Galvanometer can be changed into ammeter? Also find the expression for resistance required?
- 13) Find the value of phase between  $V$  and  $I$  in given circuit. Also find the value of additional capacitor, such that when joined to capacitor  $C=2\ \text{MF}$ , would make the power factor of circuit unity.
- 14) A capacitor of unknown is connected across a battery  $V$  volt. The charge stored in it is  $360\ \mu\text{C}$ . When potential across the capacitor is reduced by  $120\text{V}$ , the charge stored in it become  $120\ \mu\text{C}$ . Calculate.
  - (a) The potential  $V$  and unknown capacitance  $C$ .
  - (b) What will be charge stored in capacitor, if the voltage had increased by  $120\text{V}$ ?
- 15) An ammeter of resistance  $0.80\ \Omega$  can be measured current upto  $1.0\ \text{A}$ .
  - (a) What must be the value of shunt resistance to enable the ammeter to measure the current upto  $5\text{A}$ ?
  - (b) What is combined resistance of ammeter and shunt.
- 16) Find the electric field due to infinitely long straight uniformly charged wire.
- 17) Derive the expression for energy stored in a capacitor.
- 18) Determine the current in each branch of the network.
- 19) Derive the expression for a magnetic field of a current carrying ring.
- 20) Define the terms:
  - (a) Intensity of magnetization
  - (b) Angle of dip.
  - (c) Angle of declination
  - (d) Ferromagnetic substances

- 21) A hollow cylindrical box of length 1m and area of cross-section  $25\text{cm}^2$  is placed in three dimensional coordinate system as shown in figure. The electric field in the region is given as  $E=50x$  where  $E$  is  $\text{NC}^{-1}$  and  $x$  in meters. Find
- Net flux through the cylinder
  - Charge enclosed by the cylinder.

22) What is Wheatstone bridge? Give its principle, theory and proof.

Or

What is a solenoid? Drive the expression for magnetic field due to current carrying solenoid.

23) Dimpi's class was shown a video on effects of magnetic field on a current carrying straight conductor. She noticed that the force on the straight current carrying conductor becomes zero when it is oriented parallel to the magnetic field and this force becomes maximum when it is perpendicular to the field. She shared this interesting information with her grandfather in the evening. The grandfather could immediately relate it to something similar in real life situations. He explained it to Dimpi that similar things happen in real life too. When we align and orient our thinking and actions in an adaptive and accommodating way, our lives become more peaceful and happy. However, when we adopt an unaccommodating and stubborn attitude, life becomes troubled and miserable. We should therefore always be careful in our response to different situations in life and avoid unnecessary conflicts.

**Answer the following questions based on above information:**

- Express the force acting on a straight current carrying conductor kept in a magnetic field in vector form. State the rule used to find the direction of this force.

- b) Which one value is displayed and conveyed by grandfather as well as Dimpi?
- c) Mention one specific situation from your own life which reflects similar values shown by you towards your elders.

24) Write the construction, working and theory of cyclotron also find the cyclotron frequency.

Or

Show that the path followed by a charge particle in uniform electric field is parabolic and in uniform magnetic field. What will be the shape of its path if it is entered at right angle?

25) Find the expression for electric field on the axial line of electric dipole.

Or

Find the expression for electric field on the equatorial line of an electric dipole.

26) Which device is used to measure or detect the current? Write its principle, construction and working. How the sensitivity of this device can be increased?

Or

What is a potentiometer? How is it used? Explain its two uses.