Roll Number		

SET C

INDIAN SCHOOL MUSCAT
PRE-BOARD EXAMINATION
TERM I
PHYSICS (042)

CLASS: XII — Time Allotted: 90 min.

02.11.2021 — Max. Marks: 35

SECTION A

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

1 A point charge causes an electric flux of -1.0×10^3 Nm^2 /C to pass through a spherical Gaussian surface of 10.0 cm radius centred on the charge. If the radius of the Gaussian surface were doubled, how much flux would pass through the surface?

(a) Flux will increase 2 times (b) Flux will be halved
(c) Flux will remain the same (d) Flux will increase 4 times

2 Two capacitors of capacitances C_1 and C_2 are connected in parallel. If a charge Q is given to the combination the charge gets shared. The ratio of the charge on the capacitor C_1 to the charge on C_2 will be

(a) C_1/C_2 (b) $\sqrt{C_1/C_2}$ (c) $\sqrt{C_2/C_1}$ (d) C_2/C_1

3 The ratio of current density and electric field is called
(a) Resistivity (b) Conductivity (c) Mobility (d) Drift velocity

4 The drift velocity of the electrons in a copper wire of length 1m under the application of a potential difference of 200V is 0.5m/s. Their mobility (in $m^2V^{-1}s^{-1}$)
(a) 5×10^2 (b) 5×10^{-3} (c) 2.5×10^2 (d) 2.5×10^{-3}

5 In a Wheatstone bridge circuit, P =7Ω, Q = 8 Ω, R = 12 Ω and S=7 Ω. Find the additional resistance to be used in series with S, so that the bridge is balanced
(a) 6.67 Ω (b) 6.71 Ω (c) 2.67 Ω (d) 6.27 Ω

6 In a potentiometer arrangement a cell of emf 1.25 V gives a balance point at 35.0 cm length of wire. If the cell is replaced by another cell and the balance point shifts to 63.0 cm, emf of second cell will be
(a) 3.25 V (b) 1.25 V (c) 3.0 V (d) 2.25 V

7 What happens to the current sensitivity and voltage sensitivity if we increase the number of turns of the coil of the moving coil galvanometer?

(a) Current sensitivity remains constant but voltage sensitivity changes
(b) Current sensitivity increases but voltage sensitivity remains same
(c) Both of them increase
(d) No change in current sensitivity and voltage sensitivity

8 A long solenoid has 100 turns per cm and carries a current of 2.5A. The magnetic field at its centre is ($\mu_0 = 4\pi \times 10^{-7}$Wb/Am)

(a) 3.14×10^{-2} Wb/m^2 (b) 6.28×10^{-2} Wb/m^2
(c) 9.42×10^{-2} Wb/m^2 (d) 12.56×10^{-2} Wb/m^2

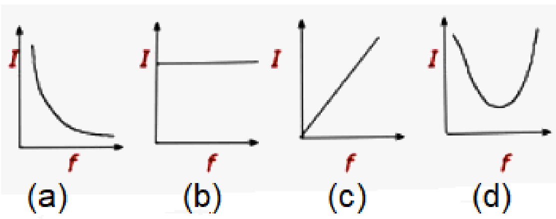
9 The relaxation time in conductors

(a) increases with the increases of temperature
(b) decreases with the increases of temperature
(c) it does not depends on temperature
(d) all of sudden changes at 400 K

10 A charged particle (charge q) is moving in a circle of radius R with uniform speed '*v*'. The magnetic moment μ associated with it is given by

(a) $\frac{qvR}{2}$ (b) qvR (c) qvR^2 (d) $\frac{qvR^2}{2}$

11 Which of the following graphs represent the variation of current (I) with frequency (f) in an AC circuit containing a pure resistor?



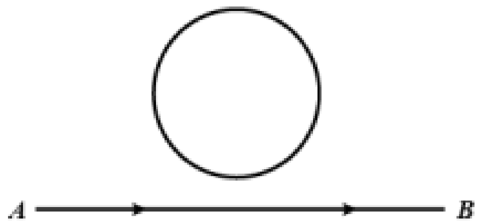
12 A capacitor and a light bulb are connected in series with an ac source. What will happen to intensity of the bulb if the capacitance of the capacitor is increased?

(a) Intensity of the bulb remains the same (b) Intensity of the bulb decreases.
(c) Intensity of the bulb increases (d) The bulb ceases to glow

13 The self-inductance L of a solenoid of length *l* and area of cross-section A, with a fixed number of turns N increases as

(a) *l* and A increase (b) *l* decreases and A increases.
© *l* increases and A decreases. (d) both *l* and A decrease

14 The electric current flowing in a wire in the direction from A to B is increasing. The direction of induced current if any ,in the metallic loop kept above the wire is



(a) first clockwise and then anticlockwise (b) clockwise
(c) anti-clockwise (d) zero

15 The maximum value of current when an inductor of inductance 2 H is connected to 150 V, 50 Hz supply is
(a) 0.337 A (b) 0.721 A (c) 1.521 A (d) 2.522 A

16 What happens to the magnetic field at the centre of a circular current carrying coil if we double the radius of the coil keeping the current unchanged?
(a) halved (b) doubled (c) becomes zero (d) remains unchanged

17 When cell of e.m.f. E is connected with an external resistance R, the potential difference across the cell becomes V. The expression for the internal resistance 'r' of the cell is
(a) $\left(\frac{E-V}{V}\right)R$ (b) $\left(\frac{V-E}{V}\right)R$ (c) $\left(\frac{V-E}{E}\right)R$ (d) $\left(\frac{E-V}{E}\right)R$

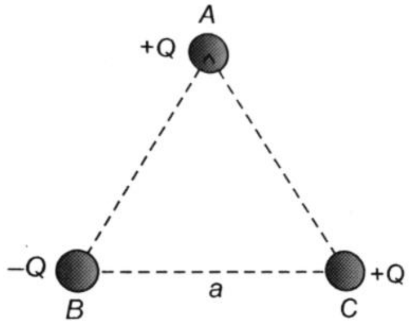
18 In a meter bridge, what is the effect on null deflection of galvanometer, when the radius of the meter bridge wire is doubled?
(a) there will be no change (b) null point will shift to $L_1/2$ point
(c) null point will shift to $2L_1$ point (d) null point will not be available

19 A galvanometer coil has a resistance of 100 Ω and the meter shows full scale deflection for a current of 1 mA. The shunt resistance required to convert the galvanometer into an ammeter of range 0 to 5 A is about
(a) 0.01 Ω (b) 0.1Ω (c) 0.02 Ω (d) 0.2 Ω

20 Which of the following combination should be selected for better tuning of a series L.C.R circuit used for communication?
(a) R = 20Ω, L= 1.5H, C = 35μF (b) R = 25Ω, L= 2.5H, C = 45μF
(c) R = 15Ω, L= 3.5H, C = 30μF (d) R = 25Ω, L= 1.5H, C = 45μF

21 The electric flux through a closed Gaussian surface depends upon
(a) Net charge enclosed and permittivity of the medium
(b) Net charge enclosed, permittivity of the medium and size of the Gaussian surface
© Net charge enclosed only
(d) Permittivity of the medium only

22 Three charges are placed at the vertices of an equilateral triangle of side ‘a’. The force experienced by the charge placed at vertex A in a direction normal to BC is



(a) $\frac{Q^2}{4\pi\varepsilon_0 a^2}$ (b) $\frac{-Q^2}{4\pi\varepsilon_0 a^2}$ (c) Zero (d) $\frac{Q^2}{2\pi\varepsilon_0 a^2}$

23 Three capacitors each of 4µF are to be connected in such a way that the effective capacitance is 6µF. This can be done by connecting

(a) them in parallel (b) all of them in series
(c) two in series and one in parallel (d) two in parallel and one in series

24 The work done to move a charge on an equipotential surface

(a) cannot be defined (b) is a negative quantity (c) is zero. (d) is a positive quantity

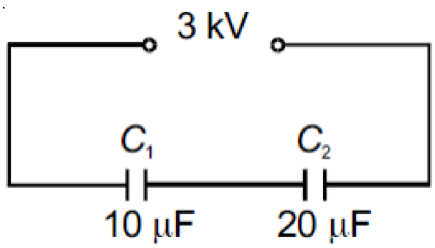
25 Two point charges placed in a medium of dielectric constant 6 are at a distance ‘r’ between them, experience an electrostatic force ‘F’. The electrostatic force between them in vacuum at the same distance ‘r’ will be

(a) F (b) 6F (c) F/6 (d) F^6

SECTION B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26 Capacitors C_1 (10 µF) and C_2 (20 µF) are connected in series across a 3 kV supply, as shown. What is the charge on the capacitor C_1?



(a) 20000 µC (b) 45000 µC (c) 15000 µC (d) 10000 µC

27 A cell of emf 10V with small finite internal resistance is charged with the help of an external battery. Terminal Potential drop across the cell while charging would be

(a) greater than 10 V (b) less than 10 V (c) zero (d) equal to 10 V

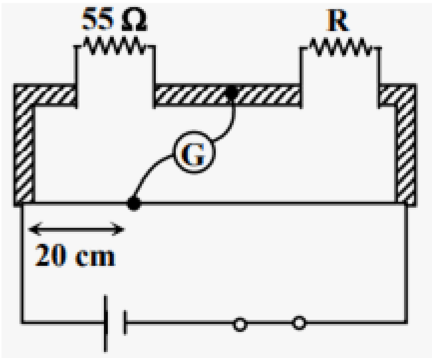
28 A strip of copper and another of germanium are cooled from room temperature to 80K. The resistance of

(a) Each of them increases
(b) Each of them decreases
(c) Copper strip increases and that of germanium decreases
(d) Copper strip decreases and that of germanium increases

29 A 100W, 200V bulb is being operated at 160V, the power dissipation is

(a) 64W (b) 32W (c) 100W (d) 160W

30 Find the value of unknown resistance in the given metre bridge set up with null deflection in the galvanometer.



(a) 55Ω (b) 200 Ω (c) 110 Ω (d) 220 Ω

31 Two point charges + 8q and –2q are located at x = 0 and x = L, respectively. The location of a point on the X-axis at which the net electric field due to these two point charges is zero, is

(a) 8 L (b) 4 L (c) 2 L (d) L/4

32 Two large, thin metal plates are parallel and close to each other. On their inner faces, the plates have surface charge densities of opposite signs and of magnitude 8.85×10^{-22} C/m^2. What is the electric field between the plates? ($\varepsilon_0 = 8.85\times10^{-12}$ C^{2}N^{-1}m^{-2})

(a) 1.92×10^{-10} N/C (b) 1.0×10^{-10} N/C (c) zero (d) 192×10^{-10} N/C

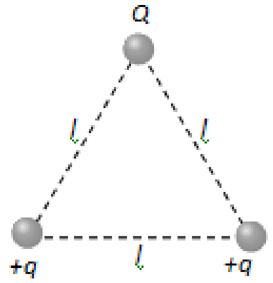
33 Equal charges are given to two spheres of different radii. The potential will

(a) Be more on smaller sphere
(b) Be more on bigger sphere
(c) Be equal on both the spheres
(d) Depend on the nature of materials of the spheres

34 SI unit of permittivity of free space is

(a) F (b) Wb (c) $C^2N^{-1}m^{-2}$ (d) $C^2N^{-1}m^2$

35 Three charges are placed at the vertex of an equilateral triangle as shown in figure. For what value of Q, the electrostatic potential energy of the system is zero?



(a) $-q$ (b) $q/2$ (c) $-q/2$ (d) $-2q$

36 The transformation ratio in the step-down transformer is
(a) One (b) greater than one (c) less than one
(d) the ratio greater or less than one depends on the other factors

37 In an a.c series circuit the instantaneous current is maximum when the instantaneous voltage is maximum. The circuit element connected to the source will be
(a) pure inductor (b) pure capacitor (c) inductor and capacitor (d) pure resistor

38 A magnetic needle, free to rotate in a vertical plane, orients itself vertically at a certain place on the Earth. The horizontal component of Earth's magnetic field at this place is
(a) 0 (b) B (c) B/2 (d) 2B

39 In a series LCR circuit, voltages across an inductor, a capacitor and a resistor are 30V, 30V and 60V respectively. The phase difference between applied voltage and current in the circuit is
(a) π rad (b) zero (c) π/2 rad (d) π/4 rad

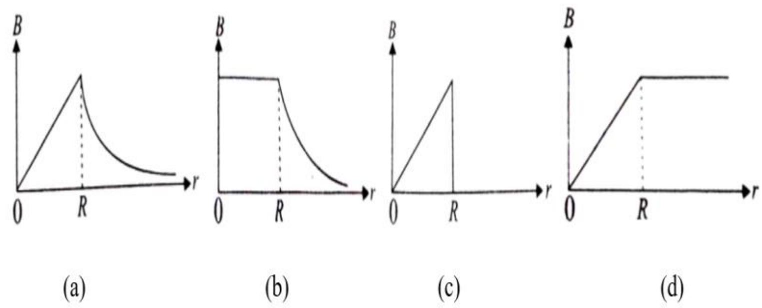
40 A circular coil of 50 turns and radius 7cm is placed in a uniform magnetic field of 4T normal to the plane of the coil. If the current in the coil is 6A, then torque acting on the coil is
(a) 14.78 Nm (b)0 Nm (c) 7.39 Nm (d) 3.69 Nm

41 The instantaneous current and voltage of an ac circuit are given by I = (10 sin 314t) A and
V = (50 sin 314t) V. Power dissipation in the circuit is
(a) 500W (b) 250W (c) 200W (d) 550W

42 The reactance of a capacitor at 50Hz is 30Ω. If the frequency is increased to 100 Hz, the new reactance is
(a) 10Ω (b) 15Ω (c) 30Ω (d) 90Ω

43 A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20A in 0.5s, what is the change of flux linkage with the other coil?
(a) 30 Wb (b) 15 Wb (c) 60 Wb (d) 15 Wb

44 The correct plot of the magnitude of magnetic field $\vec{B}$ versus distance 'r' (r < R and r > R) from the centre of a long straight wire of a circular cross section (radius R) carrying a steady current is



45 **Given below are two statements labelled as Assertion (A) and Reason (R)**

Assertion (A): Electrons move from a region of lower potential to a region of higher potential.

Reason (R) : An electron has a negative charge.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false

46 **Given below are two statements labelled as Assertion (A) and Reason (R)**

Assertion(A) : If a proton and an alpha particle enter a uniform magnetic field perpendicularly with the same speed, the time period of revolution of alpha particle is double that of proton.

Reason(R) : In a magnetic field, the period of revolution of a charged particle is directly proportional to the mass of the particle and is inversely proportional to charge of particle.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

47 **Given below are two statements labelled as Assertion (A) and Reason (R)**

Assertion (A): Two parallel conducting wires carrying currents in same direction, come close to each other.

Reason (R): Parallel currents carrying conductors attract and anti-parallel current carrying conductors repel.

Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false

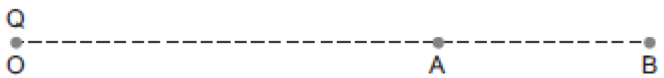
48 **Given below are two statements labelled as Assertion (A) and Reason (R)**
Assertion (A): The poles of a magnet cannot be separated by breaking into two pieces.
Reason (R) : The magnetic moment will be reduced to half when a magnet is broken into two equal pieces.
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

49 **Given below are two statements labelled as Assertion (A) and Reason (R)**
Assertion (A): Galvanometer cannot be used as an ammeter to measure the value of current in a given circuit.
Reason (R) : It gives a full scale deflection for a current of the order of microampere.
Select the most appropriate answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

SECTION C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50 A point charge Q is placed at point O as shown in the given figure. The potential difference
V_A-V_B, if the charge is negative is



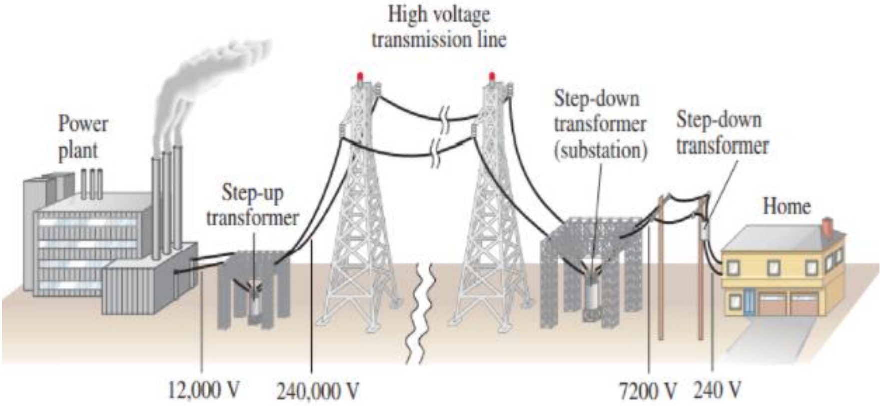
(a) Zero (b) positive (c) negative (d) neither positive nor negative

51 A dipole of dipole moment 'p' is placed parallel to electric field $\vec{E}$. Work done in rotating it from 0^0 to 180^0 is
(a) 2pE (b) pE (c) zero (d) pE/2

Case study:

Read the following paragraph and answers the questions
At power plant, a transformer increases the voltage of generated power by thousands of volts so that it can be sent of long distances through high-voltage transmission power lines. Transmission lines are bundles of wires that carry electric power from power plants to distant substations. At substations, transformers lower the voltage of incoming power to make it acceptable for high- volume delivery to nearby end-users. Electricity is sent at extremely high voltage because it limits so-called line losses. Very good conductors of electricity also offer some resistance and this resistance becomes

considerable over long distances causing considerable loss.



At generating station, normally voltage is stepped up to around thousands of volts. Power losses increase with the square of current. Therefore, keeping voltage high current becomes low and the loss is minimized.

52 The core of a transformer is laminated as

(a) it improves the ratio of voltage in the primary and secondary may be increased.
(b) it checks rusting of the core may be stopped.
(c) it reduces energy losses due to eddy currents.
(d) it increases flux linkage

53 The metal/alloy that is more suitable for making cores of transformers is

(a) Steel (b) Soft iron (c) Copper (d) Brass

54 Why does stepping up voltages reduce power loss?

(a) Since resistance of conductor decreases with increase of voltage
(b) Since current decreases with increase of voltage at constant power
(c) Both of the above
(d) Since current increases with increase of voltage

55 Which of the following statement is true for long distance transmission of electricity?

(a) Step-down transformers are used at generating station and destination substation.
(b) Step-up transformers are used at generating station and destination substation
(c) Step-up transformer is used at generating station and step-down transformer is used at destination substation.
(d) Step-down transformer is used at generating station and step-up transformer is used at destination substation.

End of the Question Paper