Class : XII SESSION 2020 – 2021

Subject : Physics (042)

Revision Examination 2020-21

Set - II

Minimum Marks : 70 Marks **Time Allowed : 3 hours**

General Instructions:

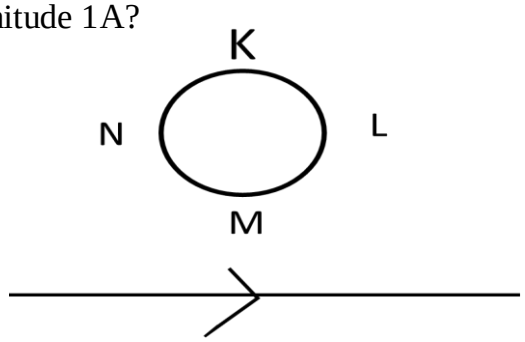
(1) All questions are compulsory. There are 33 questions in all.

(2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.

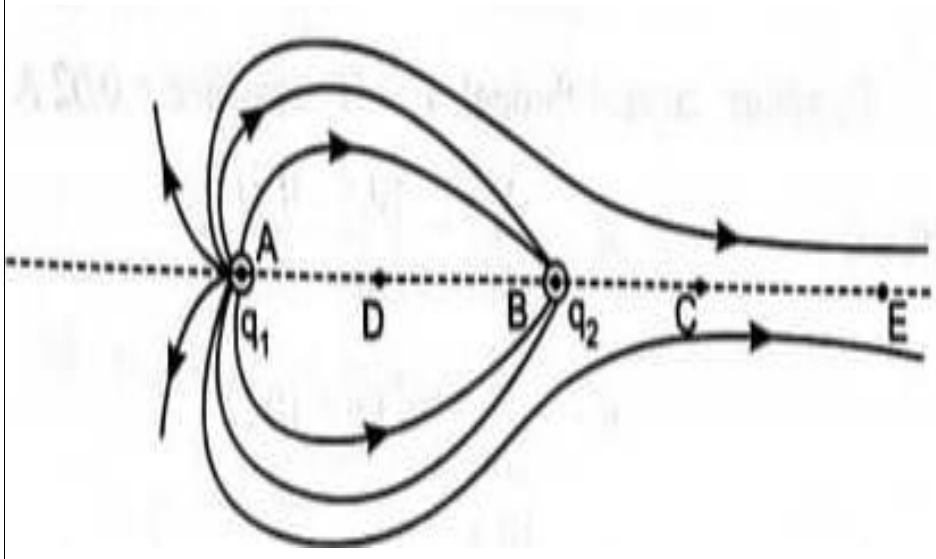
(3) Section A contains ten very short answer questions and four assertion reasoning MCQs of 1 mark each, Section B has two case based questions of 4 marks each, Section C contains nine short answer questions of 2 marks each, Section D contains five short answer question of 3 marks each and Section E contains three long answer questions of 5 marks each.

(4) There is no overall choice. However internal choice is provided. You have to attempt only one of the choices in such questions.

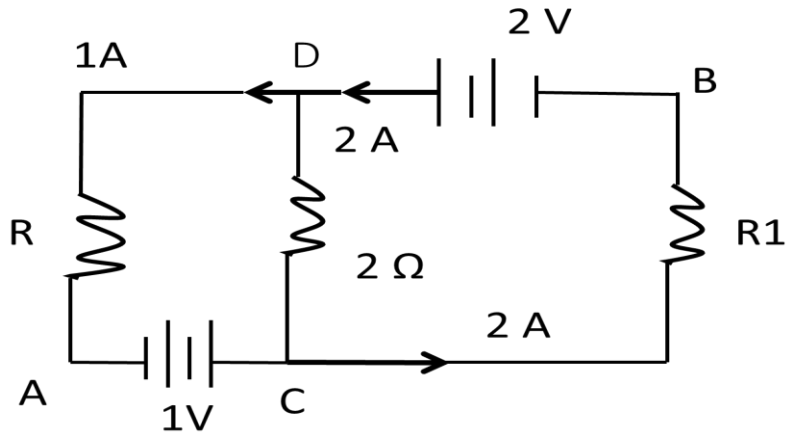
Sl. No	**SECTION - A**	Marks
	All questions are compulsory. In case of Internal choice, attempt any one of them.	
1	An electric dipole is kept with its dipole moment vector along x - axis . What will be the direction of the field strength at a point on its a) axial line b) equatorial line	1
2	Is ohm's law universally applicable for all conducting elements? If not, give examples of elements, which do not obey ohm's law. (OR) An electron is moving along positive x-axis in the presence of uniform magnetic field along positive y-axis. What is the	1

	direction of the force acting on it?	
3	What is the magnitude of the induced current in the circular loop KLMN of radius r_1, if the straight wire PQ carries a steady current of magnitude 1A?  	1
4	A coil of inductance 2 mH carrying a current 2A is given. If the current is reversed in 0.01 seconds, how much back emf is produced? (OR) A wire of length 0.7 m long is falling at speed of 1.8 km/h perpendicular to a uniform magnetic field 1 T directed from east-west. Calculate the induced Emf.	1
5	Does the apparent depth of a tank of water change if viewed obliquely? If so, does the apparent depth increase on decrease.	1
6	The refractive index of glass is 1.5. What is the speed of light in glass? (Speed of light in vacuum, C= 3 X 10^8 m/s)	1
7	A convex lens is held in eater. What change, if any, do you expect in its focal length? (OR) A thin prism of 6° angle gives a deviation of 3° , what is the refractive index of material of prism?	1
8	State Bohr's quantisation condition for defining stationary orbits. (OR) Show graphically, the variation of the de- Broglie wavelength (λ) with the potential (V) through which an electron is accelerated from rest.	1
9	What happens to the width of depletion layer of P-n junction	1

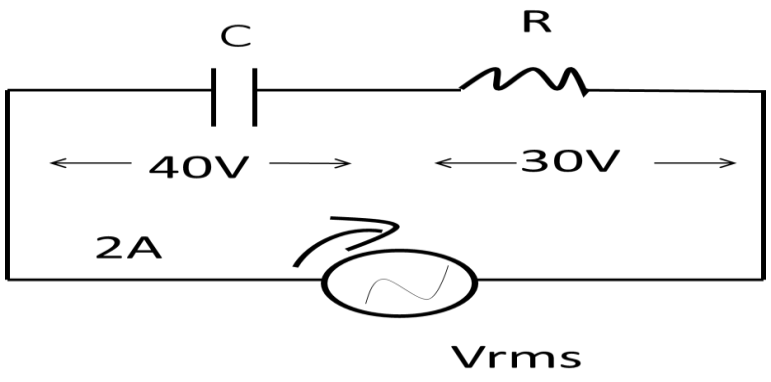
	when it is (i) forward biased (ii) reverse biased	
10	Write two uses of Infra -red rays.	1
	For question number 11,12,13 and 14, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b) , (c) and (d) as 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**	
11	**Assertion (A) :** Internal resistance of a cell is the resistance offered by the electrolyte of the cell. **Reason(R)**: Internal resistance increases with increase in concentration of the electrolyte.	1
12	**Assertion (A) :** The direction of eddy currents can be given by lenz's law. **Reason (R):** According to lenz's law, the polarity of emf induced is such that, it tends to produce a current which opposes the change in magnetic flux that produced it.	1
13	**Assertion (A):** Each point on the given wavefront called primary wavefront. **Reason (R) :**	1

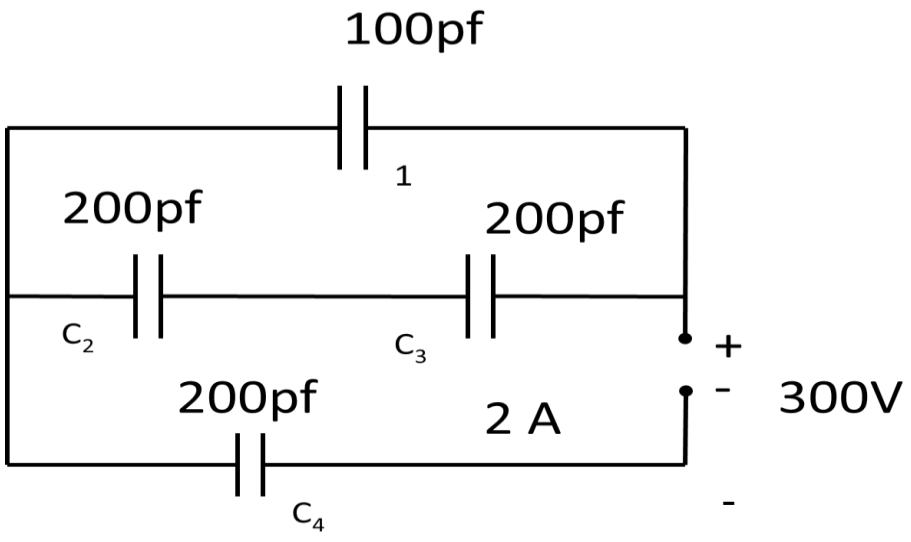
	Primary wavefront is the source of a secondary disturbances called secondary wavelets.	
14	**Assertion (A):** The different series of hydrogen spectrum can be explained by Bohr's theory. **Reason (R):** Lysnan series are found in the infra red region.	1
	Section – B	
	Questions 15 and 16 are case study based questions and are compulsory. Attempt all the questions. Each question carries 1 marks.	1
15	Two point charges q_1 and q_2 of unequal magnitude are placed as shown below..  (i) Determine the ratio $q_1 : q_2$ (ii) If one null point is at infinity, then where is another null point? (iii) If q_1 and q_2 are separated by a distance of 10 cm, then find the position of a null point? (iv) Will a positive charge follow the electric lines of force if	4

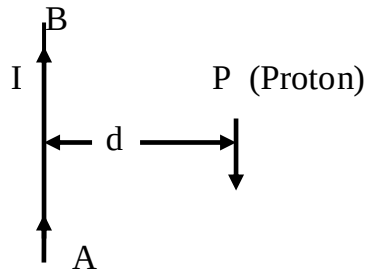
	free to move?	
16	The energy levels of a hypothetical one atoms are shown in figure below n = ∞---------- 0eV n = 5---------- -0.80 eV n = 4 ---------- -1.45 eV n = 3---------- - 3.8eV n = 2 ---------- -5.30 eV n = 1 ---------- -5.6 eV (i) Find the ionization potential of the atom. (ii) Find the short wavelength limit of the series terminating at n = 2. (iii) Find the excitation potential for the state n = 3. (iv) Find the wave number of the photons emitted for the transition n = 3 to n= 1.	4
	Section – C	
	All questions are compulsory. In case of internal choices, attempt anyone	
17	There is an isolated parallel plate capacitor of capacitance C charged to a potential difference V. If the separation between the plated is doubled, how will the following quantities vary: (i) Capacitance (ii) Potential difference (iii) Charge on the capacitor (iv) electric field inside the plates	
18	The number density of free electrons in copper conductor is 8.5×10^{28} m^{-3}. How long does an electron take to drift from one end of a wire 3m long, to its other end? The area of cross - section of the wire is 2.0×10^{-6} m^2 and is carrying current of 3 A.	2

	(OR) In the given circuit, assuming point A to be at zero potential, use Kirchhoff's rule to determine the potential at B  	
19	A solenoid is connected to a battery so that a steady current flows through it. If an iron core is inserted into the solenoid, will the current increase or decrease? Explain. (OR) Explain the terms 'reactance and 'impedance' as applied to components of an a.c circuit.	2
20	A needle placed 45 cm from a lens forms an image on a screen placed 90 cm on the other side of the lens. Identify the type of the lens and determine its focal length. What is the size of the image if the size of the needle is 5 cm?	2
21	(i) State two conditions for sustained interferences of light. (ii) Draw the variation of intensity with position in the interference pattern of young's double slit experiment.	2
22	Draw suitable graphs to show the variation of photoelectric current with collector plate potential for (i) a fixed frequency but different Intesities $I_1 > I_2 > I_3$ of	2

	radiation. (ii) a fixed intensity but different frequency $\vartheta_1 > \vartheta_2 > \vartheta_3$ of radiation.	
23	Distinguish between the phenomena of nuclear fission and fusion.	2
24	State the main practical application of LED. Explain, giving reason, why the semiconductor used for fabrication of visible light LED must have a band gap of at least 1.8 ev. (OR) (a) Why is photodiode operated in reverse bias mode? (b) For what purpose is a photodiode used?	2
25	In a potentiometer arrangement a cell of EMF 1.25 V gives a balance point at 35 cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 63 cm, what is the EMF of the second cell?	2
	Section - D	
	All questions are compulsory. In case of internal choices, attempt anyone.	3
26	The two plates of a parallel plate capacitor 4mm apart. A slab of dielectric constant 3 and thickness 3mm is introduced between the plates with its faces parallel to them. The distance between the plates is so adjusted that the capacity of the capacitor becomes $\frac{2}{3}^{rd}$ of its original value. What is the new distance between the plates?	
27	Three cells of emf 2 V, 1.8V and 1.5V are connected in series. Their internal resistances are 0.05Ω, 0.7Ω and 1Ω respectively. if this battery is connected to an external resistance of 4Ωcalculate: (i) the total current flowing in the circuit (ii) the potential difference across the terminal of the cell of emf 1.5 V while in use.	3

	(OR) Two wires x,y have the same resistivity, but their cross sectional areas are in the ratio 2:3 and lengths in the ratio 1:2. They are first connected in series and then in parallel to a dc source. Find out the ratio of the drift speeds of the electrons in the two wires for the two cases.	
28	A circular coil of radius R carries a current. Find the expression for the magnetic filed due to this coil at its centre. **(OR)** Discuss phase relationship between current and voltage in an ac circuit containing a capacitor only.	3
29	What is an optical fibre? On what principle does it work? Explain, by drawing a ray diagram, how optical fibres transmit light signals.	3
30	Describe briefly with the help of a necessary circuit diagram, the working principle of a solar cell.	3
	Section - E	
	All questions are compulsory. Incase of internal choices, attempt any one	5
31	(a) State the condition for resonance to occur in a series LCR circuit and derive an expression for the resonant frequency. (b) i) Draw a plot showing of the peak current (i_m) with frequency of the a.c source used. Define the quality factor, Q of the circuit. (ii) calculate the impedance in the given a.c circuit. 	

	(OR) (i) Draw a labelled circuit arrangement showing the windings of primary and secondary coil in a transformer. Explain the underlying principle and working of a step - up transformer. Write any two major sources of energy loss in this device. (ii) How much current is drawn by the primary coil of a transformer which steps down 220V to 22V to operate device with an impedance of 220 ohm?	
32	(a) Derive an expression for the energy stored in a parallel plate capacitor C, charge to a potential difference V. (b) obtain the equivalent capacitance of the given network for a supply of 300 V. determine the charge and voltage across C_4.  (OR) (a) Derive an expression for the force between two long parallel current carrying conductors. (b) Use this expression to define S.I unit of current. (c) A long straight wire AB carries a current I. A proton P travels with a speed v, Parallel to the wire, at a distance d from it in a direction opposite to the current as shown in the figure. What is	5

	the force experienced by the proton and what is its direction?  	
33	(a) Draw a ray diagram for foramation of iamge of a point object by a thin double convex lens having radii of curvatures R_1 and R_2 and hence derive lens maker's formula. (b) Define power of a lens and give its S1 units. If a convex lens of focal length 50 cm is placed in contact coaxially with a concave lens of focal length 20cm, what is the power of the combination? (OR) (i) Explain the formation of depletion layer and barrier potential in a p-n junction (ii) With the help of a labelled diagram explain the use of a p-n junction diode as a full wave rectifier. Draw the input and output waveforms	5