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| **KENDRIYA VIDYALAYA SANGATHAN GUWAHATI REGION** | | | | | | |
| **HALF YEARLY EXAMINATION 2019-20** | | | | | | |
| **SET-2** | | **CLASS: XII** | **SUB: PHYSICS** | **TIME: 3 HRS.** | **M.M: 70** | |
| **General Instructions:-**  (i)All questions are compulsory. There are37 questions in all.  (ii)This question paper has four sections: Section-A, Section-B, Section-C and Section-D.  (iii)Section A contains20 questions of one mark each, section-B contains 7 questions of two marks, Section- C contains 7 questions of three marks, Section-D contains 3 questions of five marks each.  (iv)Section-A comprises of MCQ, Completion Type Questions, True/False Type Questions and Matching Type Questions.  (v) There is no overall choice. However, an internal choice has been provided in 3 questions of one mark, 3 questions of two marks, 3 questions of three marks and 3 questions of five marks. You have to attempt only one of the choices in such questions. | | | | | | |
| Q.NO. | **QUESTIONS** | | | | | MARKS |
|  | **SECTION-A** | | | | |  |
| 1 | What is the value of the force between two charges of amount q placed at 1m apart  (a)kq2 (b) kq (c) kq2/2 (d) kq2/4 | | | | | 1 |
| 2 | Charge Q is kept in a sphere of 5cm first then it is kept in a cube of side 5 cm.the outgoing flux will be  (a)More in case of sphere (b) more in case of cube  (c)same in both case (d) zero in both case  **OR**  The value of electric field at the centre of the electric dipole is  (a)zero  (b)equal to the electric field due to one charge at centre  (c)twice the electric field due to one charge at the centre  (d) half the value of the electric field due to one charge at centre | | | | | 1 |
| 3 | In a Wheatstone’s bridge, all the four arms have equal resistance R. If resistance of the galvanometer arm is also R, then equivalent resistance of the bridge is  (a)R (b) R/2 (c) 4R (d) 2R | | | | | 1 |
| 4 | The magnetic susceptibility for a diamagnetic material is   1. Zero (b) +1   (c) Small and negative (d) Small and positive | | | | | 1 |
| 5 | The permanent magnetic material is characterized by  (a) Narrow hysteresis loop (b) Broad hysteresis loop  (c) low coarsely (d) mechanically hard surface | | | | | 1 |
| 6 | If both the number of turns and core length of a solenoid is double keeping other factors constant, then its self-inductance will be  (a)Unaffected (b)doubled (c) halved (d)none of these  OR  Two coils of self-inductance 2 mH and 8 mH are placed close to each other that the flux linkage is complete between the coils. The mutual inductance between these coils is  (a)4 mH (b) 6mH (c)10 mH (d)16 mH | | | | | 1 |
| 7 | In a purely resistive ac circuit, the current  (a) is in phase with the emf  (b) Leads the emf by a phase angle of1800.  (c) Leads the emf by a phase angle of 900.  (d) Lags the emf by 900. | | | | | 1 |
| 8 | In EM spectrum minimum wavelength is of  (a)gamma rays (b) radio wave  (c) micro wave (d) X-rays | | | | | 1 |
| 9 | A glass lens is immersed in water. What will be the effect on focal length of the lens?  (a)increase (b) decrease  (c) constant (d)none of these  OR  When a ray of light enters a glass slab from air  (a)its wavelength decreases (b)its wavelength increases  (c)its frequency increases (d)neither wavelength nor frequencychanges | | | | | 1 |
| 10 | The characteristic feature of light which remains unaffected on refraction is  (a)speed (b) frequency (c) wavelength (d) all | | | | | 1 |
| 11 | SI unit of electric flux is --------------------------. | | | | | 1 |
| 12 | The color sequence in a carbon resistor is red, brown and silver. The resistance of the resistor is --------------------------------------. | | | | | 1 |
| 13 | To convert galvanometer into a voltmeter of a given range, a suitable -------------- resistance is connected in ------------------------------ with the galvanometer | | | | | 1 |
| 14 | A conducting hollow sphere of radius 10 cm has an electric potential on the surface be 10 volt. Then the electric potential at the centre of the hollow sphere will be zero.(True/False) | | | | | 1 |
| 15 | A charge moves on a circle inside magnetic field. The time period of revolution is independent of mass of particle.(True/False) | | | | | 1 |
| 16 | The induced current flows in the direction of main current when main current in the coil decreases.(True/False) | | | | | 1 |
| 17 | Working of optical fibre is based on total internal reflection.(True/False) | | | | | 1 |
| 18 | Match the following  EM wave application  a)Ultraviolet P) Absorbed by Ozone layer of atmosphere  b)X- rays Q) To detect fracture of bones  R) For broadcasting | | | | | 1 |
| 19 | Match the following  a)The colour scattered most is P) red  b) The colour scattered least is Q) orange  R) violet  S) Yellow | | | | | 1 |
| 20 | Match the Column A with column B  Column A Column  a) Only capacitance is in ac circuit Q) Voltage leads the current by 900.  b) Only inductance is in ac circuit R) Voltage lags the current by 900. | | | | | 1 |
|  | **SECTION - B** | | | | |  |
| 21 | In hydrogen atom, the electron and proton are bound at a distance of about 0.53A0. Estimate the potential energy of the system. | | | | | 2 |
| 22 | Two metallic wires of the same material have the same length but cross-sectional area is in the ratio 1: 2. They are connected (i) in series and (ii) in parallel. Compare the drift velocities of electrons in the two wires in both the cases (i) and (ii).  OR  A potential difference V is applied across the ends of copper wire of length l and diameter D. What is the effect on drift velocity of electrons if   1. V is halved (ii) L is doubled. | | | | | 2 |
| 23 | A storage battery of emf 8.0 V and internal resistance 0.5Ω is being charged by a 120V dc supply using a series resistor of 15. 5 Ω.What is the terminal voltage of the battery during charging? | | | | | 2 |
| 24 | Write expression for Lorentz force on a charge particle. Derive the condition for the charge particle to move undeflected in uniform electric and magnetic field.  OR  A proton and a deuteron having equal momenta enter in a region of uniform magnetic field at right angle to the direction of the field. Find the ratio of the radii of curvature of the of the particle. | | | | | 2 |
| 25 | What is eddy current? Write its two uses. | | | | | 2 |
| 26 | What is displacement current? Write the generalized expression for the Ampere’s circuital law in terms of conduction current and the displacement current. | | | | | 2 |
| 27 | Draw the labelled ray diagram for the formation of image by a compound microscope when the final image is formed at the least distance of distinct vision.  OR  Draw the labelled ray diagram for the formation of image by an astronomical telescope for the normal adjustment. | | | | | 2 |
|  | **SECTION - C** | | | | |  |
| 28 | A parallel-plate capacitor is charged to a potential difference *V* by a dc source. The capacitor is then disconnected from the source. If the distance between the plates is doubled, state with reason how the following change:  **(a)** electric field between the plates  **(b)** capacitance and  **(c)** energy stored in the capacitor  OR  An electric dipole is placed in a uniform electric field so that its dipole moment makes angle θ with the electric field. Deduce the expression for the torque on the dipole. Draw the position of the dipole for (i) stable equilibrium and (ii) unstable equilibrium in the electric field and also write the values of the torque for these situations. | | | | | 3 |
| 29 | What is the principle of potentiometer? Draw a circuit diagram to determine the internal resistance of a primary cell and derive the formula for it. | | | | | 3 |
| 30 | Two cells ofemfs E1&E2 and internal resistance r1&r2 are connected in parallel. Derive the expression for the (i) emf and (ii) internal resistance of a single equivalent cell which can replace this combination. | | | | | 3 |
| 31 | State Ampere’s circuital law. Find out the expression for the magnetic field due to along solenoid carrying a current I and having n number of turns per unit length. | | | | | 3 |
| 32 | An inductor L of reactance XL is connected in series with a bulb B to an ac source. Briefly explain how does the brightness of the bulb change when  (a) number of turns of the inductor is increased.  (b)an iron rod is inserted in the inductor  OR  A metallic rod of length L is rotated with angular velocityω about an axis normal to the rod passing through its one end in a magnetic field parallel to the axis of rod. Derive an expression for induced emf in the rod. | | | | | 3 |
| 33 | Draw a graph to show the angle of deviationδ with the variation of angle of incidence I for a monochromatic ray of light passing through a prism of refracting angle A. Hence derive a formula for refractive index of material of prism. | | | | | 3 |
| 34 | Draw a ray diagram for formation of image of a point object by a thin double convex lens having radii of curvature R1 and R2. Hence derive lens maker’s formula for a double convex lens.  OR  Define power of a lens. Write its unit. Deduce the relation 1/F = 1/f1 +1/f2 | | | | | 3 |
|  | **SECTION- D** | | | | |  |
| 35 | Using Gauss’s law deduce expression for the electric field due to a uniformly charged spherical conducting shell of radius R at a point (i) outside and (ii) inside the shell. Plot a graph showing variation of electric field as a function of r > R and r<R. ( r being the distance from the center of the shell)  OR  Two charges1.5 μC and 2.5 μC are located at 30 cm apart. Find and the potential and electric field at a point10cm from this midpoint in a plane normal to the line passing through the midpoint. | | | | | 5 |
| 36 | Draw a schematic sketch of a Cyclotron. Explain the role of crossed electric and magnetic field in accelerating the charge. Derive the expressions for (i) cyclotron frequency and (ii) maximum kinetic energy acquired by the charge particle.  OR  (a)Draw a labelled diagram of a moving coil galvanometer.Describe briefly its working principle. Prove that the deflection of coil is directly proportional to the current flowing in the coil.  (b)What is the function of (i) uniform radial magnetic field, (ii) soft iron core? | | | | | 5 |
| 37 | Draw a schematic diagram of a step up transformer. Explain its working principle.Deduce the expression for the primary to secondary voltage in terms of the number of turns in the two coils. In an ideal transformer, how this ratio is related t the current in the two coils. Explain any two energy losses in the transformer.  OR  A series LCR circuit with L=5.0 H, C=80μF, R=40Ω is connected to a variable frequency 240V source. Calculate  (i)The angular frequency of the source which drives the circuit at resonance.  (ii)The impedance at resonance.  (iii)The current at resonance.  (iv)Power factor of the circuit at resonance.  (v)The rms potential drop across the capacitor.  . | | | | | 5 |