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| A close-up of a sign  Description automatically generated | | |
| **PB2/PHAK/1223/E 02-JAN-2024** | | |
| **EEE CONSORTIUM**  **Pre Board Examination (2023 -2024)**  **Answer Key** | | |
| **SECTION A** | | |
|  | (A) | 1 |
|  | (A) πr2E | 1 |
|  | (C) | 1 |
|  | (D) r – 3 | 1 |
|  | (C) zero | 1 |
|  | a)repelled by both the poles. | 1 |
|  | a)1 | 1 |
|  | a)Copper | 1 |
|  | a) | 1 |
|  | a) electric field is changing. | 1 |
|  | **A** | 1 |
|  | B | 1 |
|  | A | 1 |
|  | B | 1 |
|  | B | 1 |
|  | C | 1 |
| **SECTION B** | | |
|  | Circuit diagram of a full wave rectifier.  Working principle. | 1  1 |
|  | The plot is as shown. Class 12 Physics Important Questions Chapter 11 Dual Nature of Radiation and Matter 11  Class 12 Physics Important Questions Chapter 11 Dual Nature of Radiation and Matter 12 | 1  1 |
|  | 1. As the ray passes symmetricaly      1. Refractive index = sin 45/sin 30 =√2 | 0.5  0.5  1 |
|  | Req = r  Eeq =E | 1  1 |
|  | a) What is least distance of distinct vision a normal human eye?(b) With  the of labelled diagram. give the principle and magnifying power of  astronomical telescope when final image is formed least  **OR**  Draw a labelled diagram of an image formed by a compound microscope, with  the image least distance of distinct vision. Write any one expression its  magnifying power. | 2  OR  2 |
| **SECTION C** | | |
|  | (b)Mass Difference = 55.93494 – 2 × 27.98191 = - 0.02442 u Fission not possible. | 1  1  1 |
|  | Electric flux is the measure of flow of the electric field through a given area. It is proportional to the number of electric field lines going through a normally perpendicular surface.  SI unit -Vm  According to Gauss' law,  flux passing through a closed surface is proportional to the amount of charge in the enclosed volume.    Enclosed charge in this volume as shown in figure, assuming linear charge density to be λ, is  qenc=λL  Hence according to the Gauss' law, | 3 |
|  | Transition D will result in a wavelength of 620nm  Mathematics-  Energy difference in levels = energy of emitted photon=1237.5/xeV where x is wavelength in nanometer.  Given that x=620nm so Energy,E=1237.5/620eV=1.995eV  Which is nearly 2eV  We notice the difference in energy level for transition D is 2 eV given as −1eV−(−3eV)=2eV. | 1  1  1 |
|  | (i) Eq. of current according to loops  (ii). I1 = 2/13 A, I2 = 7/13 A, I3 = 9/13 A | 2  1 |
|  | Magnetic field produced by the two coils at their common centre are: Important Questions for Class 12 Physics Chapter 4 Moving Charges and Magnetism Class 12 Important Questions 23 Important Questions for Class 12 Physics Chapter 4 Moving Charges and Magnetism Class 12 Important Questions 222 The net magnetic field is directed at an angle of 45° with either of the fields. | 1  1 ½  ½ |
|  | (i). Any two properties.  (ii). Draw a sketch of a plane electromagnetic wave propagating along the z- direction. - Sarthaks eConnect | Largest Online Education Community | 2  1 |
|  | Important Questions for Class 12 Physics Chapter 6 Electromagnetic Induction Class 12 Important Questions 40  **OR** | 1  2  **OR**  1  2 |
| **SECTION D** | | |
|  | |  | | --- | | Draw the energy band diagram of(i) n-type,and (ii)p-type semiconductors at temperature  T>0 K In the case of n-type Si-semiconductor, the donor energy level is  slightly below the bottom of conduction band whereas | | A diagram of a circuit  Description automatically generated | | 1. Considering the diode characteristics as a straight line between I = 10 mA to I = 20 mA passing through the origin, we can calculate the resistance using Ohm’s law. 2. From the curve, at I = 20 mA, V = 0.8 V,   I = 10 mA, V = 0.7V  rfb = ΔV/ ΔI = 0.IV/10 mA = 10Ω   1. From the curve at V = -10 V, I = -1 µA,   Therefore, rrb = 10V/1µA = 1.0 x 107Ω | | **OR** | | 1. The reverse current is almost independent of critical voltage because the current in a reverse-biased diode is due to the drifting of the minority charge carriers from one region to another through the junction. Hence a small amount of voltage is enough to carry on the sweeping of the minority charge carriers. 2. At critical voltage or breakdown voltage, there is an enormous breakdown of covalent bonds, resulting in a rapid increase in the number of charge carriers hence it shows a sudden hike in the current. | | 1  1  2  **OR**  2 |
|  | (i). (C) When light ray travels from denser to rarer medium with angle of incidence greater than critical angle.  (ii).(B) Mirage  (iii). (B) 900  (iv). (B) 0.62  **OR**  (iv). (B) 3 x 108 m/s | 1  1  1  1  **OR**  1 |
| **SECTION E** | | |
|  | (i). (a) Derivation for constructive, y = nλD/d  (b) Derivation for destructive, y = (2n – 1)λD/2d  draw a graph showing variation of the resultant intensity in the interference  pattern against position x on the screen - Physics - - 9487573 |  Meritnation.com  (ii). (a) y = nλD/d = 6 mm  (b) y = (2n – 1)λD/2d = 4.5 mm  **OR**  (i). Statement of Huygens’ principle.  Labelled diagram of refraction of light  Proof of Snell’s law ofrefraction using Huygens’ principle.  (ii).  What is the shape of the wave front in each of the following cases:(i) Light  diverging from a point source.(ii) Light emerging out of a convex lens when  a point is placedWhat is the shape of the wave front in each of the following cases:(i) Light  diverging from a point source.(ii) Light emerging out of a convex lens when  a point is placed | 1  1  1  1  1  **OR**  1  1  1  1+1 |
|  | 1. i)Yes , electric field is zero at mid point. Electric field being a vector quantity , its resultant is zero.   ii)No, potential cannot be zero on line joining the charges. Electric potential being a scalar quantity, the net potential due to two identical charges cannot be zero.   1. The work done in bringing the charge q1 in the field   W1= F1 x r1 = q1E x r1  The work done in bringing the second charge  W2= F2 x r2 = q2E x r2  and the work is also done to overcome the force of the charge on one-another.      **OR**   1. From gauss's theorem one can show electric field inside the capaciton plates Q,   E=σ/ϵo, where σ=Q/A (charge / Area)  ⇒E=Q/Aϵo  Now, voltage across the plates is related by :  V=Ed [In general , dV=−E.dr  ⇒V=Q/dAϵo⇒Q/V=Aϵo/d  Now, capacitance is defined by C=QV, thus we get :-  C=Aϵo/d   1. C’= Aϵo/d(1-t/d+t/dk)   C’=4/3 C  T= d/2  Solving for K  K= 2   1. Equivalent capacitance C = Cs+C4 = 4 µF+12 µF= 16 µF   Total charge Q = CV = 1600 µC | 2  2  1  **OR**  2  1  2 |
|  | **OR**  a)Transformer works on the principle of mutual induction. whenever the current associated with the primary coil charges an emf is induced in the secondary coil.  b)  Efficiency =\frac{output\; power}{input \; power}  (c) Eddy current loss and hysteresis loss reduces the efficiency of the transformer  (d) Efficiency  \eta=\frac{V_{s}I_{s}}{V_{p}I_{p}}  0.9=\frac{22}{220}\times \left ( \frac{I_{s}}{I_{p}} \right )  \frac{I_{s}}{I_{p}}=9  I_{p}=\frac{I_{s}}{9}=\frac{\frac{22}{440}}{9}  =\frac{1}{180}A | 2  1  2  **OR**  1  1  1  2 |

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