**231/2**

**Physics paper 2 Marking Scheme**

**POST MOCK 2021**

**FORM 4**

**TIME: 2HRS**

|  |  |  |
| --- | --- | --- |
|   | Section A.1. 640E10B ***2mrks***  |  |
|  | Speed of sound =$\frac{2 ×distance}{time}$depth = 1450x 0.20/2 =145 m |  |
|  | **B**.√ Loses its magnetism faster thereby becoming weaker hence attracting fewer iron filings√ ***(2mrks***  |  |
|  | Leaf initially falls due to negative charges neutralizing the positive charges. Excess negative charges on the cap are repelled towards the leaf and the stem of the electroscope, causing the leaf to rise. |  |
|  (a) (b) | Current I= $\frac{power}{p.d}=\frac{100000}{500 V}=20$Power loss = 12 R = 202 X 5 = 2000wPower available for factory = 100,000 – 2,000 = 98,000W or 98KWResistance of cables/supply of high currents. |  |
|  | Resistors in parallel RT =$\frac{5 X 5}{5 X 5}=\frac{25}{10}=2.5 4∩ =10A=∩$$$Resistors in series$$$$RT=3.5+2.5+4∩ =10∩$$ |  |
| 1.

 (b)  | By the human skin to synthesize/manufacture vitamin D* In bacteriology to kill harmful organisms
* In manufacture of washing powder and paints that fluoresce
* To detect forged documents such as cheques and fake currency notes in banks
* In burglar alarms
* In automatic door openers (any 1 mark)

Photographic plates/ filmsPhotocellsLight dependant resistors (LDR) |  |
|   (i) (ii)  | X – south poole Y – noth pole : using Flemings left-hand rule* Increasing current
* Strengthening magnetic field
* Turns of the coil (any 1 mark)
 |  |
|  | Q = itBut 1 = 3A and Q = 30Ah30 = 3 X tt= 10hours |  |
|  | Section B |  |
| **11****12** **(b)**  | a= 236-4 = 232b = 72 – 2 = 70C=$ \frac{4×2}{4+2}+\\_\frac{2×4}{2+4}$=$\frac{8}{6}+\frac{8}{6}=\frac{16}{6}=2.6667µF$(a) (i) √ Both rays  √ Virtual image7A1B7294 (ii) Magnification = image height = 2.8√ = 2.545√ Object height 1.1 NB: Image and object heights must be measured accurately.C:\Users\Ruiga Day\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_20201124_100002_781.jpgMarking of graphConstruction rays to for image I (2 marks)Construction to form image 2 (2 marks) |  |
|    13 a  (b) i (ii) (iii) (c)  | C:\Users\Ruiga Day\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_20201126_085723_068.jpgQ2 < Q1 or wavefronts refracted or larger spacing in deep  Away from normal shallow region$$4\frac{3}{4} ƛ =237.5 CM$$1 ƛ = $\frac{237.5cm}{4\frac{3}{4}} 50.0 cm$Speed = $\frac{distance}{time}= \frac{224.0 cm}{2.8}=V=80.0cm/s$V = f ƛ  80 = f x 50; f = 1.6HzC:\Users\Ruiga Day\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\IMG_20201126_091109_861.jpg* Wave length spacing maintained
* Reflected wave fronts takes the shape of the reflector and more towards focal point F
 |  |
| 14a  (b)  (c) (d)  (e)  (f) (g) (ii) |  Q: target/anodeR; concave focusing cathodeQ – target/anode; tungsten or molybdenum It has a very high melting point(hence not likely to melt due to very high temperatures of the target)R- Concave focusing cathode. To concentrate (focus) the electron beam onto the target/anodeCurrent flows through the filament in the cathode and electrons are produced through thermionic emission.When the electrons at very high speed are suddenly stopped by the target their kinetic energy is transformed into X-rays and heat.To remove air molecules so that the electrons do not lose some of their kinetic energy through collisionHigh density/ its ability to absorb most of the X-raysHarder/more penetrating/higher quality X-rays are producedIntensity/quality of X-rays produced increases  |  |
|  15(a  c(i) (d) i)  (ii) (iii)  | The setting free of electrons from a surface of a metal when illuminated/irradiated with radiation of suitable frequency.Increase in intensity increases the number of emitted photoelectrons (photoelectrons increases)increase in frequency of incident radiation increases the kinetic energy of photoelectrons emittedthreshold frequency fo = 4.6 X 1014 Hz (graph line extended to cut the frequency axis)NB: must be from the graph$$\frac{h}{e}=\frac{ΔVs}{Δf} $$$$\frac{ΔVs}{Δf}=\frac{1.3-0.65}{\left(7.8-6.2\right) ×10^{14}}$$$$\frac{0.65}{1.6 ×10^{14}}$$$$=4.0625 ×10^{-15}$$$$h=e ×gradient$$$$=1.6 ×10^{-19} ×4.0625 10^{15} $$$$=6.5 ×10^{-34} J\_{5}$$$$work functon W\_{0}= hf\_{o}$$$$W\_{o}=6.5 ×10^{-34} ×4.6 ×10^{14}$$$$=2.99 ×10^{-19}JA=πr^{2}$$ |  |
| 16(a)  b)(i) (ii)17.   |   (a)7A1B7294 (b) During the first half –cycle D1 is forward biased while D2 is reverse biased. Hence , current  takes the path A , D1 RT .√ During the next half –cycle, D2 is forward biased while D1 is reverse biased and the path of  the current is BD2RT.√ (c) - Protects a circuit from damage √ - As a switch √ Any 2 - In charging a battery using solar panels.i) The galvanometer deflects on one side and then back to zeroii) A greater deflection will be obtained in the opposite direction as current takes less time to die off than to build up.Bi) The changing current in the primary coil induces a current in the secondary coil due to charging magnetic field of the primary current.ii) VS = NS = VS = 240 x 200 = 48V VP NP 1000iii) E = Power output x 100 Power input = 48 x 0.7 x 100 240 x 0.2 = 70% |  |