NYANDARUA WEST JOINT EVALUATION - 2018
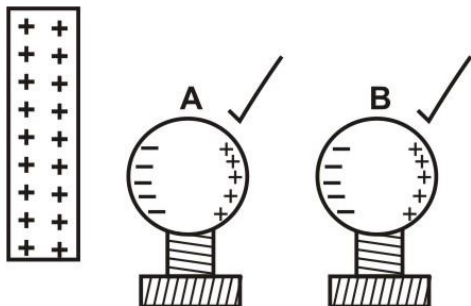
SECTION A

1. (i) Prisms do not absorb any unlike plane mirrors which absorb some of the light

(ii)   Mirrors especially if they are thick produces multiple images unlike prism

(iii)   The silvering on mirrors can become tarnished and peel off.   (any two ✓✓)

2.

3. (i) Both cathode ray and x-rays posses' energy.

(ii)   Both cathode ray and x-rays travel in a straight line

(iii)   Both causes certain substances to flourescence .   (*Any two* ✓✓)

4. $V = f\lambda$

$$= 150 \times 200 \times 10^3 \checkmark$$

$$= 3.0 \times 10^7 m/s \checkmark$$

5. (i) a or b or c

(ii)   Frequency of the radiation is greater than threshold frequency

6. ??????

7.
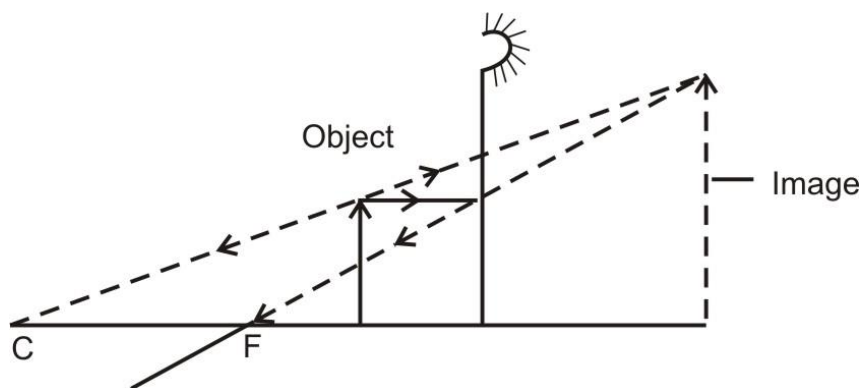
Object position ✓

Any two rays ✓

Magnified virtual image ✓

8. Sound travels faster in solid (metal) than in air

9. The depletion layer decreases

10. (i) C is alpha (α) particles

(ii)   – It is positively charged
   - It is massive hence moves slowly
   - It has a high ionizing effect

11. The keepers is magnetised making its dipoles and those of magnet to form a closed loop

12. Constructive interference is produced when two waves arrive at a point in phase, OR a crest and a crest meet✓

Destructive interference is produced when a crest of one wave meet a trough of another wave ✓
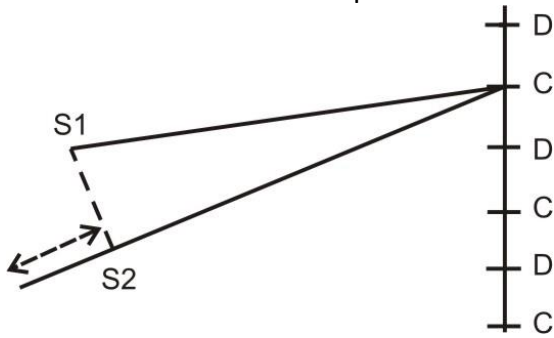
13. a) – Light must travel from an optical denser medium to a an optically less denser medium ✓
- Angle of incidence in the denser medium must be greater than critical angle in the less dense medium ✓
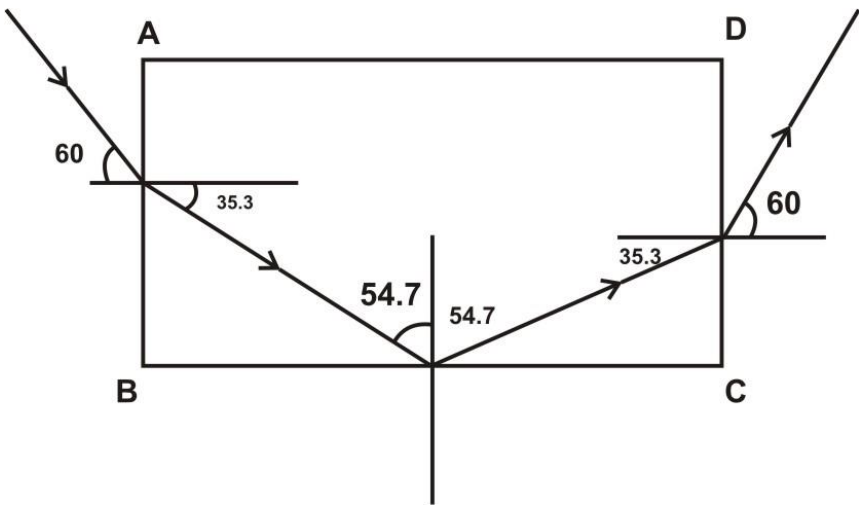
b) (i) $n = \dfrac{Sin\ i}{Sin\ r}$

$1.5 = \dfrac{\sin\ 60}{Sin\ r}$ ✓

$r = 35.26^o \,\square\, 35.3^o$ ✓

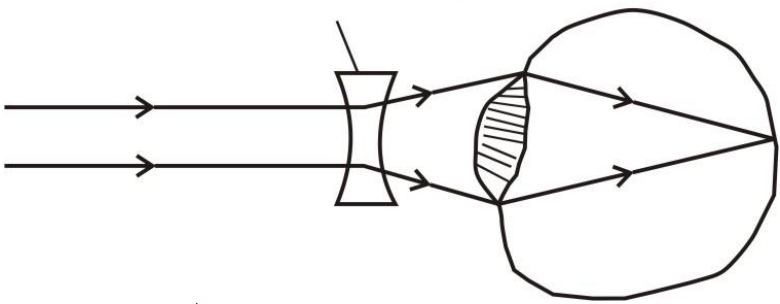(ii) $Sin\ c = \dfrac{1}{n} = \dfrac{1}{1.5}$ ✓

$c = 41.8^o$ ✓

(iii)

Total internal reflection ✓

Refraction at face ΔC ✓

Biloncave

Correct lens ✓

Correct ray ✓

14. a) (i) Parallel $\frac{1}{R} = \frac{1}{6} + \frac{1}{4} + \frac{1}{3}$ ✓ $= \frac{9}{12}$

$$R = \frac{12}{9} = 1.33\Omega \checkmark$$

$$R_T = 4 + 1.33 = 5.33\Omega \checkmark$$

(ii) $\quad V = IR$

$$I = \frac{V}{R} = \frac{4.5}{5.33} \checkmark = 0.844A \checkmark$$

$$\therefore V = 4 \times 0.844$$

$$= 3.377V \checkmark$$

b) $\quad E = 3.2r + 2.8(3.2) \checkmark = 3.2r + 8.96$ ⸻ (I)

$\quad E = 5r + 5(1.6) \checkmark = 5r + 8$ ⸻ (II)

Solving them simultaneously

$\quad$ E = 10.67V ✓

$\quad$ r = 0.533Ω ✓

c) Power consumed by five 60W bulb = 60 x 5 = 300W

Power consumed per day $= \frac{300}{1000} \times 3.5 = 1.05 Kwh \checkmark$

Cost per week $= (105 \times 7) \times 14.20 \checkmark = 104.37$

$$= Sh\ 104.40 \checkmark$$

15. a) When the switch is closed, flux in the coil on L-H-S grows and links the other coil inducing emf ✓ when the current is steady no flux change ✓ and hence no induced emf. When the switch is opened, the flux collapses✓ even in the coil on R-H-S inducing current in the opposite direction

b) (i) A step down transformer is a transformer that is used t reduce the value of the output voltage or a transformer whose turn rate is less than l $\left(le\ \frac{Ns}{Np} > 1\right)$

(ii) Soft iron reduces losses due to hysteresis or magnetic losses. This is because soft iron is easily magnetised and easily demagnetised

(iii) $\quad \frac{Vs}{Vp} = \frac{Ns}{Np} \checkmark Vs = \frac{NsVp}{Vp}$

$$Vs = \frac{40\cancel{0} \times \cancel{2}\cancel{00}}{\cancel{2}\cancel{0}\cancel{00}} = 40V$$

$$P = VsIs = 800$$

$$Is = \frac{800}{Vs} = \frac{800}{40} \checkmark$$

$$Is = 20A \checkmark$$

c) - Increase the current
- Increase the number of turns per unit length or increase the winding
- Us e a U-shaped core

16. a) (i) A – Produces electrons when heated

B – Accelerates electron to the screen

C – it glows on impact with electron

(ii) The spot on the screen becomes brighter

b) (i) Emission of electron from metal surface when heated

(ii) $\quad Ke = eV$

$$\frac{1}{2}MV^2 = eV \checkmark$$

$$V = \sqrt{\frac{2eV}{m}} = \sqrt{\frac{2 \times 1.6 \times 10^{-19} \times 4550}{9.11 \times 10^{-34}}} \checkmark$$

$$V = \sqrt{1.598 \times 10^{18}} \, m/s$$

$$V = 1.264 \times 10^9 \, m/s \checkmark$$

c) In a TV set the deflection of the beam is by magnetic field while in C.R.O is by electric field

d) – Increase the distance ,d, of separation
   - Reduce the area of overlap

17. a) - Frequency of incident light |radiation
    - work function of the metal surface

b) (i) Stopping potential is negative potential sufficient to just stop the movement of electrons

(ii) (I) $gradient = \dfrac{h}{e} \checkmark = \dfrac{3-0}{(12-4.4) \times 10^{14}} \checkmark$

$$= 3.95 \times 10^{15} \checkmark$$

$$h = 3.95 \times 10^{-15} \times 1.6 \times 10^{-19}$$

$$= 6.32 \times 10^{-34} \, Js \checkmark$$

(II) $y - \text{int } ersept = \dfrac{Wo}{e} \checkmark$

$$\frac{-Wo}{e} = -1.75V \checkmark$$

$$\therefore Wo = 1.75eV \checkmark$$