

SEETA HIGH Physics Seminar Paper - Answers (Items 6-10)

Item 6: Solar Charging and Auto Light Circuit

- (a) 52 V must be regulated to 14 V for battery.
- (b) Gate X is a NOT gate.
- (c)(i) Use NOT gate to switch on bulb at night.
- (c)(ii) Symbol: triangle with small circle.
- (c)(iii) Truth Table: 01, 10.

Item 7: Radiation Contamination Case

- (a) Isolation time 9 days.
- (b) Releasing early is risky due to residual radiation.
- (c) Use lead containers and tongs; follow safety procedures.

Item 8: X-Ray Machine Use and Voltage

- (a)(i) X-rays are EM waves, not organisms.
- (a)(ii) Used to image internal injuries.
- (b) Use resistor voltage divider to step down from 10 kV to 4 kV.

Item 9: Night Sky Broadcast and Astronomical Bodies

- (a) Grey areas = nebulae; bright spots = satellites.
- (b) Sun visible in day; stars at night due to light contrast.
- (c) Brightness and color depend on temperature and distance.

Item 10: Radioactivity Applications and Risks

- (a)(i) Uses in medicine, dating, industry.
- (a)(ii) Can cause cancer/DNA damage.
- (b) Equation: ${}^{238}\text{U} \rightarrow {}^{234}\text{Th} + {}^4\text{He}$.
- (c) Half-life depends on isotope (${}^{238}\text{U}$ 4.5 bn years).