

Physics

Section I – Part B (continued)

Marks

Question 24 (8 marks)

In terms of band structures and relative electrical resistance, describe the differences between a conductor, an insulator and a semiconductor.

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A conductor has no resistance because of ~~free~~ holes in the valence band which allows electrons from the conduction band to move around freely. Insulators have a high resistance because their outer most band, the valence band is full ~~to~~ so electrons cannot move around freely. There is also a large gap between the valence band and conduction band in insulators. Semiconductors have a small gap between valence band and conduction where as in a conductor the bands are very close or touching, overlapping. ~~so~~ the small gap in semiconductors allows some electrons to move.