

Engineering Studies

Section II (continued)

Marks

Question 16 — Telecommunication (15 marks)

- (a) (i) The telecommunications industry uses copper and fibre optics for transmission of data. State a different application for each of these materials, and explain, in terms of their properties, why they are used for this application. 4

* Fibre optics can also be used for material testing in cavities, as one optic can carry light and the other can carry a camera. The camera optics must be coherently arranged for a fully understandable image, whereas the light is irrelevant.

* Copper is a very good conductor, which means it can also be used for the windings in a motor or generator, as it will have little resistance.

- (ii) Cold drawing is used to form copper into electrical wire. Describe TWO problems associated with the use of the process. Describe a subsequent process that will reduce these problems. 3

* Cold drawing is a harder process requiring stronger machinery than hot drawing, therefore increasing costs

* The grain structure will be in a non-uniform arrangement, therefore making it weaker when loaded.

* A suitable process to overcome/reduce this is to roll it, as all grains will follow the structure of the copper, and it is an easier process

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Question 16 (continued)

- (b) Identify TWO technological changes in the telecommunications industry. 4
Discuss the effects that these changes have had on society.

* Telephone systems have gone mobile - This is positive to society as it makes business and leisure communication much easier, BUT on the negative side, it can cause unwanted costs through calls and messages

* The crossover from radio to television for main source of media - This has been positive to society as it gives an image of the topic being focused on (eg: Live shots from the war), but is negative as it keeps people indoors as they would prefer to watch TV rather than go outside, making people lazy and miss out on the finer points to life.

- (c) (i) Describe the transmission of data from a mobile phone to another mobile phone. 2

A persons voice is in analogue form, which is converted to digital. This info is sent to a base station within the 'cell' and forwarded on to a satellite which send the info to another satellite which passes it on to a base station in another 'cell', which passes it on to the receiving phone, which transfers digital to analogue, and is then

- (ii) Explain the effect that mobile phone communications may have on other electronic systems. State TWO situations where this effect could endanger lives. 2 heard!

* Mobile phones use radio waves, which can cause a spark across a gap of a conductor, which can ignite fumes/fuel at a petrol station and cause an explosion!

* Mobile phones use radio waves, which can interfere with such gadgetry as 'autopilot' in planes, which could possibly cause the plane to dive!

End of Question 16