

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

Copper can be used in the transmission of electricity due to its low resistance and good conductivity of electricity. It also has a relatively low density. Fibre optics can be used in the study of light as they fibre optic cable totally internally reflects the light. It can allow researchers to study the speed and the movement/position of light to different materials used in fibre optics.

- (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

The copper wire can become contaminated and this will affect its transmission of information or of electricity. The properties of the wire are changed, i.e. grain structure. This will affect the purity and quality of the wire. A process to reduce these problems would be alloying the copper to give it better properties or use a hot headed method or extrusion to produce the wires.

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Question 16 (continued)

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

mobile phone
satellites

The use of mobile phones has allowed people to be privately contacted when they are at home, work or out socialising. It has allowed people to be contacted basically anywhere and has removed annoying phone wires. The use of satellites has allowed transmission of information & phone calls much faster and easier. It has ~~not~~ allowed people to obtain links on the weather, allowed coast operations and mapping ^{paths} of the earth.

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

When calling & talking on a mobile phone, the base station is alerted, finds the station of the number being dialled & it does. Once connected two frequencies are allocated ^{for} ~~and~~ talking & listening (i.e. sending & receiving data). So data is transferred b/w mobile phones on two distinct frequencies.

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

Mobile phones interfere with electric circuits and radio frequencies. If on an aircraft, the electronic field sent out by the phone would ~~mess~~ damage the computer and radio settings in the plane causing it to go off course &/or lose radio contact and this would endanger lives.

End of Question 16