

COMPUTER SCIENCE TRIPOS Part II – 2018 – Paper 9

14 Topical Issues (RKH)

- (a) Explain the meaning of *spread-spectrum* as it applies to radio communications. Describe the principles of Frequency-hopping and Code-Division Multiple Access spread-spectrum techniques. Give an example consumer technology for each. [5 marks]
- (b) Explain what is meant by an *underlay system* in the context of radio systems. [3 marks]
- (c) Consider an automotive UWB pulsed radar system used to detect objects around a vehicle.
- (i) Describe the operating principles of UWB pulsed radar in this context. Your description should discuss range ambiguities, the effect of the Pulse Repetition Frequency (PRF), and how the distance to multiple objects can be determined. [6 marks]
- (ii) When multiple vehicles are equipped with UWB pulsed radars, the pulses can interfere. Discuss the effects this will produce for different PRFs. [4 marks]
- (iii) Another form of radar involves sending a continuous radio wave and measuring doppler shift. Suggest what could happen if such a signal interfered with a pulsed radar. [2 marks]