

## 2010 Paper 9 Question 1

### Additional Topics

- (a) Briefly describe the functions of the space segment, the control segment, and the user segment in the GPS system. [6 marks]
- (b) An increasing number of mobile telephony handsets are GPS-enabled.
- (i) Explain why a GPS receiver can take many minutes to locate itself when first turned on. [2 marks]
- (ii) This length of delay is unacceptable for many mobile handset users. Explain how network operators are able to reduce this delay. [2 marks]
- (iii) It is not always possible for a GPS receiver to see a sufficient number of GPS satellites to position itself. Describe how a Time Difference of Arrival (TDoA) system would allow a mobile handset to be positioned within a typical cellular network of today. Why is a Time of Arrival (ToA) system inappropriate here? [6 marks]
- (iv) Indoor location can provide very useful context for sentient computing. Assuming it worked indoors just as it does outdoors, explain why GPS locations might not be good enough for indoor applications. Describe one technique that a mobile handset of the future could potentially use to get reliable indoor location. [4 marks]