

## COMPUTER SCIENCE TRIPOS Part IB – 2019 – Paper 5

### 4 Computer Networking (awm22)

The TCP transport protocol is an example of an ARQ.

- (a) Provide a definition of an ARQ. [1 mark]
- (b) Describe the design and operation of a simple ARQ for a lossy communication channel. [3 marks]
- (c) When and why does a simple ARQ at the transport layer have a significant negative impact upon application performance? [3 marks]
- (d) Describe what additions are required to a simple ARQ to support windowing. When and why will an ARQ which supports windowing provide better application performance than a simple ARQ? [5 marks]
- (e) Describe two situations when the performance of a windowed ARQ is no better than a simple ARQ. [4 marks]
- (f) Would the QUIC protocol, when based upon UDP rather than TCP, overcome the two situations you outlined when answering Part (e)? [4 marks]