

2005 Paper 7 Question 2

Digital Communication II

- (a) Explain the rôle of the checksum mechanisms in OSI layers 2, 3 and 4 of the Internet Protocols. [9 marks]
- (b) An ARM assembly code implementation of the IP/TCP checksum function appears below. Annotate this with comments that explain the code.

```
        sub    r3, r3, #16
loop:
        ldmia  r2!, {r6-r9}
        adds  r4, r4, r6
        adcs  r4, r4, r7
        adcs  r4, r4, r8
        adcs  r4, r4, r9
        adcs  r4, r4, #0
        adc   r4, r4, #0
        subs  r3, r3, #16
        bxx  loop
        add  r3, r3, #16
```

[6 marks]

- (c) *traceroute* is a commonly used diagnostic tool in the Internet. Explain how it works, making reference to its use of the *TTL Expiry* facility of *ICMP*, and the circumstances under which it might generate misleading or incorrect output. [5 marks]