Name ______________________ Student No. ______________________

No aids allowed. Answer all questions on test paper. Use backs of sheets if necessary.

Total Marks: 40

[10] 1. (a) The possword file has the following properties (obtained by the command `ls -l`):

`-rw-r--r--   1 root  root  Jan 15 14:42 /etc/passwd`

Explain the meaning of all the fields. In particular, explain the permissions given by `-rw-r--r--`.

root can read and write, and everyone else can read only. The "1" indicates that there are no hard links to the file, root and root indicate the owner and the group, and Jan 15 14:42 indicates when was the file last modified.

(b) The file `/etc/passwd` contains the entries of the form:

`you:gkmbCTrJ04COM:500:500:You:/home/you:/bin/bash`

where the second field contains the password (the fileds are separated by ":"). Explain in detail why even if the password file is world-readable, this does *not* pose a major security threat.

It is OK for the password file to be world-readable since the password is included in an encrypted form. However, now days most UNIX systems use a shadow-password file which is not world readable, so people cannot apply password guessing software to guess the password from its encrypted form.

[10] 2. Explain what are each of the following system threats:

(a) Trap Door

(b) Stack and Buffer Overflow

(c) Worms

(d) Viruses

(e) Denial of Service

See sections 19.3 and 19.4.

[10] 3. (a) Convert the following IP address to the *dotted decimal* notation:

10011000000000101111111001010001

Is is a class A, B, or C address?

152.2.254.81; class B address.

(b) Explain the concept of a *network mask*. All hosts in the Computing and Software department have network addresses of the form 130.113.68.$*$, where the $*$ is any number in the range 0–255; what is the network mask in this case?

255.255.255.0; the netmask indicates which addresses form the subnet.

[10] 4. Explain what are the functions of the following layers in a Communication Protocol:

(a) Physical layer
(b) Data-linke layer
(c) Network layer
(d) Transport layer
(e) Session layer
(f) Presentation layer
(g) Application layer

See section 15.5.