Important:

* This question paper comprises of two parts, Part A and Part B. The time allotted for both parts is three hours.
* Use of calculators is not allowed.

PART A — Structured Essay:
(pages 02 - 07)

Answer all the questions on this paper itself. Write your answers in the space provided for each question. Note that the space provided is sufficient for your answers and that extensive answers are not expected.

PART B — Essay:
(pages 08 - 11)

This part contains six questions, of which, four are to be answered. Use the papers supplied for this purpose.
* At the end of the time allotted for this paper, tie the two parts together so that Part A is on top of Part B before handing them over to the Supervisor.
* You are permitted to remove only Part B of the question paper from the Examination Hall.

For Examiner’s Use Only

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Final Marks

In numbers

In words

Code Numbers

Marking Examiner 1
Marking Examiner 2
Marks checked by
Supervised by
1. (a) Give two techniques used in operating systems to optimize processor utilization.

(b) The following shows a part of the result obtained by executing the "ping" command to check the network connectivity to a host connected to a computer network.

```
PING www.cam.ac.uk (131.111.8.46) 56(84) bytes of data.
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46): icmp_seq=1 ttl=242 time=201 ms
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46): icmp_seq=2 ttl=242 time=204 ms
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46): icmp_seq=3 ttl=242 time=196 ms
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46): icmp_seq=4 ttl=242 time=203 ms
64 bytes from ipv4.www.cam.ac.uk (131.111.8.46): icmp_seq=5 ttl=242 time=195 ms
--- www.cam.ac.uk ping statistics ---
5 packets transmitted, 5 received,
```

Using the above information, answer the parts (i), (ii), (iii) and (iv) given below.

(i) What is meant by time in the above result?

(ii) What is the IP address of the server that hosts the website www.cam.ac.uk?

(iii) Identify the class of the IP address obtained in (ii) above.

(iv) What is the percentage of packet loss?

(c) In an operating system, a process can be in one of the states, namely, created/new, running, terminated, blocked, swapped out and waiting, or swapped out and blocked. From which of the above states can a process be directly moved into the blocked state?
2. (a) Provide a suitable definition for a system.

(b) Using the definition suggested in (a) above, show that a mobile phone is a system.

(c) State whether a mobile phone is a close system or an open system. Justify your answer.
(d) State whether the following requirements of a mobile phone are functional or non-functional. Justify your answers.

(i) A user shall be able to make a call using the mobile phone.

(ii) It shall not harm the user by emitting radiations.
3. (a) (i) Describe how you would determine whether a given positive integer is odd or even.

(ii) Develop a flowchart to represent an algorithm, based on the method suggested in (i) above, to decide whether a given positive integer is odd or even.
(iii) Convert the flowchart you have obtained for the above (ii) into a pseudo code.

(b) Show how the computation $15+(-5)$ is done in 8-bit two's complement arithmetic. Explain how you deal with the carry generated in the most significant bit.
4. (a) What do you mean by the terms “privacy” and “software piracy”?

(b) Describe the term “mobile computing”.

(c) Consider the following scenario:
A semiconductor manufacturing company has branches in Japan and USA. At present, representatives of the development team should visit other branches of the company frequently to discuss their technical issues. Over the years, the company has realized this mechanism is costly and time consuming.
(i) As an ICT student, suggest an ICT based method to conduct these technical review meetings without visiting the other branches.

(ii) Name three essential ICT devices required for the method suggested in (i) above.