DUBLIN INSTITUTE OF TECHNOLOGY

DT211C BSc. (Honours) Degree in Computer Science (Infrastructure)

Year 1

WINTER EXAMINATIONS 2015/2016

INTRODUCTION TO OPERATING SYSTEMS [CMPU1015]

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TUESDAY 17TH JANUARY 9.30 A.M. – 11.30 A.M.

TWO HOURS

ANSWER *QUESTION ONE* & TWO OTHER QUESTIONS.

QUESTION ONE IS *COMPULSORY* & CARRIES 50 MARKS.

ALL OTHER QUESTIONS CARRY 25 MARKS.

Question 1 - All sub questions have equal marks (5 marks each).

a) Name three contemporary Operating Systems.

b) Explain what a context switch is.

c) Explain what a System Call is.

d) Name two common registers required for CPU computations.

e) Explain the difference between a process and a thread.

f) Explain how processes are created in UNIX.

g) Explain the term 'Swapping' in relation to virtual memory.

h) Explain the term 'Starvation' in relation to CPU scheduling.

i) Explain 'Deadlock' in relation to writing to memory.

j) Are Operating Systems user application software?

(Total 50 marks)

Question 2.

a) Outline briefly the components of the Process Control Block. *(5 marks)*

b) Outline briefly the components of the Process Memory address at runtime. *(5 marks)*

c) Explain briefly the Producer Consumer issue in relation to a bounded buffer. *(5 marks)*

d) Identify three software methods to address the issue of mutual exclusion within the critical region of shared resource. *(5 marks)*

e) Explain with the aid of a diagram how one of the software methods identified in section (d) of this question is used to enforce mutual exclusion within the critical region of shared resource. *(5 marks)*

Question 3

a) Is MS DOS a multi-user Operating System? (1 marks)

b) What was the first multi-tasking Operating Systems developed in the mid-1960s? (3 marks)

c) Explain the term *pre-emption* in relation to such a multi-tasking Operating System. (7 marks)

d) Explain the difference between *concurrency* and *parallelism*? (7 marks)

e) Can single-user, multi-tasking Operating Systems perform *true parallelism*? Explain your answer identifying any specific requirements for true parallelism to be achieved. *(7 marks)*

Question 4.

Management of main memory is critical to the operational capability of the Operating System.

a) What are the other four primary management areas at the core of contemporary Operating Systems? *(6 marks)*

b) With the use of a diagram, describe the purpose of the Memory Page Table. *(6 marks)*

c) Identifying what a Memory Management Unit and explain its role in Virtual memory management. *(6 marks)*

d) Describe the current generic Linux and Unix Page Replacement Algorithm for User space and the kernel space. *(7 marks)*