PAPER CODE NO.	EXAMINER : Dr. Terry Payne
COMP204	DEPARTMENT : Computer Science Tel. No. 0151 795 4251

UNIVERSITY OF LIVERPOOL

MOCK EXAMINATIONS

Computer Systems and Their Implementation

TIME ALLOWED : 20 minutes

INSTRUCTIONS TO CANDIDATES

NAME OF CANDIDATE ..... SEAT NO .....

USUAL SIGNATURE .....

READ THE FOLLOWING CAREFULLY:

1. Each of the following questions comprise 5 statements, for which you should select the one most appropriate answer.
2. On this exam paper, place a tick in the appropriate box to indicate your answer.
3. The exam mark is based on the overall number of correctly answered questions. The more questions you answer correctly the higher your mark, incorrectly answered questions do not count against you.
4. Enter your name and examination number IN PENCIL on the computer answer sheet according to the instruction on that sheet. Please note that all numbers MUST consist of three digits, e.g. 9 is entered as 009 and 25 as 025. The digits should be entered in the boxes under 'Candidate Number' and entered by means of horizontal lines in the appropriate boxes underneath, exactly as when answering questions.
5. When you have completed this exam paper, read the instructions on the computer answer sheet carefully and transfer your answers from the exam paper. Use a HB pencil to mark the computer answer sheet and if you change your mind be sure to erase the mark you have made. You may then mark the alternative answer.
6. At the end of the examination, be absolutely sure to hand in BOTH this exam paper AND the computer answer sheet.

THIS PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

UNIVERSITY OF LIVERPOOL

1. Which of the following is/are valid responses that a UNIX process can make on receipt of a signal?

I. The process can ignore the signal

II. The process can perform a default action such as terminating

III. The process can specify a handling routine for dealing with the signal

☐ **A.** III only

☐ **B.** I and III only

☐ **C.** II and III only

☐ **D.** I and II only

☐ **E.** I, II and III

2. The value of a semaphore `s` is initially 1. What could happen in the following situation?

```
     T1                    T2
 V(s);                 P(s);
    critical region    critical region
 P(s);                 V(s);
```

☐ **A.** Deadlock will ensue

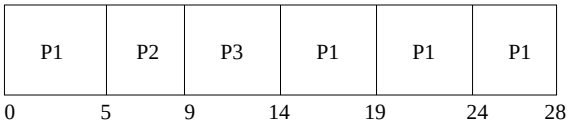
☐ **B.** T1 and T2 can both enter their critical regions simultaneously

☐ **C.** Neither T1 nor T2 can enter its critical region

☐ **D.** T1 can never enter its critical region, but T2 can enter its own

☐ **E.** T1 can enter its critical region, but T2 can never enter its own

3. Consider the following Gantt chart showing the CPU burst times (in milliseconds) of three processes using the round robin scheduling algorithm:



Suppose the three processes, P1, P2 and P3, all arrive at time 0 and we are using a time quantum of 5 milliseconds. Assuming we are not including time for performing context switching, what is the average waiting time in the above example?

☐ **A.** 5.6 milliseconds

☐ **B.** 7.67 milliseconds

☐ **C.** 9.33 milliseconds

☐ **D.** 23.67 milliseconds

☐ **E.** 33 milliseconds

4. The lookup page table shown below is for a job in a paged virtual storage system with a page size of 1024 locations. Each virtual address is of the form [p,d] where p and d are the page number and the displacement in that page, respectively.

Virtual Page	Actual Page
0	3
1	–
2	4
3	0

A virtual address of [0, 200] maps onto an actual address of:

☐ **A.** 1124

☐ **B.** 2872

☐ **C.** 3272

☐ **D.** 4096

☐ **E.** None of the above

5. A filestore allocation system uses a bit string to record the use of its blocks, with 0 denoting free and 1 denoting allocated. A 16-bit segment of this string has the hexadecimal value A9B3. How many blocks are free?

☐ **A.** 4

☐ **B.** 7

☐ **C.** 9

☐ **D.** 11

☐ **E.** 16

6. Which of the following is NOT usually represented in a subroutine's data frame for a stack-based programming language?

☐ **A.** Values of locally declared variables

☐ **B.** A heap area

☐ **C.** The return address

☐ **D.** A pointer to the calling activation record

☐ **E.** Parameter values passed to the subroutine

7. A particular BNF definition for a “word” is given by the following rules:

⟨word⟩ ::= ⟨letter⟩|⟨letter⟩⟨pairlet⟩|⟨letter⟩⟨pairdig⟩
⟨pairlet⟩ ::= ⟨letter⟩⟨letter⟩|⟨pairlet⟩⟨letter⟩⟨letter⟩
⟨pairdig⟩ ::= ⟨digit⟩⟨digit⟩|⟨pairdig⟩⟨digit⟩⟨digit⟩
⟨letter⟩ ::= a|b|c|...|y|z
⟨digit⟩ ::= 0|1|2|...|9

Which of the following lexical entities can be derived from ⟨word⟩ ?

I. note
II. notes
III. c22

☐ **A.** I and II only
☐ **B.** I and III only
☐ **C.** II and III only
☐ **D.** I, II and III
☐ **E.** None

8. Which code optimisation technique could be applied to the following piece of code?

```
a = (20+10*2)/4;
```

☐ **A.** Code deletion.
☐ **B.** Strength reduction.
☐ **C.** Constant folding.
☐ **D.** Global register allocation.
☐ **E.** Peephole optimisation.