**3 Operating Systems (IML)**

(a) To switch between processes, an operating system must save the context of the current executing process and restore the context of that being resumed.

   (i) By what mechanism is the point of execution of a process preserved and restored? [2 marks]

   (ii) Describe two methods by which the contents of a process address space are preserved and restored. [8 marks]

   (iii) Give two other elements of process context. [2 marks]

(b) The diagram below is a simplified state transition diagram for a process in a generic operating system.
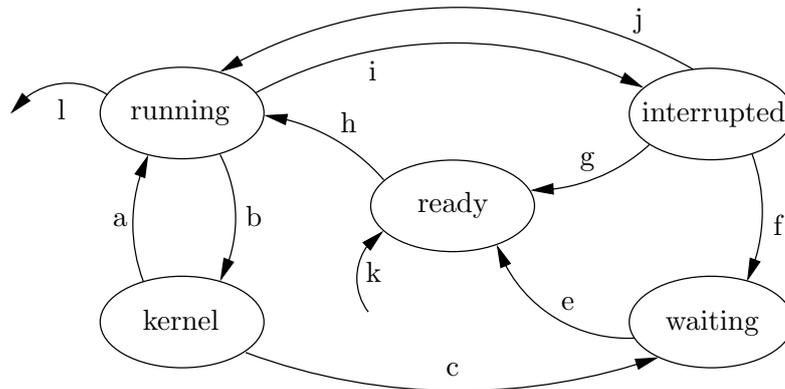
   For each of the following, describe the transitions taken by the process and say whether or not it is necessary for the process scheduler to run:

   (i) A running process is interrupted by a timer. The timer interrupt service routine determines that the time slice given to the process has not yet expired. [2 marks]

   (ii) As in (b)(i) but the time slice given to the process has expired. [2 marks]

   (iii) A running process makes a system call which can be serviced immediately by the kernel. [2 marks]

   (iv) A running process makes a system call which requires an I/O operation to be initiated. [2 marks]