Coursework Part 1

Your answers to these problems should contain explanations of the computations. If you make additional assumptions, state them explicitly.

1. There are three independent jobs. They need 10 s, 15 s and 20 s CPU time, respectively, and during their executions each of them spends half a minute waiting for I/O. Compute the minimal overall runtime of these jobs when they are processed

   (a) in a uniprogrammed system. [5 marks]

   (b) in a multiprogrammed system. [10 marks]

   Subtotal: [15 marks]

2. A computer has a cache, main memory and a hard disk. If a referenced word is in the cache, it takes 15 ns to access it. If it is in main memory but not in the cache, it takes 45 ns to load (the block containing) it into the cache (this includes the time to originally check the cache), and then the reference is started again. If the word is not in main memory, it takes 10 ms to load (the block containing) it from the disk into main memory, and then the reference is started again. The cache hit ratio is 0.5. In the case of a cache miss, the probability that the word is in the main memory is 0.7. Compute the average time required to access a referenced word in this system.

   Subtotal: [20 marks]

   Total: [35 marks]