# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

## FINAL EXAMINATION
## SEMESTER II
## SESSION 2010/2011

| | | |
|---|---|---|
| COURSE NAME | : | OPERATING SYSTEM |
| COURSE CODE | : | BIT 2043/20403 |
| PROGRAMME | : | BACHELOR OF INFORMATION TECHNOLOGY |
| EXAMINATION DATE | : | APRIL / MAY 2011 |
| DURATION | : | 2 HOURS 30 MINUTES |
| INSTRUCTION | : | ANSWER **ALL** QUESTIONS |

THIS QUESTION PAPER CONSIST OF SIX (6) PAGES

**Q1** (a)  **Figure Q1(a)** below illustrated a memory partition.

| |
|---|
| 550 KB |
| 200 KB |
| 350 KB |
| 650 KB |
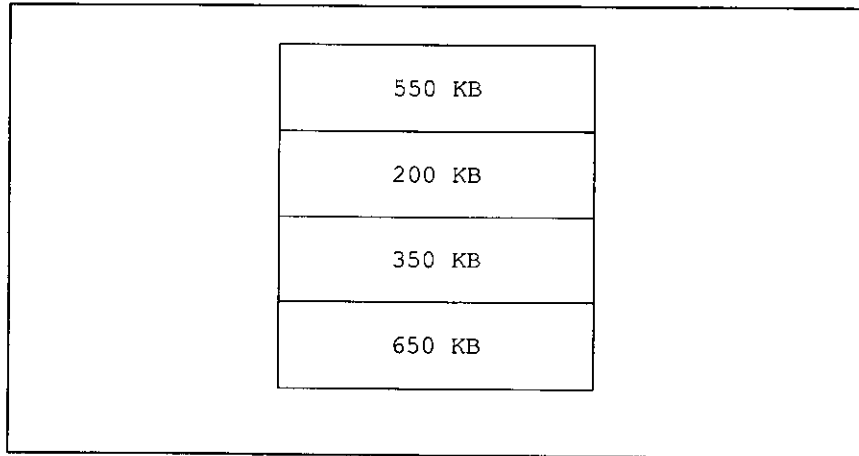
**Figure Q1(a)**

Several processes in sequence and sized 250 KB, 150 KB, 300 KB and 500 KB will be loaded into the memory. Draw the new memory partition after inserting the processes using the following methods:

(i)  First fit

(4 marks)

(ii)  Best fit

(4 marks)

(iii)  Worst fit

(7 marks)

(b)  State **ONE (1)** advantage for each of the following methods:

(i)  First fit
(ii)  Best fit

(2 marks)

(c)  An operating system file is using 400 KB of memory space and there is a sequence of memory segmentation in user process area as following:

100 KB, 500 KB, 200 KB, 300 KB and 600 KB

(i)  illustrate the new figure of memory segmentation after Segment 0 sized 212 KB, Segment 1 sized 417 KB, Segment 2 sized 112 KB and Segment 3 sized 250 KB loaded into the memory using First Come First Serve basis and Best fit method.

(10 marks)

(ii)  draw the new segment table after all the segments are loaded into the memory.

(7 marks)

2

(d) Based on the segment table drawn in **Q1(c) (ii)**, find the physical addresses of the following logical addresses:

(i)    0 141
(ii)   3 250
(iii)  2 113
(iv)   1 415

(4 marks)

**Q2** The following **Figure Q2** is the paging model of 32 byte memory with 4 byte pages that is not yet complete.
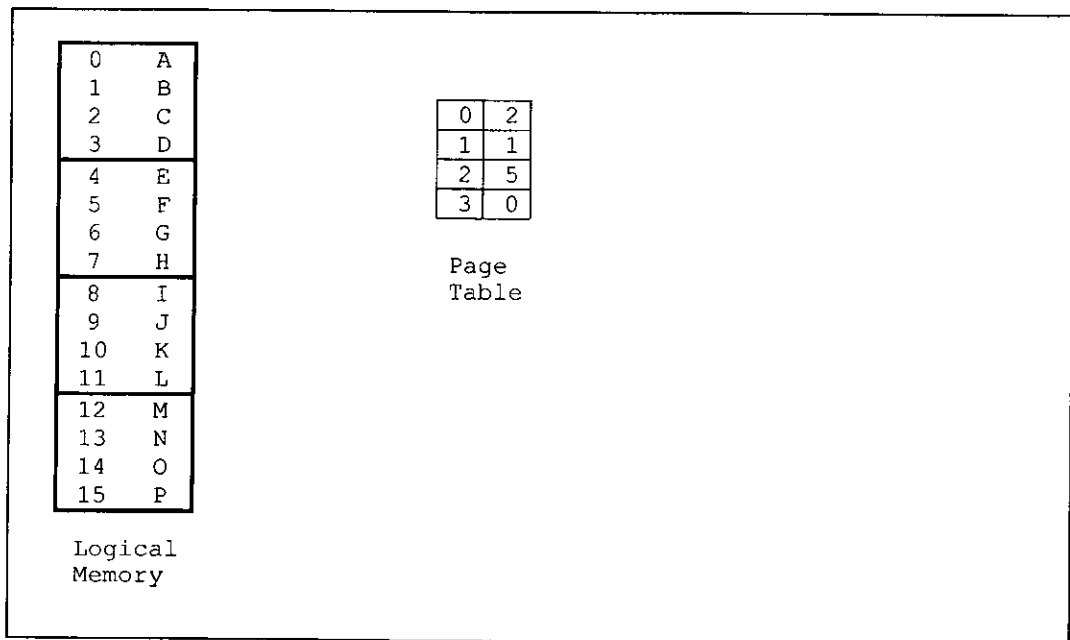


**Figure Q2**

(a) Based on the page table and logical memory in **Figure Q2**, draw a diagram of physical memory using paging scheme.

(10 marks)

(b) Find the physical addresses for the following logical addresses by showing the workflow:

(i)    logical address 14
(ii)   logical address 9
(iii)  logical address 20
(iv)   logical address 7
(v)    logical address 3

(10 marks)

**Q3** **(a)** The size of a frame in the primary memory is 4 KB and the starting address of frame 1 is 1024. Determine the address of frame 2 in physical memory.

(3 marks)

**(b)** Where is the location of the virtual memory?

(1 mark)

**(c)** Suggest the best solution when user gets an error message that warns of low virtual memory and the computer has used the maximum size of virtual memory?

(2 marks)

**(d)** Increasing the size of virtual memory is not recommended as the best solution for low virtual memory problem. Why?

(2 marks)

**(e)** Identify the **TWO (2)** decisions that operating system has to define when there is a trap of page fault?

(2 marks)

**Q4** Based on the given information, answer all following questions:

```
Process size       =    670 K
Frame size         =    50 K
Memory size        =    150 K
Address Reference  =    13, 23, 45, 133, 221, 56, 78, 168, 90, 120,
                        234, 133, 212, 311
```

**(a)** Calculate the reference string.

(2 marks)

**(b)** How many pages are required by this process?

(1 mark)

**(c)** How many frames are required by this process?

(1 mark)

**(d)** Illustrate the number of page faults produced by First In First Out (FIFO) algorithm towards the reference string you got in **Q4 (a)**.

(3 marks)

**(e)** Illustrate the number of page faults produced by Optimal algorithm towards the reference string you got in **Q4 (a)**.

(3 marks)

**Q5** (a) Based on process execution in **Table 1**, draw Gantt chart to illustrate the processes execution using:

<p align="center">**Table 1: Process Execution**</p>

| Process | Arrival Time | Processing Time |
|---------|--------------|-----------------|
| $P_1$   | 0.000        | 3               |
| $P_2$   | 1.001        | 6               |
| $P_3$   | 2.001        | 5               |
| $P_4$   | 3.002        | 2               |

(i) Shortest Remaining Time (Preemptive)

(4 marks)

(ii) Round Robin (time quantum = 2)

(4 marks)

(b) Calculate the average turnaround time for all scheduling algorithms listed in **Q5(a)**.

(4 marks)

(c) Calculate the average waiting time for all scheduling algorithms listed in **Q5(a)**.

(4 marks)

(d) Discuss the meaning of starvation problem in priority scheduling.

(1 mark)

(e) What is the solution of starvation problem in priority scheduling?

(1 mark)

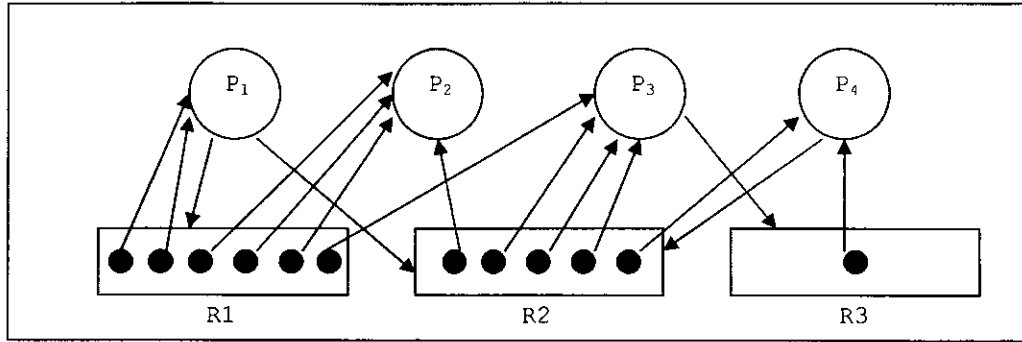**Q6** (a) Complete Table 2 based on **Figure Q6(a)**.

P₁   P₂   P₃   P₄

R1          R2          R3

**Figure Q6(a)**

**Table 2: Resources Allocation and Request**

| Process | Current Allocation | | | Outstanding Requests | | | Resources Available | | |
|---|---|---|---|---|---|---|---|---|---|
| | R₁ | R₂ | R₃ | R₁ | R₂ | R₃ | R₁ | R₂ | R₃ |
| P₁ | | | | | | | | | |
| P₂ | | | | | | | | | |
| P₃ | | | | | | | | | |
| P₄ | | | | | | | | | |

(4 marks)

(b) Printer is one of the resources that can be used by a single process at one time.

Identify the term in deadlock refer to this condition.

(2 marks)