UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER II
SESI 2008/2009

NAMA MATA PELAJARAN	:	SISTEM PENGOPERASIAN
KOD MATA PELAJARAN	:	BIT 2043
KURSUS	:	2 BIT
TARIKH	:	APRIL/MEI 2009
JANGKA MASA	:	2 JAM 30 MINIT
ARAHAN	:	JAWAB **SEMUA** SOALAN.

Instruction: Answer **ALL** questions.

Q1 (a) Define the degree of multiprogramming.

(1 mark)

(b) Draw and label the diagram of process state.

(4 marks)

(c) Explain **FIVE (5)** states of a process.

(5 marks)

Q2 (a) Based on **Table 1**, answer the following questions.

Table 1: Process Executions

P₁	0.0000	5	4
P₂	2.0001	4	2
P₃	2.0001	2	6
P₄	4.0001	4	3

(i) draw a chart illustrating process executions using preemptive priority scheduling [A larger priority number = higher priority].

(2 marks)

(ii) calculate the average waiting time (rounding to the nearest hundredth).

(2 marks)

(b) Based on **Table 2**, draw a chart illustrating the process executions using:

(i) First-Come First-Served
(ii) Shortest Job First (Non-Preemptive)
(iii) Shortest Remaining Time (Preemptive)
(iv) Round Robin (time quantum = 2)

Table 2: Process Execution

P₁	0.000	3
P₂	1.001	6
P₃	2.001	5
P₄	3.002	2

(8 marks)

(c) For all scheduling algorithms as listed in **Q2(b)**, calculate the average turnaround time (rounding to the nearest hundredth).

(8 marks)

Q3   (a)   Define the term mutual exclusion.

<div align="right">(1 mark)</div>

(b)   Draw a resource allocation graph for the system described in **Table 3**.

**Table 3: Resource Allocation and Request**

2	0	0	1	1	0			
3	1	0	0	0	0	0	0	0
1	3	0	0	0	1			
0	1	1	0	1	0			

<div align="right">(6 marks)</div>

(c)   Complete the **Table 4** based on **Figure Q3(c)**.

Table 4: Resource Allocation and Request

0								
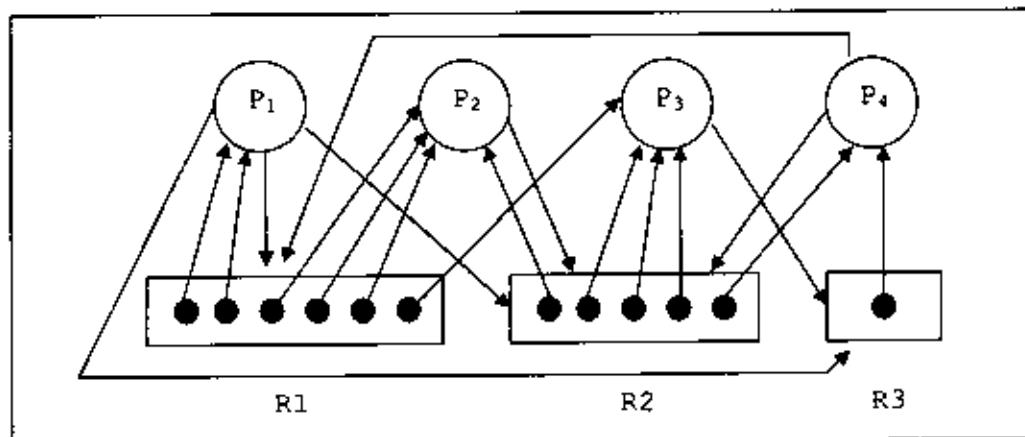
Figure Q3(c)

<div align="right">(13 marks)</div>

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Q4 (a) On a system using simple segmentation, compute the physical address for each of the logical address, given the following segment table.

Table 5: Segment Table

Segment	Base	Limit
0	1100	500
1	2500	1000
2	200	600
3	4000	1200

(i)   0, 378
(ii) 2, 800
(iii) 1, 670
(iv) 3, 3170
(v)   1, 1111

(5 marks)

(b) Assume memory is allocated as specified in **Figure Q4(b)**. Then an additional request for 20K, 10K and 5K (in that order) are received.

```
┌──────────────────┐
│  Used  =  10K    │
├──────────────────┤
│  Hole  =  10K    │
├──────────────────┤
│                  │
│  Used  =20K      │
│                  │
├──────────────────┤
│  Hole  =  30K    │
│                  │
├──────────────────┤
│  Used  =  10K    │
├──────────────────┤
│  Hole  =  5K     │
├──────────────────┤
│                  │
│  Used  =  30K    │
│                  │
├──────────────────┤
│                  │
│  Hole  =  20K    │
│                  │
├──────────────────┤
│  Used  =  10K    │
├──────────────────┤
│  Hole  =  15K    │
├──────────────────┤
│                  │
│  Used  =  20K    │
│                  │
├──────────────────┤
│                  │
│  Hole  =  20K    │
│                  │
└──────────────────┘
```
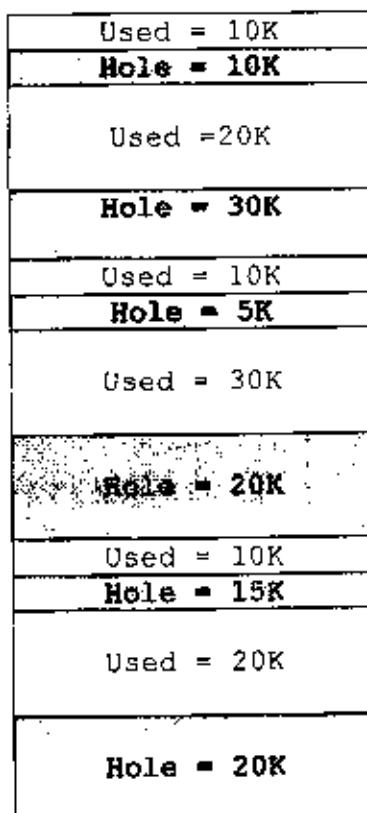
Figure Q4(b)

Draw the new diagram of Figure **Q4(b)** by using:

    (i)   First fit allocation

    (ii)   Best fit allocation

    (iii)   Worst fit allocation

(15 marks)

Q5   (a)   Based on the given reference string:

$$1,2,3,4,1,2,5,1,2,3,4,5$$

Draw a diagram by using FIFO replacement algorithm to illustrate the number of page fault that will occur if:

    (i)   the program has three frames.

    (ii)   the program has four frames.

(10 marks)

  (b)   Draw a diagram to illustrate number of page fault that will occur if the program has three frames available to it and using Optimal replacement algorithm. The reference string is:

$$0,9,0,1,8,1,8,7,8,7,1,2,8,2,7,8,2,3,8,3$$

(5 marks)

Q6   Based on **Table 6**, answer the following questions:

Table 6: Disk Directory

TAIPING	22	3
BATU GAJAH	17	2
IPOH	2	3
CAMERON HIGHLAND	8	4

  (a)   Assume that the disk have 25 blocks with each block size is 20K. Draw a disk block diagram of the files.

(6 marks)

  (b)   Draw a new disk block diagram if a new file named **TAPAH** of size 50K is kept in the disk using first fit contiguous allocation.

(4 marks)

(c)   Update the Disk Directory after **TAPAH** was stored on the disk.

(2 marks)

(d)   List the vector bit after **TAPAH** was stored.

(1 mark)

(e)   Calculate the size of free space available on the disk after **TAPAH** was stored?

(2 marks)

Arahan: Jawab **SEMUA** soalan.

S1   (a)   Takrifkan apakah pengertian *degree of multiprogramming*?

(1 markah)

        (b)   Lukis dan labelkan rajah keadaan proses.

(4 markah)

        (c)   Huraikan **LIMA (5)** keadaan bagi sesuatu proses.

(5 markah)

S2   (a)   Berdasarkan kepada **Jadual 1**, lukiskan carta yang menggambarkan perlaksanaan proses-proses tersebut menggunakan:

Jadual 1: Perlaksanaan Proses

P_1	0.0000	5	4
P_2	2.0001	4	2
P_3	2.0001	2	6
P_4	4.0001	4	3

        (i)   lukis carta untuk menggambarkan perlaksanaan proses menggunakan *preemptive priority scheduling* [nombor prioriti besar = prioriti tertinggi].

(2 markah)

        (ii)   kira purata masa menunggu (bulat kepada ratus terhampir).

(2 markah)

        (b)   Berdasarkan **Jadual 2**, lukiskan carta bagi menggambarkan perlaksanaan proses menggunakan:

        (i)   *First-Come First-Served*
        (ii)   *Shortest Job First (Non-Preemptive)*
        (iii)   *Shortest Remaining Time (Preemptive)*
        (iv)   *Round Robin (time quantum = 2)*

Jadual 2: Perlaksanaan Proses

P_1	0.000	3
P_2	1.001	6
P_3	2.001	5
P_4	3.002	2

(8 markah)

        (c)   Bagi semua algoritma penjadualan dalam **S2(b)**, kirakan purata *turnaround time* (bulatkan kepada ratus terhampir).

(8 markah)

S3   (a)   Berikan pengertian *mutual exclusion*.

(1 markah)

(b)   Lukiskan graf peruntukan sumber bagi sistem seperti yang digambarkan dalam **Jadual 3**.

**Jadual 3: Peruntukan dan Permintaan Sumber**

Proses	Peruntukan Semasa			Permintaan			Sumber Tersedia		
	2	0	0	1	1	0			
	3	1	0	0	0	0	0	0	0
	1	3	0	0	0	1			
	0	1	1	0	1	0			

(6 markah)

(c)   Lengkapkan **Jadual 4** berdasarkan **Rajab S3(c)**.

Jadual 4: Peruntukan dan Permintaan Sumber

Proses	Peruntukan Semasa			Permintaan			Sumber Tersedia		
	0								
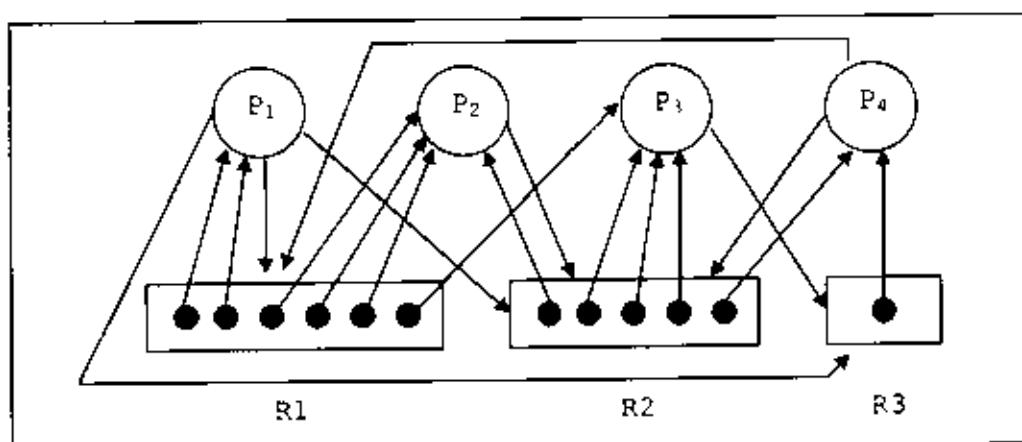
Rajah S3(c)

(13 markah)

S4   Dalam sebuah sistem yang menggunakan konsep pensegmenan ringkas, kirakan alamat fizikal bagi setiap alamat logikal berdasarkan **Jadual 5**.

Jadual 5: Jadual Segmen

Segmen	Asas	Had
0	1100	500
1	2500	1000
2	200	600
3	4000	1200

(i)   0, 378
(ii)   2, 800
(iii) 1, 670
(iv)   3, 3170
(v)   1, 1111

(5 markah)

(b)   Anggapkan ruang ingatan telah diperuntukan seperti di dalam **Rajah S4(b)**. Kemudian, wujud pula permintaan tambahan untuk menggunakan ruang ingatan seperti susunan berikut 20K, 10K and 5K.

| Used = 10K |
| |
| Used =20K |
| |
| Used = 10K |
| |
| Used = 30K |
| |
| Used = 10K |
| |
| Used = 20K |
| |
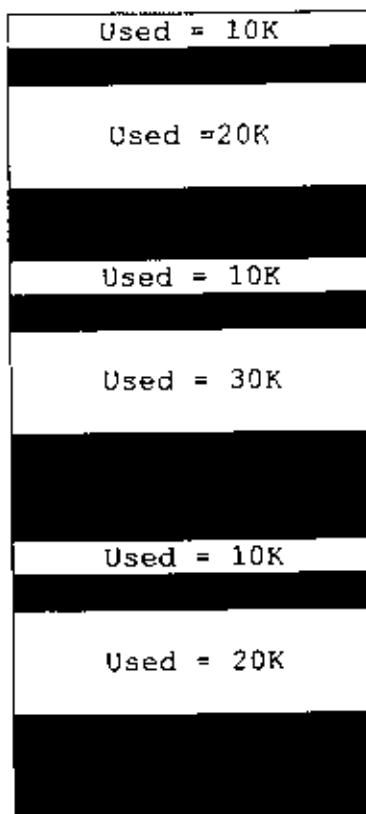
Rajah S4(b)

Lukiskan **Rajah S4(b)** yang baru setelah kemasukan 3 proses dengan menggunakan;

(i) *First fit allocation*
(ii) *Best fit allocation*
(iii) *Worst fit allocation*

(15 markah)

S5 (a) Berdasarkan kepada rentetan rujukan berikut:

1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

Lukiskan rajah bagi menunjukkan jumlah kesalahan halaman yang akan wujud dengan menggunakan algoritma penggantian *FIFO* sekiranya:

(i) program mempunyai 3 kerangka.

(5 markah)

(ii) program mempunyai 4 kerangka.

(5 markah)

(b) Lukiskan rajah bagi menunjukkan jumlah kesalahan halaman yang akan wujud sekiranya program mempunyai 3 kerangka dengan menggunakan algoritma penggantian *Optimal*. Rentetan rujukan ialah:

0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7, 8, 2, 3, 8, 3

(5 markah)

S6 Berdasarkan kepada maklumat yang diberikan di dalam **Jadual 6**, sila jawab soalan berikutnya:

Jadual 6: Direktori Cakera

TAIPING	22	3
BATU GAJAH	17	2
IPOH	2	3
CAMERON HIGHLAND	8	4

(a) Lukiskan kedudukan fail-fail di dalam direktori cakera, sekiranya cakera tersebut mempunyai 25 blok. Saiz bagi setiap blok adalah 20K.

(6 markah)

(b) Tunjukkan kedudukan baru cakera sekiranya sebuah fail bernama TAPAH yang bersaiz 50K disimpan di dalam cakera dengan menggunakan kaedah peruntukan bersebelahan penyesuaian pertama.

(4 markah)

(c) Kemaskinikan direktori cakera selepas kemasukan fail TAPAH tersebut.

(2 markah)

(d)   Senaraikan bit vektor bagi cakera selepas kemasukan fail TAPAH.

(1 markah)

(e)   Berapakah baki ruang bebas yang masih tinggal di dalam cakera selepas kemasukan fail TAPAH?

(2 markah)

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