



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER II SESSION 2009/2010

SUBJECT NAME : OPERATING SYSTEM
SUBJECT CODE : BIT 2043
COURSE : 2 BIT/3 BIT
EAMINATION DATE : APRIL/MAY 2010
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWER **ALL** QUESTIONS.

THIS QUESTION PAPER CONTAINS ELEVEN (11) PAGES

Instruction: Answer **ALL** questions

- Q1**
- (a) Where is the location of the virtual memory? (1 mark)
 - (b) What is the best solution when a user gets an error message that warns of low virtual memory? (1 mark)
 - (c) For the above situation in **Q1(b)**, why increasing size of virtual memory is not recommended? (1 mark)

- Q2**
- (a) Based on **Table 1**, draw a chart illustrating the processes execution using:
 - (i) First-Come First-Served
 - (ii) Shortest Job First (Non-Preemptive)
 - (iii) Shortest Remaining Time (Preemptive)
 - (iv) Round Robin (time quantum = 1)

Table 1: Process Execution

Process	Arrival Time	Processing Time
P ₁	0.000	4
P ₂	2.001	1
P ₃	3.001	2
P ₄	3.002	1

- (8 marks)
- (b) For all scheduling algorithms as listed in **Q2(a)**, calculate;
 - (i) average turnaround time (rounding to the nearest tenth). (8 marks)
 - (ii) average waiting time (rounding to the nearest tenth). (8 marks)

- (c) Based on **Table 2**, answer the following questions if larger priority number is higher priority.

Table 2: Process Execution

Process	Arrival Time	Burst	Priority
P ₁	0.0000	5	4
P ₂	2.0001	4	2
P ₃	2.0001	2	5
P ₄	4.0001	4	3

- (i) Draw a chart illustrating processes execution using preemptive priority scheduling. (2 marks)
- (ii) Calculate average waiting time (rounding to the nearest hundredth) and average turnaround time (rounding to the nearest hundredth). (4 marks)

- Q3** (a) Draw a resource allocation graph for the system described in **Table 3**.

Table 3: Resource Allocation and Request

Process	Current Allocation				Outstanding Requests				Maximum Allocation				Resources Available			
	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄
P ₁	2	0	0	2	0	1	0	1	2	0	1	3	1	3	0	0
P ₂	2	2	0	1	0	0	1	0	2	5	2	1				
P ₃	0	1	1	2	1	0	0	1	1	4	2	2				
P ₄	0	0	1	0	0	0	1	1	2	0	1	0				

(8 marks)

(b) Complete the **Table 4** based on **FIGURE Q3**.

Table 4: Resource Allocation and Request

Process	Current Allocation			Outstanding Request			Resources Available		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
P ₁									
P ₂									
P ₃									
P ₄									

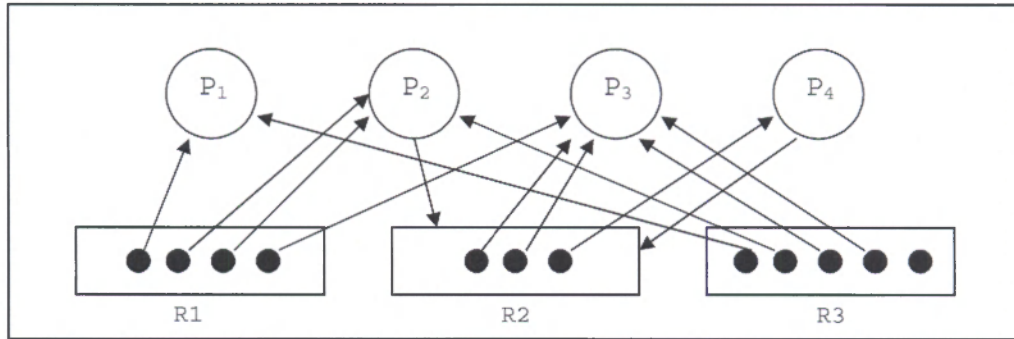


FIGURE Q3

(6 marks)

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 Number	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) Based on **FIGURE Q4** below, draw an appropriate segment table.

(5 marks)

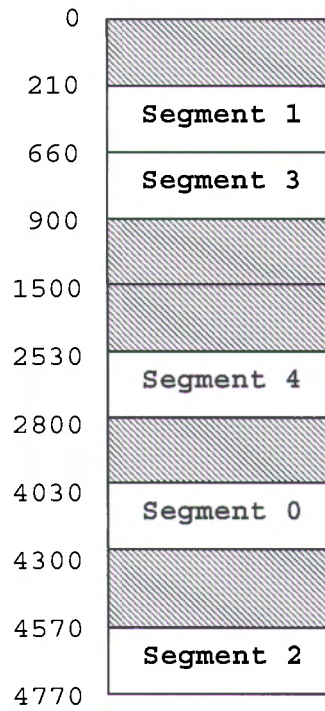


FIGURE Q4

(c) Given a memory divided in sequence of sizes 550KB, 200KB, 350KB and 650KB. Draw new diagram of memory if there are new processes sized 250KB, 150KB, 300KB and 500KB need to be inserted in the memory using;

- (i) Best fit concept
- (ii) First fit concept
- (iii) Worst fit concept

(12 marks)

Q5 Based on the information given, answer the following questions:

Process Size = 490K
 Page Size = 70K
 Memory Size = 210K
 Address Sequence = 45, 285, 119, 190, 185, 245, 389, 275, 158, 301,
 70, 436, 251.

- (a) List the reference strings. (2 marks)
- (b) How many pages and frames are needed for the program? (4 marks)
- (c) How many page faults are there if the First-In First-Out (FIFO) and Optimal algorithms are used? Draw appropriate diagrams to support your answers. (10 marks)

Q6 Based on information in **Table 6** below, answer all following questions:

Table 6: Disk Directory

Files	Start	Length
ACER	20	4
HP	17	2
NEC	4	3
ASUS	9	5

- (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 **TOSHIBA** of size 50K is kept in the disk using worst fit contiguous allocation. (4 marks)
- (c) Update the Disk Directory after **TOSHIBA** was stored on the disk. (2 marks)
- (d) List the new vector bit after **TOSHIBA** was stored. (1 mark)
- (e) Calculate the size of free space available on the disk after **TOSHIBA** was stored. (2 marks)

Arahan: Jawab **SEMUA** soalan.

- S1**
- (a) Di manakah lokasi *virtual memory*? (1 markah)
 - (b) Apakah penyelesaian terbaik apabila pengguna menerima mesej amaran *low virtual memory*? (1 markah)
 - (c) Bagi situasi seperti **S1(b)**, mengapakah peningkatan saiz *virtual memory* tidak digalakkan? (1 markah)
- S2**
- (a) Berdasarkan **Jadual 1**, lukiskan rajah pelaksanaan proses menggunakan:
 - (i) *First-Come First-Served*
 - (ii) *Shortest Job First (Non-Preemptive)*
 - (iii) *Shortest Remaining Time (Preemptive)*
 - (iv) *Round Robin (time quantum = 1)*

Jadual 1: Pelaksanaan Proses

Proses	Masa Ketibaan	Masa Pemprosesan
P ₁	0.000	4
P ₂	2.001	7
P ₃	3.001	2
P ₄	3.002	2

- (8 markah)
- (b) Bagi semua algoritma yang tesenarai di **S2(a)**, kirakan;
 - (i) purata *turnaround time* (bulatkan kepada puluh terhampir). (8 markah)
 - (ii) purata masa menunggu (bulatkan kepada puluh terhampir). (8 markah)

- (c) Berdasarkan **Jadual 2**, jawab soalan-soalan berikut dengan mengambil kira nombor keutamaan yang besar adalah lebih tinggi keutamaannya.

Jadual 2: Pelaksanaan Proses

Proses	Masa Ketibaan	Masa Pemprosesan	Keutamaan
P ₁	0.0000	5	4
P ₂	2.0001	4	2
P ₃	2.0001	2	5
P ₄	4.0001	4	3

- (i) Lukiskan rajah pelaksanaan proses menggunakan *preemptive priority scheduling*. (2 markah)
- (ii) Kira purata masa menunggu (bulatkan kepada ratus terhampir) dan purata *turnaround time* (bulatkan kepada ratus terhampir). (4 markah)

- S3 (a) Lukiskan Graf Peruntukan Sumber bagi sistem yang digambarkan dalam **Jadual 3**.

Jadual 3: Peruntukan dan Permintaan Sumber

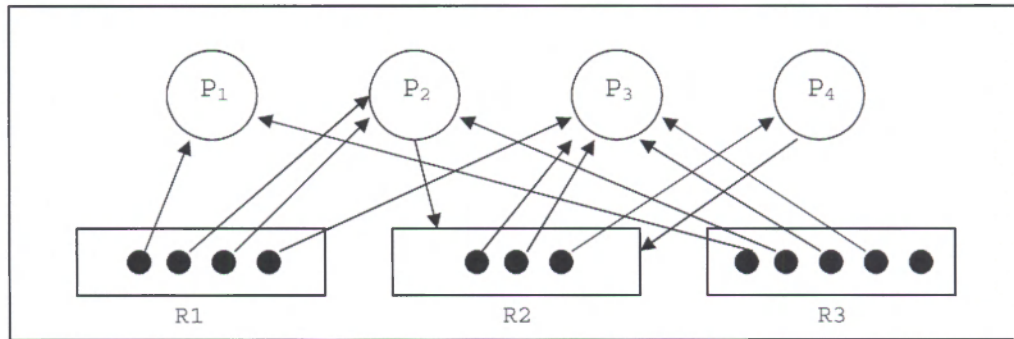
Proses	Peruntukan Semasa				Permintaan Sumber				Peruntukan Maksimum				Sumber-sumber yang bebas			
	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄	R ₁	R ₂	R ₃	R ₄
P ₁	2	0	0	2	0	1	0	1	2	0	1	3	1	3	0	0
P ₂	2	2	0	1	0	0	1	0	2	5	2	1				
P ₃	0	1	1	2	1	0	0	1	1	4	2	2				
P ₄	0	0	1	0	0	0	1	1	2	0	1	0				

(8 markah)

(b) Lengkapkan **Jadual 4** di bawah berpandukan **RAJAH S3**.

Jadual 4: Peruntukan dan Permintaan Sumber

Proses	Peruntukan Semasa			Permintaan Sumber			Sumber-sumber yang bebas		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
P ₁									
P ₂									
P ₃									
P ₄									



RAJAH S3

(6 markah)

S4 (a) Pada suatu sistem yang menggunakan segmentasi ringkas, kirakan alamat fizikal bagi setiap alamat logikal berikut berpandukan maklumat di dalam **Jadual 5**.

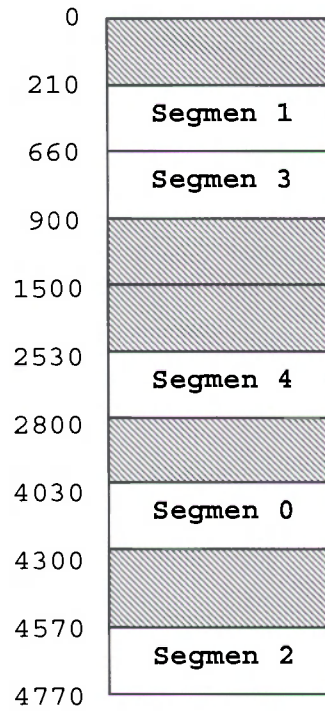
Jadual 5: Jadual Segmen

Nombor 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) Berdasarkan **RAJAH S4** di bawah, lukiskan Jadual Segmen yang bersesuaian. (5 markah)



RAJAH S4

- (c) Diberi sebuah ingatan yang dibahagikan kepada turutan saiz 550KB, 200KB, 350KB dan 650KB. Lukiskan rajah ingatan yang baru apabila terdapat proses-proses baru yang bersaiz 250KB, 150KB, 300KB dan 500KB hendak dimasukkan ke dalam ingatan menggunakan:
- (i) Konsep Penyesuaian Terbaik
 - (ii) Konsep Penyesuaian Pertama
 - (iii) Konsep Penyesuaian Terburuk

(12 markah)

S5 Berdasarkan maklumat yang diberi, jawab soalan-soalan berikut:

Saiz Proses = 490K
 Saiz Halaman = 70K
 Saiz Ingatan = 210K
 Jujukan Alamat = 45, 285, 119, 190, 185, 245, 389, 275, 158, 301, 70,
 436, 251.

- (a) Senaraikan rentetan rujukan. (2 markah)
- (b) Berapakah bilangan halaman dan kerangka yang diperlukan oleh program? (4 markah)
- (c) Berapa banyakkah kesalahan halaman (*page faults*) jika sekiranya algoritma *First-In First-Out (FIFO)* dan *Optimal* digunakan? Lukiskan rajah yang bersesuaian bagi menyokong jawapan anda. (10 markah)

S6 Berdasarkan maklumat di dalam **Jadual 6** berikut, jawab semua soalan:

Jadual 6: Direktori Cakera

Fail	Mula	Panjang
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- (a) Andaikan cakera tersebut mempunyai 25 blok dimana saiz setiap blok adalah 20K. Lukiskan kedudukan fail-fail di dalam cakera tersebut. (6 markah)
- (b) Lukiskan rajah blok cakera yang baru jika fail baru bernama **TOSHIBA** bersaiz 50K ingin disimpan ke dalam cakera menggunakan peruntukan bersebelahan penyesuaian terburuk (*worst fit contiguous allocation*). (4 markah)
- (c) Kemaskini direktori cakera selepas kemasukan fail **TOSHIBA**. (2 markah)
- (d) Senaraikan bit vektor yang baru bagi cakera di atas selepas kemasukan fail **TOSHIBA**. (1 markah)
- (e) Kirakan baki ruang bebas yang masih terdapat pada cakera selepas kemasukan fail **TOSHIBA**. (2 markah)