

MCA 3rd Semester Examination, 2013

OPERATING SYSTEM

PAPER – MCA-305

Full Marks : 100

Time : 3 hours

Answer **Q.No. 1** and any **four** from the rest

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

1. (a) Define single user and multiuser system.
- (b) List the main functions of operating system.
- (c) What is multitasking ?
- (d) What are the differences between multi-programming and multiprocessing ?

2 + 2 + 2 + 4

(Turn Over)

2. (a) What is process ? What are the differences between process and program ?
- (b) Explain different stages of a process with diagram.
- (c) What is PCB ? What types of information is stored in PCB ?
- (d) Explain priority CPU scheduling ?
4 + 4 + 3 + 4
3. (a) What are the differences between preemptive and non-preemptive scheduling. Explain preemptive SJF scheduling.
- (b) What is starvation ? Explain the techniques to avoid starvation during scheduling.
- (c) With reference to the following set of processes, determine average waiting time and average turnaround time, using the following scheduling algorithms :
- (i) SJF
- (ii) Shortest Remaining Time Next

(iii) Preemptive priority.

<u>Process</u>	<u>Arrival Time</u>	<u>Next CPU Burst</u>	<u>Priority</u>
P1	0	24	5
P2	3	7	3
P3	5	6	2
P4	10	10	1

$$(2 + 2) + (2 + 1) + (2 + 3 + 3)$$

4. (a) Explain round robin scheduling.
- (b) Consider the following snap-shot of jobs to be executed using *R - R* algorithm with a time slice = 4 ms, context switching time = 1 ms. Find the average Turnaround Time and Average Wait Time.

Process	Arrival Time (ms)	Next Burst (ms)
P_0	6	10
P_1	1	6
P_2	3	2
P_3	5	4

- (c) What is memory management ? What are the purpose of memory management ?
- (d) Explain the differences between logical and physical addresses. $4 + 5 + 3 + 3$
5. (a) What is Deadlock ? What are the four conditions that create deadlock ?
- (b) Explain safe state and unsafe state.
- (c) Consider the following snap-shot of a system :

Current state :

Process	Allocation				Max				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	1	2	2	1	0	0
P2	2	0	0	0	2	7	5	0				
P3	0	0	3	4	6	6	5	6				
P4	2	3	5	4	4	3	5	6				
P5	0	3	3	2	0	6	5	2				

- (i) Calculate the NEED matrix
 - (ii) Is the system currently in a safe or unsafe state ? Why ?
 - (iii) Is the system currently deadlocked ? Why or why not ?
 - (iv) Can a Request (0; 1, 0, 0) from P3 be safely granted immediately ? Justify the answer. $4 + 2 + (1 + 4 + 1 + 3)$
6. (a) Describe the differences between Fixed partition multiprogramming and Variable partition multiprogramming ?
- (b) What is paging ? Why it is used ?
- (c) Explain the following memory allocation algorithms :
- (i) First-fit
 - (ii) Best-fit
 - (iii) Worst-fit
- (d) What do you mean by external and internal fragmentation ? $4 + 3 + 4 + 4$

(6)

7. (a) Why page replacement algorithm are necessary? Explain FIFO and LRU page replacement algorithm.

(b) Condition the following reference string :

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

If buffer size is 3, count the number of page faults using the following page replacement algorithm :

(i) FIFO

(ii) LRU and

(iii) Optimal.

(c) Why are pages sizes always power of 2 ?

$$(1 + 4) + 3 \times 3 + 1$$

[*Internal Assessment – 30 Marks*]
