PG/IIIS/COS-301/18

M.Sc. 3rd Semester Examination, 2018

COMPUTER SCIENCE

PAPER – COS-301

Full Marks : 50

Time : 2 hours

Answer **all** questions

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

GROUP – A

1. Answer any *four* questions : 2 × 4

   (*a*) What is bootstrap loader ?

   (*b*) Compare between buffering and spooling.

(*c*) What is the difference between multiprogramming and multitasking ?

(*d*) What is device controller ? Give example.

(*e*) What is clustered system ?

(*f*) What is real-time system ?

(*g*) Explain peer to peer computing.

(*h*) What is open source OS ?

GROUP – B

Answer any **four** questions : 4 × 4

2. (*a*) What is PCB ?

(*b*) Compare job queue, ready queue and device queue. 2 + 2

3. (*a*) What is degree of multiprogramming ?

(*b*) "It is important that long-term scheduler select a good process mix of I/O and CPU bound processes." Why ? 2 + 2

4. (*a*) What is semaphore ?

   (*b*) Implement producer-consumer problem using semaphore. 1 + 3

5. (*a*) Compare safe, unsafe and deadlock states.

   (*b*) "A cycle in resource allocation graph does not necessaryly implies the system is in deadlock state." Justify. 2 + 2

6. (*a*) What is swapping ?

   (*b*) What is the difference between external and internal fragmentation ? 2 + 2

7. Explain paging with example. 4

8. (*a*) What is virtual memory ?

   (*b*) Explain Belady's anomaly with example. 1 + 3

9. Explain medium term scheduler with diagram. 4

GROUP–C

Answer any two questions : 8 × 2

10. (*a*) What is starvation ? What is the solution of this problem ?

(*b*) Consider the following set of processes :

Process	Arrival time	Burst time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

Draw Gnatt charts and calculate the average waiting time, execution time and turnaround time for FCFS and shortest remaining time first scheduling algorithms. 2 + 6

11. Consider the following reference string for a memory with three frames

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

How many page faults occur for LRU and optimal page replacement algorithm. (Show which pages are in the three frames for each page fault). 4 + 4

12. Consider a system with five processes p_0 through p_4 and three resource types A, B and C. Resource type A has 10 instances, B has 5 instances and C has 7 instances. Suppose that, at time T_0, the following snapshot of the system has been taken :

	Allocation			*Max*			*Available*		
	A	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*
p_0	0	1	0	7	5	3	3	3	2
p_1	2	0	0	3	2	2			
p_2	3	0	2	9	0	2			
p_3	2	1	1	2	2	2			
p_4	0	0	2	4	3	3			

(*a*) Is the current system in safe state ?

(*b*) p_1 requests (1, 0, 2). Decide whether this request can be granted ? 4 + 4

13. On a simple paging system with a page table containing 64 entries of 11 bits (including valid/ invalid bit) each and a page size of 512 bytes.

(*a*) How many bits in physical address specify the page frame number ?

(*b*) How many bits in physical address specify the offset within the page frame ?

(*c*) How many bits are in a physical address ?

(*d*) What is the size of the physical address space ? 2 + 2 + 2 + 2

[*Internal Assessment* : 10 Marks]