## 2018

## OPERATING SYSTEM

Paper : CS 303

Full Marks : 100

Time : Three hours

*The figures in the margin indicate*
*full marks for the questions.*

*Answer any five questions.*

1. (a) Briefly describe the following terms :
   2×5=10

   (i) Thread

   (ii) Demand paging

   (iii) Race condition

   (iv) Throughput

   (v) Deadlock.

(b) Differentiate between :    2×5=10

(i) Preemptive and Non-Preemptive Scheduling

(ii) Kernel-level thread and User-level thread

(iii) Internal fragmentation and External fragmentation

(iv) Short-term scheduler and long-term scheduler

(v) Pages and Frames.

2. (a) What are the necessary conditions for a deadlock to occur? Give a suitable algorithm how deadlock can be avoided.    4+8=12

(b) Why a process control block is essential? Explain the life cycle of a process.    2+6=8

3. (a) What is a network operating system? Mention its *three* advantages.    2+3=5

(b) How does interprocess communication take place between two processes? Explain.    5

(c) What is round robin scheduling? Find out the average waiting time for round robin scheduling and shortest job next scheduling of the following problem :    2+4×2=10

| Process | Arrival time | Burst time |
| --- | --- | --- |
| $P_1$ | 0 | 7 |
| $P_2$ | 1 | 12 |
| $P_3$ | 2 | 8 |
| $P_4$ | 3 | 11 |

Note : Quantum = 3

4. (a) Briefly describe about the following algorithms :    2×3=6

(i) FIFO

(ii) LRU

(iii) Optimal.

(b) Consider the following page reference string :    3×3=9

1, 2, 3, 4, 1, 2, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

How many page faults will occur if FIFO, LRU and Optimal algorithms are used?

Note : Only five pages can be stored in memory.

(c) What is called virtual memory ? What is the function of Memory Management Unit (MMU) ?  2+3=5

5. (a) How pages can be mapped into memory using page map table ? Explain with a suitable diagram.  7

(b) What is segmentation ? What is the application of a segment map table ? Explain with a suitable example.  2+6=8

(c) Mention *five* points why threads have advantages over processes.  5

6. (a) How to identify the necessity of data synchronization between two processes ? How data synchronization can be achieved ?  3+2=5

(b) Briefly explain the function of each segment of a process when it is in memory.  2×4=8

(c) What is a shell ? Mention *five* functions performed by Kernel.  2+5=7

7. Write short notes on : *(any four)*  4×5=20

(a) Real-time operating system

(b) Batch processing system

(c) Garbage collection

(d) Priority scheduling

(e) Memory compaction

(f) Distributed operating system.