2022

COMPUTER SCIENCE — GENERAL

Paper : GE/CC-4

(Operating Systems)

Full Marks : 50

The figures in the margin indicate full marks.

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

Answer *Question no.* 1 and *any four* questions from the rest.

1. Answer *any five* questions :   2×5
   (a) What do you understand by System Software? Give examples.
   (b) What is multiprogramming?
   (c) Define kernel of an OS.
   (d) Why is scheduling needed?
   (e) Differentiate between pre-emptive and non-preemptive scheduling algorithm.
   (f) What is starvation?
   (g) What is the requirement of internal fragmentation?
   (h) How does an interrupt differ from a trap?

2. (a) Explain the four necessary conditions for deadlock.
   (b) Given the following set of processes whose burst time are tabulated below :

Process ID	Burst Time
P_0	4
P_1	6
P_2	8
P_3	2

Assume that the processes have arrived in the order P_0, P_1, P_2, P_3.

If SJF scheduling algorithm is used, perform the following—

   (i) Draw GNATT chart showing sequence of execution of the processes.
   (ii) Calculate average waiting time.
   (iii) Calculate average turnaround time.   4+(2+2+2)

Please Turn Over

3. (a) Why is inter-process communication needed? Discuss any four methods for IPC.

    (b) Describe Process Control Block.   (2+4)+4

4. (a) What is virtual memory? State its role in operating system.

    (b) What is semaphore? How can critical section problem be overcome by using semaphore.
                                                                       (2+2)+(2+4)

5. (a) What is demand paging? What is the advantage of demand paging over swapping?

    (b) Consider the following reference string : 1, 3, 2, 7, 2, 1, 4, 6, 2, 4, 2, 3, 7, 8, 3, 2, 4, 2, 3, 6. How many page fault will occur for 4 page frames for each of the following algorithms.

        (i) Optimal page replacement

        (ii) LRU.   (2+2)+(3+3)

6. (a) Given memory partition of 100k, 500k, 200k, 300k and 600k in order, if we have processes needing memory of 212k, 417k, 112k and 405k respectively, which of the following memory allocation techniques will be suitable to allocate memory for all the processes?

        (i) First-fit

        (ii) Best-fit

        (iii) Worst-fit.

    (b) Explain how a file allocation table (FAT) is implemented.   (2×3)+4

7. (a) How is a process different from a program?

    (b) Define process threads.

    (c) Explain with a diagram how context switching occurs.

    (d) What is the function of medium term scheduler?   3+2+3+2

8. Write notes on *any two* of the following :   5+5

    (a) Real-time OS

    (b) Deadlock Prevention

    (c) Memory Partitioning

    (d) Round Robin Scheduling Algorithm.

_____