

**2021**

**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) Define spooling.
  - (b) Why do we need scheduling?
  - (c) State the purpose of kernel.
  - (d) What do you mean by caching?
  - (e) Write two functions of a dispatcher.
  - (f) When does thrashing occur?
  - (g) Distinguish between multi-tasking and multi-processing operating system.
  - (h) State the key difference between logical and physical address space.
2. (a) Define thread.
- (b) Differentiate between pre-emptive and non-preemptive scheduling algorithm.
- (c) Briefly explain how deadlock can be avoided. 2+3+5
3. (a) State the advantages of context switching.
- (b) Name various IPC (Inter Process Communication) mechanisms.
- (c) Explain different states of a process with a suitable diagram. 2+3+5

**Please Turn Over**

4. (a) Briefly explain how deadlock can be detected using Resource Allocation Graph.  
 (b) Consider the set of 5 processes whose arrival time and burst time are given below :

Process Id	Arrival Time	Burst Time
P <sub>1</sub>	3	4
P <sub>2</sub>	5	3
P <sub>3</sub>	0	2
P <sub>4</sub>	5	1
P <sub>5</sub>	4	3

If the CPU scheduling policy is FC FS, calculate the average waiting time and average turn around time. 6+(2+2)

5. (a) Briefly explain the term – ‘Cascading termination’.  
 (b) Distinguish between micro-kernel and mono-lithic kernel.  
 (c) Differentiate between binary semaphore and mutex. 3+3+4
6. (a) State the purpose of PCB (Process Control Block).  
 (b) What do you mean by Belady’s anomaly?  
 (c) Distinguish between paging and segmentation. 3+3+4
7. (a) Define starvation.  
 (b) Write two disadvantages of round robin scheduling.  
 (c) Consider the set of 5 processes whose arrival time and burst time are given below :

Process Id	Arrival Time	Burst Time
P <sub>1</sub>	0	5
P <sub>2</sub>	1	3
P <sub>3</sub>	2	1
P <sub>4</sub>	3	2
P <sub>5</sub>	4	3

If the CPU scheduling policy is Round Robin with time quantum = 2 units, calculate the average waiting time and average turn around time. 2+2+(3+3)

( 3 )

*T(4th Sm.)-Computer Science-G/(GE/CC-4)/CBCS*

8. (a) On a system using simple segmentation, compute the physical address for each of the logical addresses, given the following segment table. If the address generates a segment fault, indicate so.

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

- (i) 0, 99
  - (ii) 2, 78
  - (iii) 1, 265
  - (iv) 3, 222.
- (b) 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 technique(s) will be suitable to allocate memory for all the processes?
- (i) First-fit
  - (ii) Best-fit
  - (iii) Worst-fit.

4+6

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