

# SYCS/SEM III/EXT/PRINCIPLES OF OPERATING SYSTEM

Marks:75

Time: 2½ hrs.

- Note:
1. All questions are compulsory with internal choice.
  2. Draw neat diagrams wherever necessary.
  3. Figures to the right indicate full marks.

- Q.1 Answer the following (any Four) • (20)**
- (a) What is an operating system, and what are its main objectives?
  - (b) How does an operating system handle memory management?
  - (c) What is a monolithic operating system? Provide an example.
  - (d) List and explain five essential services provided by an operating system.
  - (e) Define system calls and explain their role in the functioning of an operating system.
  - (f) What is a process, and how does it differ from a program?
- Q.2 Answer the following (any Four) (20)**
- (a) Describe the four necessary conditions for a deadlock to occur.
  - (b) What is the critical-section problem, and why is it important in process synchronization?
  - (c) Differentiate between counting semaphores and binary semaphores.
  - (d) Describe the dining philosophers' problem and its significance in process synchronization.
  - (e) What is CPU scheduling, and why is it essential in an operating system?
  - (f) Describe the First-Come, First-Served (FCFS) scheduling algorithm and discuss its advantages and disadvantages.
- Q.3 Answer the following (any Four) (20)**
- (a) What is main memory, and why is it a critical component of the operating system?
  - (b) Explain the difference between logical address space and physical address space.
  - (c) Define swapping in the context of memory management.
  - (d) What is contiguous memory allocation, and how does it work?
  - (e) What are the key differences between paging and demand paging?
  - (f) Describe the Least Recently Used (LRU) page replacement algorithm.
- Q.4 Answer the following (any Five) (15)**
- (a) What is a process scheduler, and what are its main responsibilities?
  - (b) What is inter-process communication (IPC), and why is it necessary?
  - (c) What is the general structure of a typical process in an operating system?
  - (d) What is deadlock prevention?
  - (e) What are the advantages and disadvantages of swapping?
  - (f) Discuss the difference between fixed and variable frame allocation strategies.

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