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FIRST SEMESTER [MCA] Supplementary Internal Examination, December 2023

Paper Code: MCA-105	***Subject: Operating Systems with Linux***
Time: 03:00 Hrs.	***Maximum Marks: 60***

Note: Attempt five questions in all, including Q. No. 1 which is compulsory. Attempt one question from each unit.

Q1. Answer the following briefly: **(2 × 10 = 20)**

(a) Discuss various types of kernel in operating system.

(b) List names of 5 internal and externals commands with their use.

(c) Illustrate the working of multilevel queue scheduling.

(d) Explain dining-philosophers problem with solution using Semaphore.

(e) Discuss Peterson's solution to solve critical-section problem.

(f) Explain memory compaction with its need and limitations.

(g) Discuss the necessary conditions for a deadlock situation in computer system.

(h) Differentiate between global and local approaches of allocation of frames.

(i) Explain sequential file organization with its advantages and limitations.

(j) Compare grouping and counting approaches of free space management in disk.

UNIT - 1

Q2. **(a)** Compare process with program. Describe various types of schedules with their usages. **(5)**

(b) Explain the following types of operating systems: (a) multi-programmed, (b) distributed, (c) time-sharing, and (d) real-time embedded systems. **(5)**

OR

Q3. **(a)** Discuss different types of inter-process communication models with their advantages and disadvantages. **(5)**

(b) Describe trap with suitable example. Explain interrupt-driven operations of operating system. **(5)**

UNIT - 2

Q4. **(a)** Discuss different types of synchronization hardware approaches to solve process-synchronization problem. **(5)**

(b) Explain the producer-consumer problem. Write algorithm (code snippet) to solve the producer-consumer problem using Semaphore. **(5)**

OR

Q5. **(a)** Explain the process-synchronization problem. Discuss various approaches to implement process synchronization. **(5)**

(b) Discuss the major problem with priority scheduling with its solution. Three processes P1, P2 and P3 arrive at time zero. Their total execution time is 10ms, 15ms, and 20ms, respectively. They spent first 20% of their execution time in doing I/O, next 60% in CPU processing and the last 20% again doing I/O. Using round robin algorithm, determine the utilization of CPU in percentage. **(5)**

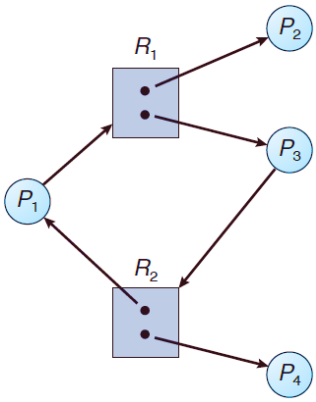
UNIT - 3

Q6. (a) Compare deadlock and starvation. Discuss deadlock prevention and deadlock avoidance mechanisms. **(5)**

(b) Explain paging and segmentation approaches of memory management. **(5)**

OR

Q7. (a) Differentiate between request edge and assignment edge in RAG. Apply RAG approach to determine whether the system shown in the following graph is deadlocked or not. Justification your answer. **(5)**



(b) Differentiate between page and frame in memory? Consider the page reference string: 3, 2, 1, 0, 3, 2, 4, 3, 2, 1, 0, 4 with 4 page frames, calculate the number of page faults using LRU and optimal page replacement algorithm. **(5)**

UNIT – 4

Q8. (a) Differentiate between the Look and C-Look disk-scheduling algorithms. A disk queue requests for I/O to blocks on cylinders 98, 183, 37, 122, 14, 124, 65, and 67, apply C-Look algorithm to find total head movement if the disk head is at 53 and is moving to 0. **(5)**

(b) Explain various methods of allocating disk space, with their advantages and disadvantages. **(5)**

OR

Q9. (a) Describe system call. Explain various system calls used for file and process management in Linux. **(5)**

(b) Discuss data stripping in RAID. Explain various levels of RAID. **(5)**

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