**Total No. of Questions : 08]**

**SEAT No. :** ____

**P-1601**

**[Total No. of Pages : 2**

# [6002]-231

## S.E. (Artificial Intelligence and Machine Learning)

## OPERATING SYSTEMS

## (2019 Pattern) (Semester - IV) (218552)

***Time : 2½ Hours]*** ***[Max. Marks : 70***

***Instructions to the candidates :***

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

***Q1)*** a) What is the critical section problem? Discuss the criteria for a solution to a critical section problem. **[8]**

b) What is a deadlock? What is a safe, unsafe, and deadlock state? Explain the deadlock detection algorithm for resources with multiple instances with a suitable diagram. **[9]**

OR

***Q2)*** a) Explain the Dining Philosopher problem with the help of pseudo code.**[8]**

b) What are the four necessary conditions for deadlock? How is a deadlock detected in a system with resources having single instances? Explain with an example. **[9]**

***Q3)*** a) For the physical memory of 1MBytes, demonstrate the following memory requests and release using the buddy system.

Request 120K, Request 155K, Request 42K, Request 240K. Release 120K. Release 42K. Request 80K. Release 240K. Release 155K, Release 80K.

Also, draw the tree representation after Request 240K. **[9]**

b) Why is the capability to relocate processes desirable? Explain in detail with the help of a neat diagram. **[9]**

OR

***P.T.O.***

***Q4)*** a) Consider the page reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5. Calculate the number of page faults for the FIFO page replacement algorithm with 3 frames and with 4 frames. Discuss your observations from the number of page faults in both cases. **[9]**

b) What are the distinctions among logical, relative and physical addresses? Give Example. **[9]**

***Q5)*** a) With the help of a neat diagram, explain free space management methods in secondary storage. **[9]**

b) Describe different methods of record blocking with the help of a neat diagram. **[9]**

OR

***Q6)*** a) A disk drive has 200 tracks, numbered 0-199. The drive is currently serving the request at track no 100. The queue of pending requests in FIFO order is 27, 129, 110, 186, 147, 41, 10, 64, 120. Starting from the current head position what is the total distance that disk arm moves to satisfy all the pending requests for the following disk scheduling algorithms. Assume that the head is moving in the decreasing order of track number for SCAN and C-LOOK. **[12]**

i) FCFS ii) SCAN

iii) C-LOOK iv) SSTF

b) Explain in brief, with the help of a diagram different techniques for performing I/O. **[6]**

***Q7)*** a) Explain the imperative statement, declarative statement and assembly directive of assembly language programming. **[6]**

b) Give a complete design of an Absolute Loader with a suitable example. **[6]**

c) Define Macro. How are Macros different from functions? **[5]**

OR

***Q8)*** a) What is system software? Explain any 4 system software in brief. **[6]**

b) What are assembler directives? Explain with example **[6]**

c) Discuss with an example what is forward reference problem. **[5]**