Total No. of Questions : 10]

SEAT No. :

PF-12284

[Total No. of Pages : 3

[6625]-203
S.E. (A.I.D.S/C.S.E/C.S.E(A.I.)/Computer Engg.
PCC-203-(AID/COM/CAI/CSE) : OPERATING SYSTEM
(2024 Pattern) (Semester - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Numeric figures in square brackets [] indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define Operating System. List and explain any four major functions of an OS. **[5]**

b) What is a Real-Time Operating System? Explain its characteristics and applications. **[5]**

c) Compare Process Management in Windows 11 and Linux with suitable examples. **[4]**

OR

Q2) a) Describe the component of OS in details. **[5]**

b) What is a System Call? List and describe different types of system calls in Linux. **[5]**

c) Explain the Process Life Cycle with a neat Process State Transition Diagram. **[4]**

Q3) a) Define Scheduling Metrics : **[5]**

i) Burst Time (BT) ii) Response Time (RT)
iii) Completion Time (CT) iv) Waiting Time (WT)
v) Turnaround Time. (TAT)

b) Consider following set of process with their CPU Burst Time. Draw Gantt chart FCFS. Calculate average Turn-around time and average waiting time. **[5]**

Process	Arrival time	Burst time
P1	0	4
P2	1	3
P3	2	1
P4	3	2
P5	4	5

c) Differentiate between Shortest Job First (SJF) and Shortest Remaining Time First (SRTF). **[4]**

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OR

Q4) a) Given the following processes : **[6]**

Process	Arrival time	Burst time
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

Draw the Round Robin scheduling Gantt chart with (Time Quantum =2 unit) and calculate :

i) Completion Time of all processes

ii) Average Turnaround Time

iii) Average Waiting Time

b) Write Short note on : Multi-Level Feedback Queue. **[4]**

c) Compare Single-Queue and Multi-Queue scheduling techniques. **[4]**

Q5) a) Define Address Space. Explain how memory virtualization is achieved in modern systems. **[5]**

b) Explain the following terms in brief **[5]**

i) Internal Fragmentation

ii) External Fragmentation

c) What is Segmentation? Differentiate between fine-grained and coarse-grained segmentation. **[4]**

OR

Q6) a) Explain Paging with neat diagrams. Discuss how logical addresses are translated into physical addresses. **[5]**

b) What is a Translation Lookaside Buffer (TLB)? Explain its working and replacement policies. **[5]**

c) Consider the following page reference string: 7, 1,2, 1, 2, 5, 4, 5, 9, 4, 9, 8, 1, 3. The number of page frame=3, calculate the number of Page fault and number of Hits for First In first Out Page replacement algorithm.**[4]**

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Q7) a) What is Concurrency? Explain the problems caused by uncontrolled scheduling in concurrent systems. **[5]**

b) Define Thread. Explain the need for threads and thread creation using Pthread API. **[5]**

c) Define Semaphore. Differentiate between Binary and Counting Semaphores. **[4]**

OR

Q8) a) What is the Dining Philosophers Problem? How can it lead to Deadlock, and what are possible solutions? **[7]**

b) Describe the Producer–Consumer (Bounded Buffer) Problem and its semaphore-based solution. **[7]**

Q9) a) Explain the System Architecture for I/O Management in operating systems. **[7]**

b) Describe how Interrupts and DMA reduce CPU overhead during I/O operations. **[7]**

OR

Q10)a) Explain the working of a Device Driver with an example of an IDE Disk Driver. **[7]**

b) Describe File System Implementation and explain the concept of Fast File System (FFS). **[7]**

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