8374

B.Tech. (Reg./Back) Vth Semester Examination, 2022–23

CONCEPTS OF OPERATING SYSTEM

Paper : CS–501

Time : 3 Hours] [*M.M. : 70*

Note :– Answer any *five* questions. All questions carry equal marks.

1. (a) Describe some of the challenges of designing operating systems for mobile devices compared with designing operating systems for traditional PCs.

   (b) Write about layered and microkernel structures of Operating Systems.

(c) Differentiate between Multiprogramming and Time Sharing System. 5,5,4

2. (a) Describe the differences among Short-term, Medium-term and Long-term Scheduler.

(b) Consider three CPU-intensive processes, which require 15, 25 and 35 time units and arrive at times 0, 3 and 6 respectively. How many context switches are needed if the OS implements a shortest remaining time first CPU scheduling algorithm ? Do not count the context switches at time zero and at the end.

(c) CPU burst time and arrival time of four processes is as follows :

Process	Burst Time	Arrival Time
P0	1	0
P1	9	1
P2	4	8
P3	7	9

Draw the Gantt chart and calculate the following by using FCFS CPU scheduling algorithm :

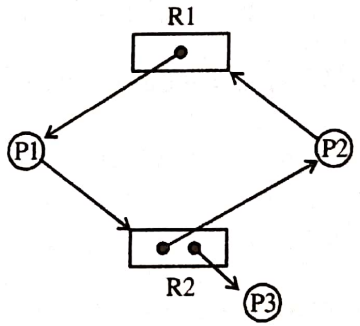
(i) Average Turn Around Time

(ii) Average Waiting Time 5,5,4

3. (a) What is the meaning of the term Busy Waiting ? How to overcome busy waiting using Semaphore Operations ?

(b) What is Dining Philosophers Problem ? Discuss the solution to Dining philosopher's problem.

(c) Consider the resource allocation graph in the figure :



Find if the system is in a deadlock state, otherwise find a safe sequence. 5,5,4

4. (a) What is the cause of Thrashing ? How does the system detect thrashing ? Once it detects thrashing, what can the system do to eliminate this problem ?

(b) Explain the difference between Internal and External Fragmentation. How to solve the fragmentation problem using paging ?

(c) What do you mean by Belady's Anomaly ? Which algorithm suffers from Belady's anomaly ? Explain with a suitable example. 5,5,4

5. (a) Explain File Organization and Access Mechanism.

(b) Write short note on RAID.

(c) Suppose the moving head disk with 200 tracks is currently serving a request for track 145 and has just finished a request for track 120. If the queue of request is dept in FIFO order as 90, 153, 104, 183, 100, 158. What is the total head movement for the **LOOK** disk scheduling ? 5,5,4

6. What is an Operating System ? Describe the operating system functions.

7. What do you understand by Process ? Explain the various steps involved in change of a process state with neat transition diagram.

8. An operating system uses the Banker's algorithm for deadlock avoidance when managing the allocation of these resources of types X, Y and Z to three processes P0, P1 and P2. The table given below presents the current system state. Here, the

Allocation matrix shows the current number of resources of each type, allocated to each process and the **Max** matrix shows the maximum number of resources of each type required by each process during its execution. There are 3 units of type X, 2 units of type Y and 2 units of type Z still available.

Answer the following questions :

(a) What are the contents of the Need Matrix ?

(b) Find the safe sequence for the system state, if any :

	Allocation			Max		
	X	Y	Z	X	Y	Z
P0	0	0	1	8	4	3
P1	3	2	0	6	2	0
P2	2	1	1	3	3	3

9. Under what circumstances do page faults occur ? Consider the following page reference string :

   2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 3, 2, 0, 1, 9

   How many page faults would occur for LRU page replacement algorithms, assuming four frames (initially empty) ?

10. What is a Directory ? Explain any *two* ways to implement the directory.

Question Paper Code : 8374

B.Tech. (5th) (Odd Semester) Examination, 2021

CONCEPTS OF OPERATING SYSTEM

[Paper : CS-501]

Time : Three Hours] **[Maximum Marks : 70**

Note : Answer **any five** questions. All questions carry equal marks.

1. Justify the statement "Operating system can be viewed as a government, resource allocator and a control program". [14]

2. Attempt all parts :

   (i) List out different services of Operating System and explain each service. [7]

   (ii) Explain the layered approach of the operating system. [7]

3. Attempt all parts :

   (i) What is the difference between a preemptive and non-preemptive scheduling algorithms ? [7]

(ii) Explain FCFS scheduling algorithm. Find the average turn around time and average waiting time for the processes given in the table below. Assume that all processes arrived at time O. [7]

Process	CPU burst time (in ms)
P1	24
P2	3
P3	3

4. Consider the following data with burst time given in milliseconds :

Process	Burst time	Priority
P1	10	3
P2	3	1
P3	4	3
P4	2	4
P5	5	2

The process has arrived in the order p1,p2,p3,p4,p5 all at time 0.

(i) Draw Gantt charts for the execution of these processes using FCFS, non-preemptive SJF, a non-preemptive priority and round robin (quantum=1) scheduling. [7]

TAT = CT − AT

~~TAT = BT − CT~~

WT = TAT − BT

(ii) What is the turn around time and waiting time of each process for non-preemptive SJF and Round Robin scheduling algorithm ? [7]

5. Attempt all parts :

(i) Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, with a cycle but no deadlock. [7]

(ii) Describe necessary conditions for a deadlock situation to arise. Explain the methods for deadlock prevention. [7]

6. Given 3 processes A, B and C, three resources x, y and z and following events : [14]

A B C

(i) A requests x A → x

(ii) A requests y A → y

(iii) B requests y B → y

(iv) B requests z B → z

(v) C requests z C → z

(vi) C requests x C → x

(vii) C requests y C → y.

Assume that requested resources should always be allocated to the request process if it is available. Draw the resource allocation graph for the sequences and also mention whether it is a deadlock. If it is, how to recover the deadlock ?

7. Attempt all parts :

(i) What is Paging and Swapping ? With a diagram discuss the steps involved in handling a page fault. [7]

(ii) Consider the reference stream 1,2,3,4,1,5,6,2,1, 2,3,7,6,3,2,1,2,3,6. How many page faults while using FCFS and LRU using 3 frames ? [7]

8. (i) What is Address Binding ? Explain the concept of dynamic relocation of addresses. [7]

(ii) Memory partitions of 100kb, 500kb, 200kb, 300kb, 600kb is available how would best, worst, first fit algorithm to place processes 212,417,112,426 in order. Which is the best algorithm ? [7]

9. Explain physical and logical address. Consider a logical address space of 8 pages of 1024 words each, mapped on to a physical memory of 32 frames. How many bits are there in the logical address ? How many bits are there in the physical address ? [14]

10. Attempt all parts :

(i) Describe the SSTF disk scheduling algorithm using the following data. The disk head is initially at position-cylinder 53. The cylinder sequence of requests is 98,183,37,122,14,124, 65, 67. Find the total head movement. [7]

(ii) Differentiate between protection and security in file system. How they are implemented ? [7]

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FACULTY OF ENGINEERING& TECHNOLOGY
UNIVERSITY OF LUCKNOW
Mid-Term Examination -2
B.Tech SEMESTER–V, 2021-22

Student's Name & Roll No.....1900131350008.....

Subject Code: CS-501 **Subject: Concepts of Operating System**

Time: 1 Hrs. **Max. Marks: 20**

Instruction: Attempt all sections. **Branch: B.TECH(C.S.E)**

SECTION A

1. **Attempt all parts** **(1X5 = 5)**

a) Define the term 'Critical Section' with example.

b) List the functions of Memory Management Unit (M.M.U).

c) Differentiate between 'Logical' & 'Physical' Address Space.

d) Define the term 'Safe State' with the help of an example.

e) What is meant by 'Thrashing'? Also state the significance of 'Cache Memory'.

SECTION B

Answer any THREE questions. **(5X3 = 15)**

2. What is purpose of 'Resource Allocation Graph' (R.A.G) with respect to Deadlock handling? Also Differentiate between 'Paging' & 'Segmentation'.
3. Define the term Inter Process Communication (I.P.C) with its two fundamental models?
4. Define the term 'Semaphore'. Also discuss how it has been implemented in 'Producer- Consumer' problem.
5. Consider a logical address space of 8 pages of 1024 words, each mapped into a physical memory of 32 frames then Calculate-
   (i) How many bits are in the logical address?
   (ii) How many bits are in the physical address?

FACULTY OF ENGINEERING & TECHNOLOGY
UNIVERSITY OF LUCKNOW
Mid-Term Examination -1
B. TECH SEMESTER – V, 2022-23

Student's Name & Roll No. .....

Subject Code: CS-501	**Subject: Operating System**
Time: 1 Hrs.	**Max. Marks: 20**
Instruction: Attempt all sections.	**Branch: CSE**

SECTION-A

Attempt all parts **(1X5 = 5)**

Ques 1 a) What do you mean by kernel?
Ques 1 b) List objectives of OS.
Ques 1 c) Define hard and soft-real time OS?
Ques 1 d) List various optimization criteria of CPU Scheduling.
Ques 1 e) Define system calls.

SECTION-B

Answer any three questions. **(5X3 = 15)**

Ques 2) Explain PCB with diagram.
Ques 3) Explain short-term, medium-term and long-term scheduler.
Ques 4) Explain various steps involved in change of process state with diagram.
Ques 5) What is operating system? Explain layered structure with suitable diagram.