DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. **Branch: Computer Engineering** **Semester: IV**

Subject Code & Name: BTCOC402 & Operating Systems

Max Marks: 60 **Date: 18/08/2022** **Duration: 3.45 Hr.**

Instructions to the Students:
1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level)	Marks

Q. 1 Solve Any Two of the following. *(This is just a sample instruction)*

A) Define a virtual machine with neat diagram. Describe the concept and working of JVM. Explain what are the benefits of a VM? **(2)** **6**

B) What is the purpose of command interpreter? Why is it usually separate from the Kernel? **(2)** **6**

C) Describe major activities of an operating system in regard to: **(2)** **6**

  1) Process management   3) Main Memory management

  2) File management   4) Secondary storage management

Q.2 Solve Any Two of the following. *(This is just a sample instruction)*

A) Consider the following data with burst time given in milliseconds: **(3)** **6**

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

The process has arrived in the order P1, P2, P3, P4, P5.

  i) Draw Gantt charts for the execution of these processes using FCFS, SJF, non-preemptive Priority and RR (quantum=2) scheduling.

  ii) What is turnaround time and waiting time of each process for each of the scheduling algorithm.

B) What are co-operating processes? Describe the mechanism of inter process communication using shared memory and massage passing **(2)** **6**

C) Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time. **(3)** **6**

Job	arrival time	burst time
1	0.0	8
2	0.4	4
3	1.0	1

   i)   Give a Gantt chart illustrating the execution of these jobs using the non- preemptive FCFS and SJF scheduling algorithms.

   ii)   What is turnaround time and waiting time of each job for the above algorithms?

Q. 3 **Solve Any Two of the following.** *(This is just a sample instruction)*

A) Examine banker's algorithm after applying to the example given below. A system has 5 processes, P1, P2, P3, P4 and P5. There are 3 types of resources R1, R2 and R3. there are 10 instances of R1, 5 instances of R2 and 7 instances of R3. At time T0, the situation is as follows;   **(3)**   **6**

Process	Allocation R1 R2 R3	Maximum R1 R2 R3
P1	0 1 0	7 5 3
P2	2 0 0	3 2 2
P3	3 0 2	9 0 2
P4	2 1 1	2 2 2
P5	0 0 2	4 3 3

Is the system in a safe state at time T0?

Suppose now at time T1, process P2 requests one additional instance of resource type R1, is the system in a safe state?

B) Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, also explain resource allocation graph with a cycle but no deadlock.   **(2)**   **6**

C) Describe the bounded-buffer Producer-Consumer problem and give a solution for the same using semaphores. Write the structure of Producer and Consumer processes.   **(2)**   **6**

Q.4 **Solve Any Two of the following.** *(This is just a sample instruction)*

A) Given memory partitions of 150 K, 250 K, 500 K, 300 K and 600 K (in order) how would each of the first-fit, best-fit and worst-fit algorithms allocate processes of 212K, 417K, 112K and 426 K (in order)? Which algorithm makes the most efficient use of memory?   **(3)**   **6**

B) Consider the following page reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 **(3)** **6**

Find out the number of page faults if there are 3 page frames, using the following page replacement algorithm i) LRU ii) FIFO iii) Optimal

C) Describe the action taken by the operating system when a page fault occurs with neat diagram. **(2)** **6**

Q. 5 **Solve Any Two of the following.** *(This is just a sample instruction)*

A) Describe the different file allocation methods. Also explain the methods of file implementation with merits and demerits. **(2)** **6**

B) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. the drive currently services a request at cylinder 1043, and the previous request was at cylinder 1225. the queue of pending request in FIFO order is 486, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests, for each of the following algorithms i) FCFS ii) SSFT iii) SCAN iv) LOOK v) C-SCAN. **(3)** **6**

C) Describe how free-space management is implemented in file system. Also explain bit map with the help of an example **(2)** **6**

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