

MIT ACADEMY OF ENGINEERING

COURSE CODE: CS301

10 OCTOBER 2018

TY BTECH SEMESTER - V 2018 - 2019 EXAMINATION

CYCLE - 1

DEPARTMENT OF COMPUTER ENGINEERING

END COURSE EXAMINATION

OPERATING SYSTEM

TIME : 3 HOURS

MAX MARKS : 100 MARKS

TOTAL NO OF QUESTIONS: 10

TOTAL NO OF PRINTED PAGES:3

INSTRUCTIONS TO CANDIDATES:

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

- | | | | | |
|----------|---|------------|------------|-----------|
| 1 | a) How does the signal() operation associated with monitors differ from the corresponding operation defined for semaphores? Explain with example
(Explanation-3M, Example 2M) | [5] | CO2 | L2 |
| 2 | a) What is critical section problem? and What are the conditions that a solution to the critical section problem must satisfy?
(Explanation of Critical section with pseudocode-2M, conditions-3M) | [5] | CO2 | L2 |
| 2 | a) How to create the child processes with help of fork() system call? (Explanation -3M,example 2M) | [5] | CO2 | L3 |
| 2 | b) State the assumptions behind the bounded buffer producer consumer problem and how to solve bounded buffer producer consumer problem using semaphores.
(Assumption for Bounded buffer problem -2M,Solution for bounded buffer with pseudocode-3M) | [5] | CO2 | L2 |
| 3 | a) Explain the runlevels in booting of operating system.
(Explanation 3M) | [3] | CO1 | L1 |
| 3 | b) What are the advantages of a multiprocessor system?
(Explanation -2M) | [2] | CO1 | L1 |

- c) How kernel is handling the user application invoking the open() system call. [5] CO1 L2

(Explanation with example 3M , suitable diagram-2M)

- 4 a) Max Allocation Available [10] CO3 L3

Pid	A,	B,	C,	D	A, B,	C, D	A, B, C, D
P0	6	0	1	2	4	0	0
P1	2	7	5	0	1	1	0
P2	2	3	5	6	1	2	5
P3	1	6	5	3	0	6	3
P4	1	6	5	6	0	2	1

a) Find if the current system is in safe state? If it is, find the safe sequence. (5M)

b) How many resources of type A, B, C, D are there? (1M)

c) Would the following requests be granted in current state?

1) Process P1 requests for (0,0,2,1) (2M)

2) Process P3 request for (1,0,1,0) (2M)

- 5 a) What is fragmentation? Explain the difference between internal and external fragmentation. [4] CO4 L1

(Definition -1M, any three differences 3M)

- b) Compare first-fit, worst fit and best-fit strategies for disk space allocation, with their advantages and disadvantages. [6] CO4 L2

(any 3 three differences -6M)

- 6 a) What is the need of Page replacement? [10] CO4 L3

Consider the following reference string

7,0,1,2,0,3, 0, 4, 2, 3, 0, 3,2, 1,2,0, 1, 7, 0, 1

Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with four free frames which are empty initially. Which algorithm gives the minimum number of page faults?

(Need of Page replacement algorithm 1/2M, Solution for each algorithm 3M, correct identification of algorithm 1/2M)

- 7 a) Explain how paging supports virtual memory. With neat diagram. Explain how logical address is translated into physical address. [7] CO4 L2

(Explanation-Paging with virtual address - 2M,

Translation logical to physical address -3M, diagram -2M)

- b)** The open-file table is used to maintain information about files that are currently open. Should the operating system maintain a separate table for each user or maintain just one table that contains references to files that are currently being accessed by all users? If the same file is being accessed by two different programs or users, should there be separate entries in the open-file table?
(Correct explanation 3M) [3] CO5 L4
- 8 a)** What is File and What are the attributes of files? [5] CO5 L2
(Definition of file-1M, and attributes -4M)
- b)** Explain the different types of files with its usages and examples. [5] CO5 L2
- 9 a)** What are the different ways to allocate memory to files in operating system.Explain with neat diagram.
(Explanation of any two types with example 2M per type and diagram 1/2M per type) [5] CO5 L2
- b)** Explain kernel IO structure for interfacing with applications with neat diagram. (Suitable diagram - 2M,Explanation 3M) [5] CO5 L1
- 10 a)** How processes are communicating with each other with help of shared memory.explain with suitable example.
(Explanation-5M) [5] CO2 L2
- b)** Four jobs to be executed on a single processor system arrive at time 0 in the order A, B, C, D. their burst CPU time requirements are 4, 1, 8, 1 time units respectively. calculate Calculate the completion time of all processes under round robin scheduling with time slice of one time unit.(Gantt chart 2M,Completion time completion time of all processes-3M) [5] CO2 L3

MIT ACADEMY OF ENGINEERING

COURSE CODE: CS301

21 NOVEMBER 2018

TY BTECH SEMESTER - V 2018 - 2019 EXAMINATION

CYCLE - 2

DEPARTMENT OF COMPUTER ENGINEERING

IN COURSE EXAMINATION

OPERATING SYSTEM

TIME : 2 HOURS

MAX MARKS : 50 MARKS

TOTAL NO OF QUESTIONS : 5

TOTAL NO OF PRINTED PAGES:3

INSTRUCTIONS TO CANDIDATES:

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

- 1 a) How does the system calls provide an interface to the [4] CO1 L1 services made available by an operating system.
Definition and explanation of system call 1M,typesof system calls-1M,Example-2M
- b) What is the relationship between threads and [2] CO2 L2 processes?
Definition of Process 1/2M, Definition of threads 1/2M, the relationship between process and thread - 1M
- c) During execution of Web Browser applications how [4] CO2 L2 the server is able to provide the similar types of services to different clients with the help of multithreading.
Definition of multithreading -1M,Explanation -3M.
- 2 a) Compare Linux operating system and Window [3] CO1 L1 operating system?
Any 3 similarities(1&1/2M) &
3 differences(1&1/2M).

- b)** List five services provided by an operating system, [5] CO1 L1 and explain how each creates convenience for users.
List of services -1M,Explanation-4M
- c)** Is it possible to have concurrency but not parallelism? [2] CO2 L2 Explain?
Explanation -2M.
- 3 a)** How could a system be designed to allow a choice of [2] CO1 L1 operating systems(kernel images) from which to boot?
- b)** Explain multicore programming with an example. [4] CO2 L1 Explanation 2M,example-2M
- c)** What are the reasons for providing an environment [4] CO2 L2 that allows process cooperation?
Definition of process cooperation-1M,Explanation of any 3 reasons-3M.
- 4 a)** What is the use of fork() system call?What is the [6] CO2 L3 output of following program? and Excluding the initial parent process, how many processes are created by the program shown in following program

```
#include <stdio.h>
#include <unistd.h>
int main()
{
    fork();
    fork();
    fork();
    fork();
    printf("Wel Come to Opearting System\n");
    return 0;
}
```

Explanation of Fork()System call -3M,Correct Output - 2M,Number of child processes created -1M
- b)** What is Process scheduler?What are the types of [4] CO2 L1 queues are maintained for process scheduling?
Definition of Process scheduler -1M,Types of Queues-3M with diagram.

- 5 a) Given a single-CPU system and the following set of [8] CO2 L3 processes with execution times (in milliseconds)

Pid	Execution time	Priority
P1	5	5(lowest priority)
P2	7	4
P3	2	3
P4	3	1(Highest Priority)
P5	1	2

For each of the following scheduling algorithms, create a Gantt chart (time bar diagram, starting at t=0ms) that shows when the processes will execute on the CPU. Where applicable, the time quantum will be 3 ms. Assume that all tasks will be eligible for scheduling immediately on arrival at same time. If you need to make further assumptions, state them carefully and explain your solution to calculate average waiting time for given algorithm.(i) Round-robin;(ii) Priority Scheduling without preemption.

Gantt chart-1M per algorithm, average waiting time 3M per algorithm.

- b) Justify - The objective of multiprogramming is to have [2] CO2 L2 some process running at all times, to maximize CPU utilization.

Justification with example-2M

MIT ACADEMY OF ENGINEERING

COURSE CODE: CS301

21 NOVEMBER 2018

TY BTECH SEMESTER - V 2018 - 2019 EXAMINATION

CYCLE - 2

DEPARTMENT OF COMPUTER ENGINEERING

IN COURSE EXAMINATION

OPERATING SYSTEM

TIME : 2 HOURS

MAX MARKS : 50 MARKS

TOTAL NO OF QUESTIONS : 5

TOTAL NO OF PRINTED PAGES:3

INSTRUCTIONS TO CANDIDATES:

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
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- 1 a) How does the system calls provide an interface to the [4] CO1 L1 services made available by an operating system.
Definition and explanation of system call 1M,typesof system calls-1M,Example-2M
- b) What is the relationship between threads and [2] CO2 L2 processes?
Definition of Process 1/2M, Definition of threads 1/2M, the relationship between process and thread - 1M
- c) During execution of Web Browser applications how [4] CO2 L2 the server is able to provide the similar types of services to different clients with the help of multithreading.
Definition of multithreading -1M,Explanation -3M.
- 2 a) Compare Linux operating system and Window [3] CO1 L1 operating system?
Any 3 similarities(1&1/2M) &
3 differences(1&1/2M).

- b) List five services provided by an operating system, [5] CO1 L1 and explain how each creates convenience for users.
List of services -1M,Explanation-4M
- c) Is it possible to have concurrency but not parallelism? [2] CO2 L2 Explain?
Explanation -2M.
- 3 a) How could a system be designed to allow a choice of operating systems(kernel images) from which to boot? [2] CO1 L1
- b) Explain multicore programming with an example. [4] CO2 L1 Explanation 2M,example-2M
- c) What are the reasons for providing an environment that allows process cooperation? Definition of process cooperation-1M,Explanation of any 3 reasons-3M. [4] CO2 L2
- 4 a) What is the use of fork() system call?What is the output of following program? and Excluding the initial parent process, how many processes are created by the program shown in following program [6] CO2 L3
- ```
#include <stdio.h>
#include <unistd.h>
int main()
{
 fork();
 fork();
 fork();
 fork();
 printf("Wel Come to Opearting System\n");
 return 0;
}
```
- Explanation of Fork()System call -3M,Correct Output - 2M,Number of child processes created -1M
- b) What is Process scheduler?What are the types of queues are maintained for process scheduling? Definition of Process scheduler -1M,Types of Queues-3M with diagram. [4] CO2 L1

- 5 a) Given a single-CPU system and the following set of [8] CO2 L3 processes with execution times (in milliseconds)

| Pid | Execution time | Priority            |
|-----|----------------|---------------------|
| P1  | 5              | 5(lowest priority)  |
| P2  | 7              | 4                   |
| P3  | 2              | 3                   |
| P4  | 3              | 1(Highest Priority) |
| P5  | 1              | 2                   |

For each of the following scheduling algorithms, create a Gantt chart (time bar diagram, starting at t=0ms ) that shows when the processes will execute on the CPU. Where applicable, the time quantum will be 3 ms. Assume that all tasks will be eligible for scheduling immediately on arrival at same time. If you need to make further assumptions, state them carefully and explain your solution to calculate average waiting time for given algorithm.(i) Round-robin;(ii) Priority Scheduling without preemption.

Gantt chart-1M per algorithm, average waiting time 3M per algorithm.

- b) Justify - The objective of multiprogramming is to have [2] CO2 L2 some process running at all times, to maximize CPU utilization.

Justification with example-2M

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301**

**10 OCTOBER 2018**

## **TY BTECH SEMESTER - V 2018 - 2019 EXAMINATION**

**CYCLE - 1**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **END COURSE EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 HOURS**

**MAX MARKS : 100 MARKS**

**TOTAL NO OF QUESTIONS: 10**

**TOTAL NO OF PRINTED PAGES:3**

#### **INSTRUCTIONS TO CANDIDATES:**

- 1    a) How does the signal() operation associated with monitors differ from the corresponding operation defined for semaphores? Explain with example (Explanation-3M, Example 2M) [5]    CO2    L2
- b) What is critical section problem? and What are the conditions that a solution to the critical section problem must satisfy? (Explanation of Critical section with pseudocode-2M, conditions-3M) [5]    CO2    L2
- 2    a) How to create the child processes with help of fork() system call? (Explanation -3M,example 2M) [5]    CO2    L3
- b) State the assumptions behind the bounded buffer producer consumer problem and how to solve bounded buffer producer consumer problem using semaphores. (Assumption for Bounded buffer problem -2M,Solution for bounded buffer with pseudocode-3M) [5]    CO2    L2
- 3    a) Explain the runlevels in booting of operating system. (Explanation 3M) [3]    CO1    L1
- b) What are the advantages of a multiprocessor system? (Explanation -2M) [2]    CO1    L1

- c) How kernel is handling the user application invoking the open( ) system call. [5] CO1 L2

(Explanation with example 3M , suitable diagram-2M)

- 4 a) Max Allocation Available [10] CO3 L3

| Pid | A, | B, | C, | D | A, B, | C, D | A, B, C, D |
|-----|----|----|----|---|-------|------|------------|
| P0  | 6  | 0  | 1  | 2 | 4     | 0    | 0 1        |
| P1  | 2  | 7  | 5  | 0 | 1     | 1    | 0 0        |
| P2  | 2  | 3  | 5  | 6 | 1     | 2    | 5 4        |
| P3  | 1  | 6  | 5  | 3 | 0     | 6    | 3 3        |
| P4  | 1  | 6  | 5  | 6 | 0     | 2    | 1 2        |

a) Find if the current system is in safe state? If it is, find the safe sequence. (5M)

b) How many resources of type A, B, C, D are there? (1M)

c)Would the following requests be granted in current state?

1)Process P1 requests for (0,0,2,1) (2M)

2)Process P3 request for (1,0,1,0) (2M)

- 5 a) What is fragmentation?Explain the difference between internal and external fragmentation. [4] CO4 L1

(Definition -1M,any three differences 3M)

- b) Compare first-fit ,worst fit and best-fit strategies for disk space allocation, with their advantages and disadvantages. (any 3 three differences -6M)

- 6 a) What is the need of Page replacement? [10] CO4 L3

Consider the following reference string

7,0,1,2,0,3, 0, 4, 2, 3, 0, 3,2, 1,2,0, 1, 7, 0, 1

Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with four free frames which are empty initially. Which algorithm gives the minimum number of page faults?

(Need of Page replacement algorithm 1/2M, Soution for each algorithm 3M,correct identification of algorithm 1/2M)

- 7 a) Explain how paging supports virtual memory. With neat diagram. Explain how logical address is translated into physical address. [7] CO4 L2

(Explanation-Paging with virtual address - 2M,

Translation logical to physical address -3M,diagram -2M)

- b) The open-file table is used to maintain information about files that are currently open. Should the operating system maintain a separate table for each user or maintain just one table that contains references to files that are currently being accessed by all users? If the same file is being accessed by two different programs or users, should there be separate entries in the open-file table?  
(Correct explanation 3M)
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(Definition of file-1M, and attributes -4M )
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(Explanation of any two types with example 2M per type and diagram 1/2M per type) [5] CO5 L2
- b) Explain kernel IO structure for interfacing with applications with neat diagram. (Suitable diagram - 2M,Explanation 3M) [5] CO5 L1
- 10 a) How processes are communicating with each other with help of shared memory.explain with suitable example.  
(Explanation-5M) [5] CO2 L2
- b) Four jobs to be executed on a single processor system arrive at time 0 in the order A, B, C, D. their burst CPU time requirements are 4, 1, 8, 1 time units respectively. calculate Calculate the completion time of all processes under round robin scheduling with time slice of one time unit.(Gantt chart 2M,Completion time completion time of all processes-3M) [5] CO2 L3

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**30 SEPTEMBER 2019**

**TY BTECH SEMESTER - V 2019 - 2020 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING**

**IN SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOURS**

**MAX MARKS : 50 MARKS**

**TOTAL NO OF QUESTIONS: 4**

**TOTAL NO OF PRINTED PAGES:2**

**INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

- 1 a)** Describe the essential properties of the following [5] CO1 L2 types of the operating system.
1. Batch
  2. Multiuser
  3. Time Sharing
  4. Real Time
  5. Embedded OS
- [1 Mark for each operating system properties]
- b)** Describe the significance of operating system functionalities [5] CO1 L2
- [1 mark for each significance ]
- 2 a)** How user level threads are different from kernel level threads? Under what circumstances is one type "better" than the other? [5] CO2 L2
- [3 marks for difference and 2 marks for circumstances]
- b)** What are the advantages of multiple threads over multiple processes? What major disadvantage do they have? Suggest one application that would benefit from the use of threads, and one that would not [2 marks advantages 1 marks disadvantages and 2 mark for application.]
- 3 a)** Compare short-term, medium-term, and long-term schedulers [5] CO2 L3

- b)** What resources are used when a thread is created? [5] CO2 L2  
How do they differ from those used when a process is created?
- 4 a)** Consider the following set of processes, with the length of the CPU burst time given in milliseconds: [12] CO2 L3
- | Process | Burst Time | Priority |
|---------|------------|----------|
| P1      | 2          | 2        |
| P2      | 1          | 1        |
| P3      | 8          | 4        |
| P4      | 4          | 2        |
| P5      | 5          | 3        |
- The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.
- Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, nonpreemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).[4 M]
  - What is the turnaround time of each process for each of the scheduling algorithms in part a?[4]
  - What is the waiting time of each process for each of these scheduling algorithms?[4]
- b)** List the types of Interprocess communication. Describe any one in detail. [list 1 mark description 5 mark]
- c)** Describe the actions taken by a kernel to switch context  
a. Among threads.  
b. Among processes.  
[Explantion of context switch 2 marks for threads and 2 marks for process]

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T**

**08 DECEMBER 2022**

**TY BTECH SEMESTER - V 2022 - 2023 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING**

**END SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOURS**

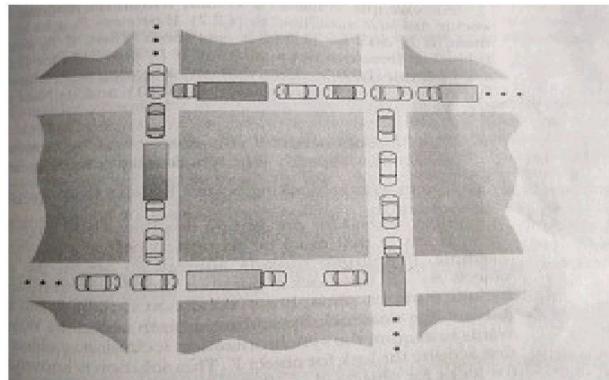
**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES: 2**

## **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
  2. Non programmable scientific calculators are allowed
  3. Black figures to the right indicate full marks
- 1 a)** Explain the critical section problem. Illustrate any two [08] CO3 L2 solutions to the critical-section problem. (*explanation:2 marks, solution:3 marks each*)
- b)** Consider the Traffic Deadlock depicted in the given [08] CO3 L3 figure
- a) In the above figure, state the analogy you are considering for the Processes and Resources, with respect to deadlocks in OS. (1 mark)
  - b) Show that the 4 necessary conditions for deadlock hold in this example. (4 marks)
  - c) State a simple rule for avoiding deadlock in this system (3 marks)



- 2 a)** Consider an executable problem that has to be [08] CO4 L3 loaded from disk to memory. Suggest a technique that loads pages only when they are needed and discuss the suggested technique in detail. (*Diagram:4 marks, explanation:4 marks*)
- b)** For the following page reference string [06] CO4 L3 2,3,0,1,5,4,0,1,2,5,4,3,4,2,3,5 compute the number of page faults following the 1. LRU page replacement policy with 3 frames 2. Optimal page replacement policy with 4 frames. ( 3 marks each)
- c)** Demonstrate with an example how memory [04] CO4 L2 management is achieved through swapping in UNIX systems.( 4 marks)
- 3 a)** Several file system structures are used to implement [8] CO5 L2 a file system. Describe these structures with its significance in the file system implementation. How these structures are used in the open() system call (4 marks) ? Support your answer with a diagram. (*Significance: 4 marks, system structures: 4 marks*)
- b)** A user on linux system would like to know the file [4] CO5 L3 permissions of a file "abc.txt ". Identify the command to obtain the same and explain the file permissions in detail.(*Command:1 mark , explantion:3 marks*)
- c)** Compare Contigous Allocation and Linked Allocation [4] CO5 L2 methods (*Each distinguishing point : 1 mark*)

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**08 DECEMBER 2022**

## **TY BTECH SEMESTER - V BACKLOG 2016 PATTERN 2022 - 2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING END SEMESTER EXAMINATION OPERATING SYSTEM**

**TIME : 2 HOURS**

**MAX MARKS : 50**

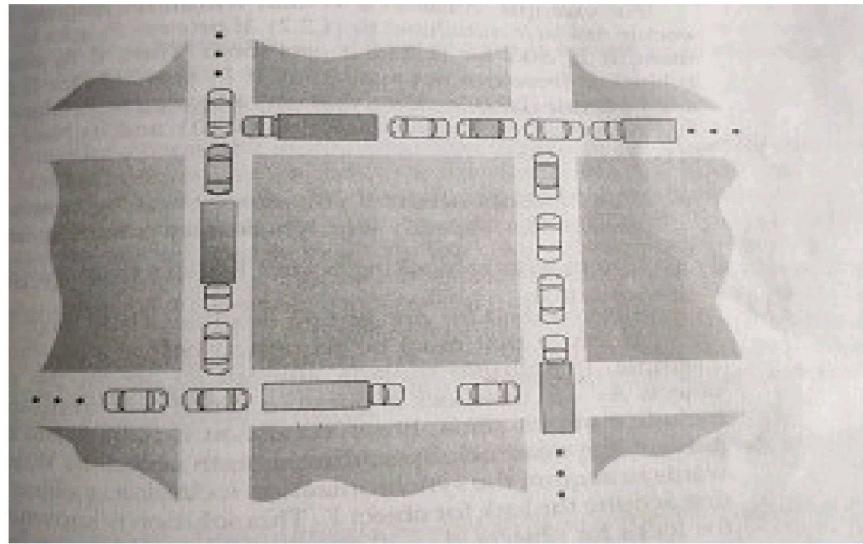
**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES: 3**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
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- 1 a) Explain the critical section problem. Illustrate any two [08] CO3 L2 solutions to the critical-section problem. (*explanation:2 marks, solution:3 marks each*)
- b) Consider the Traffic Deadlock depicted in the given [08] CO3 L3 figure.
- a) In the above figure, state the analogy you are considering for the Processes and Resources, with respect to deadlocks in OS. (1 mark)
  - b) Show that the 4 necessary conditions for deadlock hold in this example. (4 marks)
  - c) State a simple rule for avoiding deadlock in this system (3 marks)



- 2 a)** Consider an executable problem that has to be [08] CO4 L3 loaded from disk to memory. Suggest a technique that loads pages only when they are needed and discuss the suggested technique in detail. (*Diagram:4 marks, explanation:4 marks*)
- b)** For the following page reference string [06] CO4 L3 2,3,0,1,5,4,0,1,2,5,4,3,4,2,3,5 compute the number of page faults following the 1. LRU page replacement policy with 3 frames 2. Optimal page replacement policy with 4 frames. ( 3 marks each)
- c)** Demonstrate with an example how memory [04] CO4 L2 management is achieved through swapping in UNIX systems.( 4 marks)
- 3 a)** Several file system structures are used to implement [8] CO5 L2 a file system. Describe these structures with its significance in the file system implementation. How these structures are used in the open() system call (4 marks) ? Support your answer with a diagram. (*Significance: 4 marks, system structures: 4 marks*)

- b)** A user on linux system would like to know the file [4] CO5 L3 permissions of a file "abc.txt ". Identify the command to obtain the same and explain the file permissions in detail.(*Command:1 mark , explantion:3 marks*)
- c]** Compare Contigous Allocation and Linked Allocation [4] CO5 L2 methods (*Each distinguishing point : 1 mark*)

[3]

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**08 DECEMBER 2022**

## **TY BTECH SEMESTER - V BACKLOG 2016 PATTERN 2022 - 2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING END SEMESTER EXAMINATION OPERATING SYSTEM**

**TIME : 2 HOURS**

**MAX MARKS : 50**

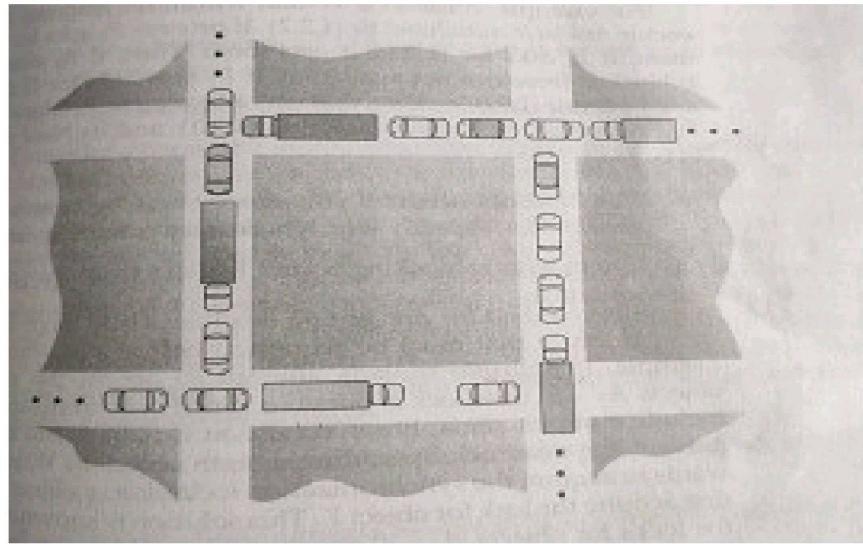
**TOTAL NO OF QUESTIONS: 3**

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- a) In the above figure, state the analogy you are considering for the Processes and Resources, with respect to deadlocks in OS. (1 mark)
  - b) Show that the 4 necessary conditions for deadlock hold in this example. (4 marks)
  - c) State a simple rule for avoiding deadlock in this system (3 marks)



- 2 a)** Consider an executable problem that has to be [08] CO4 L3 loaded from disk to memory. Suggest a technique that loads pages only when they are needed and discuss the suggested technique in detail. (*Diagram:4 marks, explanation:4 marks*)
- b)** For the following page reference string [06] CO4 L3 2,3,0,1,5,4,0,1,2,5,4,3,4,2,3,5 compute the number of page faults following the 1. LRU page replacement policy with 3 frames 2. Optimal page replacement policy with 4 frames. ( 3 marks each)
- c)** Demonstrate with an example how memory [04] CO4 L2 management is achieved through swapping in UNIX systems.( 4 marks)
- 3 a)** Several file system structures are used to implement [8] CO5 L2 a file system. Describe these structures with its significance in the file system implementation. How these structures are used in the open() system call (4 marks) ? Support your answer with a diagram. (*Significance: 4 marks, system structures: 4 marks*)

- b)** A user on linux system would like to know the file [4] CO5 L3 permissions of a file "abc.txt ". Identify the command to obtain the same and explain the file permissions in detail.(*Command:1 mark , explantion:3 marks*)
- c]** Compare Contigous Allocation and Linked Allocation [4] CO5 L2 methods (*Each distinguishing point : 1 mark*)

[3]

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T**

**08 DECEMBER 2022**

**TY BTECH SEMESTER - V 2022 - 2023 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING**

**END SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOURS**

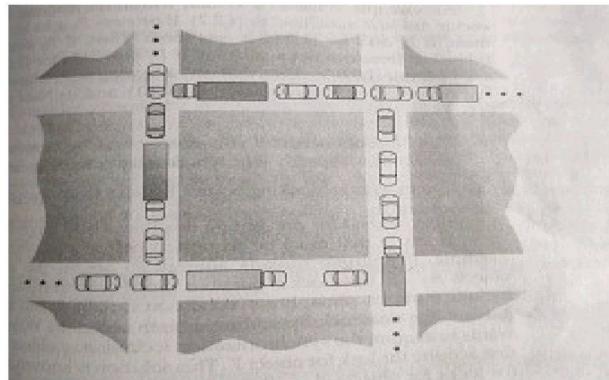
**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES: 2**

## **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
  2. Non programmable scientific calculators are allowed
  3. Black figures to the right indicate full marks
- 1 a)** Explain the critical section problem. Illustrate any two [08] CO3 L2 solutions to the critical-section problem. (*explanation:2 marks, solution:3 marks each*)
- b)** Consider the Traffic Deadlock depicted in the given [08] CO3 L3 figure
- a) In the above figure, state the analogy you are considering for the Processes and Resources, with respect to deadlocks in OS. (1 mark)
  - b) Show that the 4 necessary conditions for deadlock hold in this example. (4 marks)
  - c) State a simple rule for avoiding deadlock in this system (3 marks)



- 2 a)** Consider an executable problem that has to be [08] CO4 L3 loaded from disk to memory. Suggest a technique that loads pages only when they are needed and discuss the suggested technique in detail. (*Diagram:4 marks, explanation:4 marks*)
- b)** For the following page reference string [06] CO4 L3 2,3,0,1,5,4,0,1,2,5,4,3,4,2,3,5 compute the number of page faults following the 1. LRU page replacement policy with 3 frames 2. Optimal page replacement policy with 4 frames. ( 3 marks each)
- c)** Demonstrate with an example how memory [04] CO4 L2 management is achieved through swapping in UNIX systems.( 4 marks)
- 3 a)** Several file system structures are used to implement [8] CO5 L2 a file system. Describe these structures with its significance in the file system implementation. How these structures are used in the open() system call (4 marks) ? Support your answer with a diagram. (*Significance: 4 marks, system structures: 4 marks*)
- b)** A user on linux system would like to know the file [4] CO5 L3 permissions of a file "abc.txt ". Identify the command to obtain the same and explain the file permissions in detail.(*Command:1 mark , explantion:3 marks*)
- c)** Compare Contigous Allocation and Linked Allocation [4] CO5 L2 methods (*Each distinguishing point : 1 mark*)

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T / CS341T**

**27 MAY 2022**

## **TY BTECH SEMESTER - V RE-EXAMINATION 2021 - 2022 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **RE-EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 HOURS**

**MAX MARKS : 100**

**TOTAL NO OF QUESTIONS: 06**

**TOTAL NO OF PRINTED PAGES: 03**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

- 1    a) List and explain various types of operating system and [6] CO1 L2 state the important features. (*6 operating systems are expected, 1 mark for each*)  
b) One of the important functionality of an operating system is [10] CO1 L2 process management. State the system calls that are used to manage the process with the input parameters (*5 system calls are expected, 2 marks for each*)
- 2    a) Compare user level threads and kernel level threads (6 [6] CO2 L3 points are expected)  
b) Inspect the basics of Inter-Process communication. [8] CO2 L2 Elaborate the two models of IPC with suitable diagram. (*Basics points explanation- 2 mks each, two model with diagram - 3 mks each*)
- 3    a) What is process scheduling in operating system? Which [8] CO2 L2 feature of OS makes process scheduling possible? State different types of schedulers? (*Concept of process scheduling-1 mark, feature-2 marks, scheduler types-5 marks*)

- b)** Consider the following set of processes, with the length of the CPU burst given in milliseconds: [12] CO2 L3

| Time | Priority | Burst |
|------|----------|-------|
| P1   | 2        | 2     |
| P2   | 1        | 1     |
| P3   | 8        | 4     |
| P4   | 4        | 2     |
| P5   | 5        | 3     |

- i) Show the scheduling order of the processes using a Gantt chart for the following scheduling algorithms: FCFS ,SJF(preemptive and non preemptive ,RR (quantum=2)
- ii)What is the turnaround time and the waiting time of each process for each of the scheduling algorithm in part i ?
- iii) Which of the algorithms results in the minimum average waiting time ? *(i)-3 marks ii)8 marks iii)1 mark*

- 4   **a)** The OS contains 3 resources.The number of instances available for each resource type are 7,7,10.The current resource allocation state is shown below. [8] CO3 L3

- 1. Calculate the need matrix
  - 2.Find out the safe sequence showing the step wise calculation
- (2 marks for calculating Need Matrix , 6 marks for safe sequence)*

| Process | Allocation |   |   | Max |   |   |
|---------|------------|---|---|-----|---|---|
|         | A          | B | C | A   | B | C |
| P0      | 2          | 2 | 3 | 3   | 6 | 8 |
| P1      | 2          | 0 | 3 | 4   | 3 | 3 |
| P2      | 1          | 2 | 4 | 3   | 4 | 4 |

- 4   **b)** Making use of semaphore discuss how synchronization is achieved in reader writer problem. [6] CO1 L1

- 4   **c)** Explain the necessary conditions for Deadlock

[4] CO3 L2

5 a) Consider the following page reference string: [8] CO4 L3

1, 2, 3, 4, 2, 1, 4, 5, 7, 1, 2, 3, 3, 6, 3, 2, 4, 2, 3, 6.

Assuming demand paging with four frames, how many page faults would occur for the following replacement algorithms (*3 marks each*) ?

- LRU
- FIFO

What is Belady's anomaly problem and which algorithm suffer with Belady's anomaly (*2 Marks*)

5 b) What is a page fault and how it is handled by the operating system? [6] CO4 L2  
*(Definition-1 mark, Diagrams -2 marks, Process -3 Marks)*

5 c) The address generated by CPU is called as the logical address. Demonstrate the address translation scheme that converts the logical address into physical address. [4] CO4 L3

OR

Memory gets splitted into number of partitions when assigned to processes. Demonstrate the concept from the above statement, its types and discuss its causes. (*Concept and types - 2 marks, Causes - 2 marks*)

6 a) Several file system structures are used to implement a file system. Describe these structures with its significance in the file system implementation. How these structures are used in the open() system call (*4 marks*) ? Support your answer with a diagram. (*Significance - 4 marks, structures - 4 marks*) [8] CO5 L2

b) Explain the directory implementation mechanisms in the file system (*3 marks each*) [6] CO5 L2

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T / CS301T**

**17 SEPTEMBER 2022**

**TY BTECH SEMESTER - V 2022 - 2023 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING & INFORMATION  
TECHNOLOGY ENGINEERING**

**MID SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOURS**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS:03      TOTAL NO OF PRINTED PAGES: 03**

**INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. All questions are compulsory

**1 a) What do you mean by system call ? What services [6] CO1 L2 OS provides to user ? Explain these services in brief.**  
*System call -1 mark, Services -5marks*

**1 b) State in brief four key features of each of the following [4] CO1 L2 types of OS with examples of each :**

- 1)Real Time and
- 2)Distributed

*Real time-2 marks , distributed-2 marks*

**2 a) What is the role of process control block? Explain the [6] CO2 L2 function of each attribute in PCB(6)**

**2 b)** Assume a scenario with a system having two cores. [6] CO2 L3  
Each core has two processors .A cpu intensive application is running on this system. When the program starts ,a single file must be opened and it should be read sequentially ie all input is performed as soon as the program starts.

Similarly just before the program terminates, the program results should be written sequentially to a single file. The program is CPU bound after the startup and before the termination. Explain how will you improve the performance by using multithreading.

i)Also determine how many threads are to be created for taking care of input & output; Substantiate your answer

Determine the no of threads -1 marks

Stating the reason for the no of threads-2 marks

ii)For the cpu bound part of the application how many threads are to be created ? Explain

Determine the no of threads for cpu bound part of application-1 marks

*Stating the reason for the no of threads-2 marks*

**2 c)** Explain the different states of process in Unix with the [8] CO2 L2 help of state transition diagram.

*Diagram -2 marks Expalanation -6 marks*

**3 a)** Consider the following set of processes, with the [5] CO2 L3 length of the cpu burst time given in milliseconds.

1)Draw the Gantt chart illustrating the execution of these processes using Round Robin with Time quantum = 1 milli seconds. ( 3 marks)

2)Calculate the weighting time and Turn around time for each of the processes (1 mark)

3) Compute the average weighting time and turn around time(1 mark)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 2            | 4          |
| P3      | 3            | 2          |
| P4      | 9            | 1          |

- 3 b) Consider the following set of processes, with the [5] CO2 L3 length of the cpu burst time given in milliseconds.

1)Draw the Gantt chart illustrating the execution of these processes using preemptive and non preemptive shortest job first(2 marks)

2)Calculate the weighting time and Turn around time for each of the processes and compute the average weighting time and turnaround time (3 marks)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 1            | 1          |
| P3      | 2            | 3          |
| P4      | 3            | 4          |

- 3 c) Interrupts cause the operating system to change the [5] CO2 L3 CPU from its current task.According to you what actions are taken by the kernel in the given situation.

*Diagram -2 marks ; Explanation 3 marks*

- 3 d) What is a thread in OS? How it is different from a [5] CO2 L2 process ? Explain the different multithreading models

*Thread-1 mark; difference with process-1 marks; multi threading models -3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T / CS301T**

**17 SEPTEMBER 2022**

**TY BTECH SEMESTER - V 2022 - 2023 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING & INFORMATION  
TECHNOLOGY ENGINEERING**

**MID SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOURS**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS:03      TOTAL NO OF PRINTED PAGES: 03**

**INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. All questions are compulsory

**1 a) What do you mean by system call ? What services [6] CO1 L2 OS provides to user ? Explain these services in brief.**  
*System call -1 mark, Services -5marks*

**1 b) State in brief four key features of each of the following [4] CO1 L2 types of OS with examples of each :**

- 1)Real Time and
- 2)Distributed

*Real time-2 marks , distributed-2 marks*

**2 a) What is the role of process control block? Explain the [6] CO2 L2 function of each attribute in PCB(6)**

**2 b)** Assume a scenario with a system having two cores. [6] CO2 L3  
Each core has two processors .A cpu intensive application is running on this system. When the program starts ,a single file must be opened and it should be read sequentially ie all input is performed as soon as the program starts.

Similarly just before the program terminates, the program results should be written sequentially to a single file. The program is CPU bound after the startup and before the termination. Explain how will you improve the performance by using multithreading.

i)Also determine how many threads are to be created for taking care of input & output; Substantiate your answer

Determine the no of threads -1 marks

Stating the reason for the no of threads-2 marks

ii)For the cpu bound part of the application how many threads are to be created ? Explain

Determine the no of threads for cpu bound part of application-1 marks

*Stating the reason for the no of threads-2 marks*

**2 c)** Explain the different states of process in Unix with the [8] CO2 L2 help of state transition diagram.

*Diagram -2 marks Expalanation -6 marks*

**3 a)** Consider the following set of processes, with the [5] CO2 L3 length of the cpu burst time given in milliseconds.

1)Draw the Gantt chart illustrating the execution of these processes using Round Robin with Time quantum = 1 milli seconds. ( 3 marks)

2)Calculate the weighting time and Turn around time for each of the processes (1 mark)

3) Compute the average weighting time and turn around time(1 mark)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 2            | 4          |
| P3      | 3            | 2          |
| P4      | 9            | 1          |

- 3 b) Consider the following set of processes, with the [5] CO2 L3 length of the cpu burst time given in milliseconds.

1)Draw the Gantt chart illustrating the execution of these processes using preemptive and non preemptive shortest job first(2 marks)

2)Calculate the weighting time and Turn around time for each of the processes and compute the average weighting time and turnaround time (3 marks)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 1            | 1          |
| P3      | 2            | 3          |
| P4      | 3            | 4          |

- 3 c) Interrupts cause the operating system to change the [5] CO2 L3 CPU from its current task.According to you what actions are taken by the kernel in the given situation.

*Diagram -2 marks ; Explanation 3 marks*

- 3 d) What is a thread in OS? How it is different from a [5] CO2 L2 process ? Explain the different multithreading models

*Thread-1 mark; difference with process-1 marks; multi threading models -3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T / CS301T**

**17 SEPTEMBER 2022**

**TY BTECH SEMESTER - V 2022 - 2023 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING & INFORMATION  
TECHNOLOGY ENGINEERING**

**MID SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOURS**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS:03      TOTAL NO OF PRINTED PAGES: 03**

**INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. All questions are compulsory

**1 a) What do you mean by system call ? What services [6] CO1 L2 OS provides to user ? Explain these services in brief.**  
*System call -1 mark, Services -5marks*

**1 b) State in brief four key features of each of the following [4] CO1 L2 types of OS with examples of each :**

- 1)Real Time and
- 2)Distributed

*Real time-2 marks , distributed-2 marks*

**2 a) What is the role of process control block? Explain the [6] CO2 L2 function of each attribute in PCB(6)**

**2 b)** Assume a scenario with a system having two cores. [6] CO2 L3  
Each core has two processors .A cpu intensive application is running on this system. When the program starts ,a single file must be opened and it should be read sequentially ie all input is performed as soon as the program starts.

Similarly just before the program terminates, the program results should be written sequentially to a single file. The program is CPU bound after the startup and before the termination. Explain how will you improve the performance by using multithreading.

i)Also determine how many threads are to be created for taking care of input & output; Substantiate your answer

Determine the no of threads -1 marks

Stating the reason for the no of threads-2 marks

ii)For the cpu bound part of the application how many threads are to be created ? Explain

Determine the no of threads for cpu bound part of application-1 marks

*Stating the reason for the no of threads-2 marks*

**2 c)** Explain the different states of process in Unix with the [8] CO2 L2 help of state transition diagram.

*Diagram -2 marks Expalanation -6 marks*

**3 a)** Consider the following set of processes, with the [5] CO2 L3 length of the cpu burst time given in milliseconds.

1)Draw the Gantt chart illustrating the execution of these processes using Round Robin with Time quantum = 1 milli seconds. ( 3 marks)

2)Calculate the weighting time and Turn around time for each of the processes (1 mark)

3) Compute the average weighting time and turn around time(1 mark)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 2            | 4          |
| P3      | 3            | 2          |
| P4      | 9            | 1          |

- 3 b) Consider the following set of processes, with the [5] CO2 L3 length of the cpu burst time given in milliseconds.

1)Draw the Gantt chart illustrating the execution of these processes using preemptive and non preemptive shortest job first(2 marks)

2)Calculate the weighting time and Turn around time for each of the processes and compute the average weighting time and turnaround time (3 marks)

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 1            | 1          |
| P3      | 2            | 3          |
| P4      | 3            | 4          |

- 3 c) Interrupts cause the operating system to change the [5] CO2 L3 CPU from its current task.According to you what actions are taken by the kernel in the given situation.

*Diagram -2 marks ; Explanation 3 marks*

- 3 d) What is a thread in OS? How it is different from a [5] CO2 L2 process ? Explain the different multithreading models

*Thread-1 mark; difference with process-1 marks; multi threading models -3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T**

**31 JULY 2023**

## **TY BTECH SEMESTER - V REMEDIAL TERM 2022 - 2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **REMEDIAL EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 Hrs**

**MAX MARKS : 100**

**TOTAL NO OF QUESTIONS:**      **TOTAL NO OF PRINTED PAGES: 4**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
  2. Non programmable scientific calculators are allowed
  3. Black figures to the right indicate full marks
  4. ALL Questions are compulsory
- 1 a)** How does the system calls provide an interface to the [5] CO1 L1 services made available by an operating system. Definition and explanation of system call 2M, types of system calls-1M, Example-2M
- b)** During execution of Web Browser applications how the [5] CO2 L2 server is able to provide the similar types of services to different clients with the help of multithreading. Definition of multithreading -2M, Explanation -3M.
- c)** Describe the essential characteristics of the following [5] CO1 L2 types of the operating system.  
1. Batch 2. Multiuser 3. Time Sharing 4. Real Time  
5. Embedded OS  
1 mark for each
- d)** Describe the significance of operating system [5] CO1 L2 functionalities. [1 mark for each significance ]

**2 a)** How user level threads are different from kernel level [5] CO2 L2 threads? Under what circumstances is one type "better" than the other?  
[3 marks for difference and 2 marks for circumstances]

**b)** What are the advantages of multiple threads over multiple processes? What major disadvantage do they have? Suggest one application that would benefit from the use of threads, and one that would not [2marks advantages ,1mark disadvantage, and 2marks for application.]

**c)** Compare short-term, medium-term, and long-term [5] CO2 L2 schedulers

**d)** What resources are used when a thread is created? [5] CO2 L2 How do they differ from those used when a process is created?

Resources used -2 marks & difference -3 marks

**3 a)** Consider the following set of processes, with the length [10] CO2 L3 of the CPU burst time given in milliseconds. Draw the Gantt chart and calculate the average waiting time and turn around time, considering 1) Non pre-emptive SJF scheduling 2) FCFS. Arrival time of all processes may be taken as Zero ms.

| Process | Burst Time |
|---------|------------|
| P1      | 6          |
| P2      | 8          |
| P3      | 7          |
| P4      | 3          |

**b)** List the types of Inter process communication. Describe [5] CO2 L2 any one in detail. [list- 1 mark and description 4 marks]

**c) Describe the actions taken by a kernel to switch [5] CO2 L2 context**

a.) Among threads.b.) Among processes.

[Explanation of context switch for threads 3marks and 2marks for process]

**4 a) What is critical section problem? What are the [5] CO3 L2 conditions that a solution to the critical section problem must satisfy? (Explanation of Critical section with pseudocode-2M,conditions-3M)**

**b) State the assumptions behind the bounded buffer [5] CO3 L2 producer consumer problem and how to solve bounded buffer producer consumer problem using semaphores.(Assumption for Bounded buffer problem-2M,Solution for bounded buffer with pseudocode-3M)**

**c) Consider the given snapshot of the system.Find if the [10] CO3 L3 current system is in safe state?If it is,find the safe sequence.**

| Process Id | Allocation |   |   | Max |   |   | Available |   |   |
|------------|------------|---|---|-----|---|---|-----------|---|---|
|            | A          | B | C | A   | B | C | A         | B | C |
| P0         | 0          | 1 | 0 | 7   | 5 | 3 | 3         | 3 | 2 |
| P1         | 2          | 0 | 0 | 3   | 2 | 2 |           |   |   |
| P2         | 3          | 0 | 2 | 9   | 0 | 2 |           |   |   |
| P3         | 2          | 1 | 1 | 2   | 2 | 2 |           |   |   |
| P4         | 0          | 0 | 2 | 4   | 3 | 3 |           |   |   |

**5 a)** What is the need of Page replacement? Consider the [10] CO4 L3 following reference string

7,0,1,2,0,3, 0, 4, 2, 3, 0, 3,2, 1,2,0, 1, 7, 0, 1

Find the number of Page Faults with FIFO,Optimal Page replacement and LRU with four free frames which are empty initially.Which algorithm gives the minimum number of page faults?(Need of Page replacement algorithm 1/2M, Soution for each algorithm 3M,correct identification of algorithm 1/2M)

**6 a)** What is File and What are the attributes of [5] CO5 L2 files?(Definition of file-1M, and attributes -4M )

**b)** Explain the different types of files with its usages and [5] CO5 L2 examples.

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**13 DECEMBER 2023**

## **TY BTECH SEMESTER - V BACKLOG 2016 PATTERN 2023 - 2024 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING END SEMESTER EXAMINATION OPERATING SYSTEM**

**TIME : 2 HOUR**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES: 2**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. ALL Questions are compulsory

**1 a) What is meant by Semaphore ? Explain how it is used to provide mutual exclusion in operating system .**

*Concept of Semaphore -2 marks, Explanation w.r.t. mutual exclusion-3 marks*

**[5] CO3 L2**

**b) A multithreaded application uses only reader-writer locks for synchronization. Applying the four necessary conditions for deadlock, is deadlock still possible if multiple reader—writer locks are used?**

**[5] CO3 L3**

*Correct answer-1 mark , Justification for the answer-4 marks*

**c) Consider a system consisting of 4 resources of same type that are shared by 3 processes each of which needs at most two resources. Show that the system is deadlock free .**

**[5] CO3 L3**

*Correct explanation -5 marks*

**d) Consider the given snapshot of the system.The available resources in the system is given as (3 3 2 1 ). Use the Banker's algorithm to illustrate that the system is in the safe state by showing the order in which the processes may complete .**

**[5] CO3 L3**

| Process | Max<br>A B C D | Allocation<br>A B C D | Need    |
|---------|----------------|-----------------------|---------|
|         |                |                       | A B C D |
| P0      | 4 2 1 2        | 2 0 0 1               | 2 2 1 1 |
| P1      | 5 2 5 2        | 3 1 2 1               | 2 1 3 1 |
| P2      | 2 3 1 6        | 2 1 0 3               | 0 2 1 3 |
| P3      | 1 4 2 4        | 1 3 1 2               | 0 1 1 2 |
| P4      | 3 6 6 5        | 1 4 3 2               | 2 2 3 3 |

- 2 a) Compare the memory organization schemes of Contiguous Allocation with fixed size and variable size , Segmentation and Paging with respect to 1)External Fragmentation 2)Internal Fragmentation 3)Ability to share code across processes. [6] CO4 L2  
*Comparison with respect to internal fragmentation, external fragmentation and sharing code -2 marks each*
- b) Explain the following terms in brief 1)Virtual Memory, 2)Compaction 3)Thrashing 4)Belady's Anomaly [8] CO4 L2
- c) Consider the following page sequence 4 , 7, 6, 1, 7, 6, 1, 2, 7, 2 and explain the working of page replacement policies .Considering 3 frames calculate the number of page faults and the number of page hits for each of the given policies: 1)FIFO 2)Optimal 3) LRU [6] CO4 L3
- 3 a) Several file system structures are used to implement a file system. Describe these structures with its significance in the file system implementation ( 4 marks) . How these structures are used in the open() system call (4 marks) ? Support your answer with a diagram. [8] CO5 L3
- b) Differentiate between Mandatory Locks and Advisory Locks [2] CO5 L2

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T**

**13 DECEMBER 2023**

**TY BTECH SEMESTER - V 2019 REGULAR 2023 - 2024 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING**

**END SEMESTER EXAMINATION**

**OPERATING SYSTEM**

**TIME : 2 HOUR**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES: 2**

**INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. ALL Questions are compulsory

**1 a)** What is meant by Semaphore ? Explain how it is used to provide mutual exclusion in operating system .

*Concept of Semaphore -2 marks, Explanation w.r.t. mutual exclusion-3 marks*

**[5] CO3 L2**

**b)** A multithreaded application uses only reader-writer locks for synchronization. Applying the four necessary conditions for deadlock, is deadlock still possible if multiple reader—writer locks are used?

*Correct answer-1 mark , Justification for the answer-4 marks*

**[5] CO3 L3**

**c)** Consider a system consisting of 4 resources of same type that are shared by 3 processes each of which needs at most two resources. Show that the system is deadlock free .

*Correct explanation -5 marks*

**[5] CO3 L3**

**d)** Consider the given snapshot of the system.The available resources in the system is given as (3 3 2 1 ). Use the Banker's algorithm to illustrate that the system is in the safe state by showing the order in which the processes may complete .

**[5] CO3 L3**

| Process | Max     | Allocation | Need    |
|---------|---------|------------|---------|
|         | A B C D | A B C D    | A B C D |
| P0      | 4 2 1 2 | 2 0 0 1    | 2 2 1 1 |
| P1      | 5 2 5 2 | 3 1 2 1    | 2 1 3 1 |
| P2      | 2 3 1 6 | 2 1 0 3    | 0 2 1 3 |
| P3      | 1 4 2 4 | 1 3 1 2    | 0 1 1 2 |
| P4      | 3 6 6 5 | 1 4 3 2    | 2 2 3 3 |

- 2 a) Compare the memory organization schemes of Contiguous Allocation with fixed size and variable size , Segmentation and Paging with respect to 1)External Fragmentation 2)Internal Fragmentation 3)Ability to share code across processes.

[6] CO4 L2

*Comparison with respect to internal fragmentation,external fragmentation and sharing code -2 marks each*

- b) Explain the following terms in brief 1)Virtual Memory, 2)Compaction 3)Thrashing 4)Belady's Anomaly

[8] CO4 L2

- c) Consider the following page sequence 4 , 7, 6, 1, 7, 6, 1, 2, 7, 2 and explain the working of page replacement policies .Considering 3 frames calculate the number of page faults and the number of page hits for each of the given policies: 1)FIFO 2)Optimal 3) LRU

[6] CO4 L3

- 3 a) Several file system structures are used to implement a file system. Describe these structures with its significance in the file system implementation ( 4 marks) . How these structures are used in the open() system call (4 marks) ? Support your answer with a diagram.

[8] CO5 L3

- b) Differentiate between Mandatory Locks and Advisory Locks

[2] CO5 L2

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**14 JUNE 2023**

## **TY BTECH SEMESTER - V RE-EXAMINATION BACKLOG 2016 PATTERN 2022-2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **RE-EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 Hours**

**MAX MARKS : 100**

**TOTAL NO OF QUESTIONS: 6**

**TOTAL NO OF PRINTED PAGES:4**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

**1 a) How does the system calls provide an interface to the [5] CO1 L2 services made available by an operating system.**

*Definition and explanation of system call 2M, types of system calls-1M, Example-2M*

**b) Compare hard and soft real time operating systems [5] CO1 L2 with an example for each. Which type of OS is used in Air Traffic control system.?**

*Comparison -2 marks, Example for each -2 marks, Correct Identification -1 mark*

**2 a) What is the relationship between threads and [5] CO2 L2 processes?**

*Definition of Process 1M, Definition of threads 1M, the relationship between process and thread -3M*

**b) What is a process control block and explain the [5] CO2 L2 components of the process control block**

*Explanation -5 marks*

c) During execution of Web Browser applications how the [5] CO2 L3 server is able to provide the similar types of services to different clients with the help of multithreading.

*Definition of multithreading -2M,Explanation -3M.*

d) Can a multithreaded solution using multiple user level [5] CO2 L3 threads achieve better performance on a multiprocessor system than on a single processor system ? Explain.

*Correct identification – 1 mark,*

*Correct Explanation -4 marks*

3 a) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is SJF pre-emptive, calculate the average waiting time and average turnaround time. *Correct answer with intermediate steps-5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 3            | 1          |
| P2      | 1            | 4          |
| P3      | 4            | 2          |
| P4      | 0            | 6          |
| P5      | 2            | 3          |

b) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is Round Robin with time quantum=2 , calculate the average waiting time and average turnaround time.

*Correct answer with all intermediate steps- 5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 5          |
| P2      | 1            | 3          |
| P3      | 2            | 1          |
| P4      | 3            | 2          |
| P5      | 4            | 3          |

- c) How many times the word hello will be printed by the [5] CO2 L3 given module

```
#include<stdio.h>
#include<unistd.h>
int main()
{
 fork();
 fork();
 printf(" hello");
 return 0;
}
```

*Correctly stating the no of times hello is printed-1 mark, Correct explanation -4 marks*

- d) Briefly explain the criterias for the optimization of CPU [5] CO2 L2 scheduling algorithms with example

*For each criteria with example-1 mark*

- 4 a) What is a Critical Section problem? Give the conditions [8] CO3 L2 that a solution to the critical section problem must satisfy.

*Critical section problem -2 marks, Conditions -6 marks*

- b) What is Dining Philosophers problem? Discuss the [8] CO3 L3 solution to Dining philosopher's problem

*Dining philosopher problem-2 marks , Solution with pseudocode-6 marks*

- c) Discuss various techniques to recover from deadlock [4] CO3 L2

- 5 a) For the given below page sequence , discuss the [9] CO4 L3 working of the LRU, FIFO and Optimal page replacement policies by considering 4 frames . Also count the no of page faults for each algorithm.

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

*3 marks for each page replacement policy*

- b) Explain the data structures used for Demand paging in [5] CO4 L2 UNIX

*Diagram -2 marks & explanation 3 marks*

- c) Explain the following terms in brief :- [6] CO4 L2**
- 1) Compaction 2) Belady's Anomaly 3) Thrashing  
Two marks for each
- 6 a) Making use of example , explain the different allocation [6] CO5 L3 methods**  
*For each method -1M for explanation and 1 Mark for example*
- b) Explain the file system layout in UNIX [4] CO5 L2**  
*Diagram -1 Mark ,Explanation 3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T**

**14 JUNE 2023**

## **TY BTECH SEMESTER - V RE-EXAMINATION 2022-2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **RE-EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 Hours**

**MAX MARKS : 100**

**TOTAL NO OF QUESTIONS: 6      TOTAL NO OF PRINTED PAGES: 4**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

**1 a)** How does the system calls provide an interface to the [5] CO1 L2 services made available by an operating system.

*Definition and explanation of system call 2M, types of system calls-1M, Example-2M*

**b)** Compare hard and soft real time operating systems [5] CO1 L2 with an example for each. Which type of OS is used in Air Traffic control system.?

*Comparison -2 marks, Example for each -2 marks, Correct Identification -1 mark*

**2 a)** What is the relationship between threads and [5] CO2 L2 processes?

*Definition of Process 1M, Definition of threads 1M, the relationship between process and thread -3M*

**b)** What is a process control block and explain the [5] CO2 L2 components of the process control block

*Explanation -5 marks*

c) During execution of Web Browser applications how the [5] CO2 L3 server is able to provide the similar types of services to different clients with the help of multithreading.  
*Definition of multithreading -2M,Explanation -3M.*

d) Can a multithreaded solution using multiple user level [5] CO2 L3 threads achieve better performance on a multiprocessor system than on a single processor system ? Explain.

*Correct identification – 1 mark,*

*Correct Explanation -4 marks*

3 a) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is SJF pre-emptive, calculate the average waiting time and average turnaround time. *Correct answer with intermediate steps-5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 3            | 1          |
| P2      | 1            | 4          |
| P3      | 4            | 2          |
| P4      | 0            | 6          |
| P5      | 2            | 3          |

b) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is Round Robin with time quantum=2 , calculate the average waiting time and average turnaround time.

*Correct answer with all intermediate steps- 5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 5          |
| P2      | 1            | 3          |
| P3      | 2            | 1          |
| P4      | 3            | 2          |
| P5      | 4            | 3          |

- c) How many times the word hello will be printed by the [5] CO2 L3 given module

```
#include<stdio.h>
#include<unistd.h>
int main()
{
 fork();
 fork();
 printf(" hello");
 return 0;
}
```

*Correctly stating the no of times hello is printed-1 mark, Correct explanation -4 marks*

- d) Briefly explain the criterias for the optimization of CPU [5] CO2 L2 scheduling algorithms with example

*For each criteria with example-1 mark*

- 4 a) What is a Critical Section problem? Give the conditions [8] CO3 L2 that a solution to the critical section problem must satisfy.

*Critical section problem -2 marks, Conditions -6 marks*

- b) What is Dining Philosophers problem? Discuss the [8] CO3 L3 solution to Dining philosopher's problem

*Dining philosopher problem-2 marks , Solution with pseudocode-6 marks*

- c) Discuss various techniques to recover from deadlock [4] CO3 L2

- 5 a) For the given below page sequence , discuss the [9] CO4 L3 working of the LRU, FIFO and Optimal page replacement policies by considering 4 frames . Also count the no of page faults for each algorithm.

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

*3 marks for each page replacement policy*

**b)** Explain the data structures used for Demand paging in [5] CO4 L2 UNIX

*Diagram -2 marks & explanation 3 marks*

**c)** Explain the following terms in brief :- [6] CO4 L2

1) Compaction 2) Belady's Anomaly 3) Thrashing

*Two marks for each*

**6 a)** Making use of example , explain the different allocation [6] CO5 L3 methods

*For each method -1M for explanation and 1 Mark for example*

**b)** Explain the file system layout in UNIX [4] CO5 L2

*Diagram -1 Mark ,Explanation 3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS341T**

**14 JUNE 2023**

## **TY BTECH SEMESTER - V RE-EXAMINATION 2022-2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **RE-EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 Hours**

**MAX MARKS : 100**

**TOTAL NO OF QUESTIONS: 6      TOTAL NO OF PRINTED PAGES: 4**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

**1 a)** How does the system calls provide an interface to the [5] CO1 L2 services made available by an operating system.

*Definition and explanation of system call 2M, types of system calls-1M, Example-2M*

**b)** Compare hard and soft real time operating systems [5] CO1 L2 with an example for each. Which type of OS is used in Air Traffic control system.?

*Comparison -2 marks, Example for each -2 marks, Correct Identification -1 mark*

**2 a)** What is the relationship between threads and [5] CO2 L2 processes?

*Definition of Process 1M, Definition of threads 1M, the relationship between process and thread -3M*

**b)** What is a process control block and explain the [5] CO2 L2 components of the process control block

*Explanation -5 marks*

c) During execution of Web Browser applications how the [5] CO2 L3 server is able to provide the similar types of services to different clients with the help of multithreading.  
*Definition of multithreading -2M,Explanation -3M.*

d) Can a multithreaded solution using multiple user level [5] CO2 L3 threads achieve better performance on a multiprocessor system than on a single processor system ? Explain.

*Correct identification – 1 mark,*

*Correct Explanation -4 marks*

3 a) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is SJF pre-emptive, calculate the average waiting time and average turnaround time. *Correct answer with intermediate steps-5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 3            | 1          |
| P2      | 1            | 4          |
| P3      | 4            | 2          |
| P4      | 0            | 6          |
| P5      | 2            | 3          |

b) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is Round Robin with time quantum=2 , calculate the average waiting time and average turnaround time.

*Correct answer with all intermediate steps- 5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 5          |
| P2      | 1            | 3          |
| P3      | 2            | 1          |
| P4      | 3            | 2          |
| P5      | 4            | 3          |

- c) How many times the word hello will be printed by the [5] CO2 L3 given module

```
#include<stdio.h>
#include<unistd.h>
int main()
{
 fork();
 fork();
 printf(" hello");
 return 0;
}
```

*Correctly stating the no of times hello is printed-1 mark, Correct explanation -4 marks*

- d) Briefly explain the criterias for the optimization of CPU [5] CO2 L2 scheduling algorithms with example

*For each criteria with example-1 mark*

- 4 a) What is a Critical Section problem? Give the conditions [8] CO3 L2 that a solution to the critical section problem must satisfy.

*Critical section problem -2 marks, Conditions -6 marks*

- b) What is Dining Philosophers problem? Discuss the [8] CO3 L3 solution to Dining philosopher's problem

*Dining philosopher problem-2 marks , Solution with pseudocode-6 marks*

- c) Discuss various techniques to recover from deadlock [4] CO3 L2

- 5 a) For the given below page sequence , discuss the [9] CO4 L3 working of the LRU, FIFO and Optimal page replacement policies by considering 4 frames . Also count the no of page faults for each algorithm.

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

*3 marks for each page replacement policy*

**b)** Explain the data structures used for Demand paging in [5] CO4 L2 UNIX

*Diagram -2 marks & explanation 3 marks*

**c)** Explain the following terms in brief :- [6] CO4 L2

1) Compaction 2) Belady's Anomaly 3) Thrashing

*Two marks for each*

**6 a)** Making use of example , explain the different allocation [6] CO5 L3 methods

*For each method -1M for explanation and 1 Mark for example*

**b)** Explain the file system layout in UNIX [4] CO5 L2

*Diagram -1 Mark ,Explanation 3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**14 JUNE 2023**

## **TY BTECH SEMESTER - V RE-EXAMINATION BACKLOG 2016 PATTERN 2022-2023 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **RE-EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 3 Hours**

**MAX MARKS : 100**

**TOTAL NO OF QUESTIONS: 6**

**TOTAL NO OF PRINTED PAGES:4**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks

**1 a) How does the system calls provide an interface to the [5] CO1 L2 services made available by an operating system.**

*Definition and explanation of system call 2M, types of system calls-1M, Example-2M*

**b) Compare hard and soft real time operating systems [5] CO1 L2 with an example for each. Which type of OS is used in Air Traffic control system.?**

*Comparison -2 marks, Example for each -2 marks, Correct Identification -1 mark*

**2 a) What is the relationship between threads and [5] CO2 L2 processes?**

*Definition of Process 1M, Definition of threads 1M, the relationship between process and thread -3M*

**b) What is a process control block and explain the [5] CO2 L2 components of the process control block**

*Explanation -5 marks*

c) During execution of Web Browser applications how the [5] CO2 L3 server is able to provide the similar types of services to different clients with the help of multithreading.  
*Definition of multithreading -2M,Explanation -3M.*

d) Can a multithreaded solution using multiple user level [5] CO2 L3 threads achieve better performance on a multiprocessor system than on a single processor system ? Explain.

*Correct identification – 1 mark,  
Correct Explanation -4 marks*

3 a) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is SJF pre-emptive, calculate the average waiting time and average turnaround time. *Correct answer with intermediate steps-5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 3            | 1          |
| P2      | 1            | 4          |
| P3      | 4            | 2          |
| P4      | 0            | 6          |
| P5      | 2            | 3          |

b) Consider the set of 5 processes whose arrival time and [5] CO2 L3 burst time are given below.If the CPU scheduling policy is Round Robin with time quantum=2 , calculate the average waiting time and average turnaround time.

*Correct answer with all intermediate steps- 5 marks*

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 5          |
| P2      | 1            | 3          |
| P3      | 2            | 1          |
| P4      | 3            | 2          |
| P5      | 4            | 3          |

- c) How many times the word hello will be printed by the [5] CO2 L3 given module

```
#include<stdio.h>
#include<unistd.h>
int main()
{
 fork();
 fork();
 printf(" hello");
 return 0;
}
```

*Correctly stating the no of times hello is printed-1 mark, Correct explanation -4 marks*

- d) Briefly explain the criterias for the optimization of CPU [5] CO2 L2 scheduling algorithms with example

*For each criteria with example-1 mark*

- 4 a) What is a Critical Section problem? Give the conditions [8] CO3 L2 that a solution to the critical section problem must satisfy.

*Critical section problem -2 marks, Conditions -6 marks*

- b) What is Dining Philosophers problem? Discuss the [8] CO3 L3 solution to Dining philosopher's problem

*Dining philosopher problem-2 marks , Solution with pseudocode-6 marks*

- c) Discuss various techniques to recover from deadlock [4] CO3 L2

- 5 a) For the given below page sequence , discuss the [9] CO4 L3 working of the LRU, FIFO and Optimal page replacement policies by considering 4 frames . Also count the no of page faults for each algorithm.

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

*3 marks for each page replacement policy*

- b) Explain the data structures used for Demand paging in [5] CO4 L2 UNIX

*Diagram -2 marks & explanation 3 marks*

- c) Explain the following terms in brief :- [6] CO4 L2**
- 1) Compaction 2) Belady's Anomaly 3) Thrashing  
Two marks for each
- 6 a) Making use of example , explain the different allocation [6] CO5 L3 methods**  
*For each method -1M for explanation and 1 Mark for example*
- b) Explain the file system layout in UNIX [4] CO5 L2**  
*Diagram -1 Mark ,Explanation 3 marks*

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**18 SEPTEMBER 2023**

## **TY BTECH SEMESTER -V BACKLOG 2016 PATTERN 2023 - 2024 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING**

#### **MID SEMESTER EXAMINATION**

#### **OPERATING SYSTEM**

**TIME : 2 HOUR**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES: 2**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. ALL Questions are compulsory

|           |                                                                                                                                                                                                                                                                                    |            |            |           |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|-----------|
| <b>1</b>  | <b>a)</b> With a neat sketch explain the System Kernel of Unix<br><i>Diagram -2 marks &amp; explanation -3 marks</i>                                                                                                                                                               | <b>[5]</b> | <b>CO1</b> | <b>L2</b> |
| <b>b)</b> | During execution of Web Browser applications how the server is able to provide the similar types of services to different clients. Identify the OS concept and explain with respect to above application. <i>Identification -1M,Explanation -4M.</i>                               | <b>[5]</b> | <b>CO2</b> | <b>L3</b> |
| <b>c)</b> | Explain the distinguishing features of<br>i). Real time system ii) Multiprocessor system<br>Give examples for each of the above systems<br><i>For each system with example 2.5 marks</i>                                                                                           | <b>[5]</b> | <b>CO1</b> | <b>L2</b> |
| <b>d)</b> | Describe the significance of operating system functionalities. <i>[1 mark for each significance ]</i>                                                                                                                                                                              | <b>[5]</b> | <b>CO1</b> | <b>L2</b> |
| <b>2</b>  | <b>a)</b> wait() system call plays a major role in termination of child process.Justify your answer                                                                                                                                                                                | <b>[5]</b> | <b>CO2</b> | <b>L3</b> |
| <b>b)</b> | What are the advantages of multiple threads over multiple processes? What major disadvantage do they have?Suggest one application that would benefit from the use of threads, and one that would not<br><i>[2marks advantages ,1mark disadvantage, and 2marks for application.</i> | <b>[5]</b> | <b>CO2</b> | <b>L2</b> |
| <b>c)</b> | Compare short-term,medium-term, and long-term schedulers                                                                                                                                                                                                                           | <b>[5]</b> | <b>CO2</b> | <b>L2</b> |

- 3 a) Consider the following set of processes, with the arrival time, burst time given in milliseconds and the priority (lowest number is the highest priority). Draw the Gantt chart and calculate the average waiting time and turn around time, considering 1) FCFS (Considering Arrival Time) and 2) Pre-emptive priority scheduling

**FCFS-2marks, Pre-emptive Priority-3 marks**

[5] CO2 L3

| Process | Burst Time<br>in ms | Priority | Arrival<br>Time |
|---------|---------------------|----------|-----------------|
| P1      | 8                   | 4        | 0               |
| P2      | 6                   | 1        | 1               |
| P3      | 1                   | 2        | 3               |
| P4      | 9                   | 2        | 6               |

- b) Consider the following set of processes, with the burst time given in milliseconds. Draw the Gantt chart and calculate the average waiting time and turn around time, considering Round Robin Scheduling algorithm

| Process | Burst Time<br>in ms |
|---------|---------------------|
| P1      | 8                   |
| P2      | 6                   |
| P3      | 1                   |
| P4      | 9                   |

[5] CO2 L3

- c) Process P1 has created a child process C1. Choose any IPC mechanism to send and receive data between P1 and C1 with clear elaborate steps

[5] CO2 L3

# **MIT ACADEMY OF ENGINEERING**

COURSE CODE: CS341T

18 SEPTEMBER 2023

## **TY BTECH SEMESTER - V 2019 REGULAR 2023 - 2024 EXAMINATION**

### **DEPARTMENT OF COMPUTER ENGINEERING MID SEMESTER EXAMINATION OPERATING SYSTEM**

**TIME : 2 HOUR**

**MAX MARKS : 50**

**TOTAL NO OF QUESTIONS: 3**

**TOTAL NO OF PRINTED PAGES:2**

#### **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
2. Non programmable scientific calculators are allowed
3. Black figures to the right indicate full marks
4. ALL Questions are compulsory

**1 a)** With a neat sketch explain the System Kernel of Unix.  
*Diagram -2 marks & explanation -3 marks*

**[5] CO1 L2**

**b)** During execution of Web Browser applications how the server is able to provide the similar types of services to different clients. Identify the OS concept and explain with respect to above application. *Identification -1M,Explanation -4M.*

**[5] CO2 L3**

**c)** Explain the distinguishing features of  
i)Real time system ii) Multiprocessor system  
Give examples for each of the above systems  
*For each system with example 2.5 marks*

**[5] CO1 L2**

**d)** Describe the significance of operating system functionalities.  
*1 mark for each significance*

**[5] CO1 L2**

**2 a)** wait() system call plays a major role in termination of child process.Justify your answer.

**[5] CO2 L3**

- b)** What are the advantages of multiple threads over multiple processes? What major disadvantage do they have? Suggest one application that would benefit from the use of threads, and one that would not.

**[5] CO2 L2**

**[ 2 marks advantages ,1mark disadvantage, and 2 marks for application]**

- c)** Compare short-term, medium-term, and long-term scheduler.

**[5] CO2 L2**

- 3 a)** Consider the following set of processes, with the arrival time, burst time given in milliseconds and the priority (lowest number is the highest priority) Draw the Gantt chart and calculate the average waiting time and turn around time, considering 1) FCFS (Considering Arrival Time ) and 2) Pre-emptive priority scheduling

**FCFS-2 marks, Pre-emptive Priority-3 marks**

| Process | Burst Time<br>in ms | Priority | Arrival<br>Time |
|---------|---------------------|----------|-----------------|
| P1      | 8                   | 4        | 0               |
| P2      | 6                   | 1        | 1               |
| P3      | 1                   | 2        | 3               |
| P4      | 9                   | 2        | 6               |

**[5] CO2 L3**

- b)** Consider the following set of processes with the burst time given in milliseconds .Draw the Gantt chart and calculate the average waiting time and turn around time, considering Round Robin Scheduling algorithm

| Process | Burst Time<br>in ms |
|---------|---------------------|
| P1      | 8                   |
| P2      | 6                   |
| P3      | 1                   |
| P4      | 9                   |

**[5] CO2 L3**

- c)** Process P1 has created a child process C1. Choose any IPC mechanism to send and receive data between P1 and C1 with clear elaborate steps

**[5] CO2 L3**

# **MIT ACADEMY OF ENGINEERING**

**COURSE CODE: CS301T**

**23 JANUARY 2024**

**TY BTECH SEMESTER - V RE-EXAMINATION BACKLOG 2019 PATTERN  
2023 - 2024 EXAMINATION**

**DEPARTMENT OF COMPUTER ENGINEERING**

**RE-EXAMINATION**

**OPERATING SYSTEM**

**TIME : 3 hours**

**MAX MARKS : 80**

**TOTAL NO OF QUESTIONS: 06**

**TOTAL NO OF PRINTED PAGES:03**

## **INSTRUCTIONS TO CANDIDATES:**

1. Assume suitable data wherever necessary
  2. Non programmable scientific calculators are allowed
  3. Black figures to the right indicate full marks
- 1 a)** Define operating system. Explain RTOS services in [6] CO1 L2 contrast with traditional OS.  
*(Definition : 2 marks,RTOS services:4 marks)*
- b)** Explain the concept of a System Call. Illustrate the [8] CO1 L2 different types of system calls?  
*(Concept of system call with diagram:4 marks,Types with 3 examples each:4 marks)*
- 2 a)** Explain five state process model with diagram. [4] CO2 L2
- b)** Compare the following types of Schedulers 1.Short [6] CO2 L2 term 2. Long term 3. Medium term  
*(2 marks each)*
- c)** How does pipe perform interprocess [6] CO2 L3 communication?  
*(Concept of pipe:2 marks,types with explanation and differences:4 marks)*
- 3 a)** What is meant by Threads on OS? Explain the [5] CO2 L2 multithreading models with diagram.

- b)** Draw Gantt chart and calculate Avg. turnaround time, [5] CO2 L3  
 Avg. waiting time for the following process using Round robin algorithm with time quantum 3 Units

| Process | Burst Time |
|---------|------------|
| P1      | 5          |
| P2      | 3          |
| P3      | 8          |
| P4      | 6          |

- 4 a)** What is a semaphore? Illustrate the use of semaphore [4] CO3 L3 in the solution of the critical section problem.
- b)** Briefly describe any one of the classical problems of [6] CO3 L2 synchronization.  
 i) Reader -Writer Problem  
 ii) The Dining -Philosopher Problem
- c)** The OS contains 3 resources. The number of [6] CO3 L3 instances available for each resource type are 7,7,10. The current resource allocation state is shown below.  
 1. Calculate the need matrix  
 2. Find out the safe sequence showing the step wise calculation  
*(1 mark for calculating Need Matrix, 5 marks for safe sequence)*

| Process | Allocation |   |   | Max |   |   |
|---------|------------|---|---|-----|---|---|
|         | A          | B | C | A   | B | C |
| P0      | 2          | 2 | 3 | 3   | 6 | 8 |
| P1      | 2          | 0 | 3 | 4   | 3 | 3 |
| P2      | 1          | 2 | 4 | 3   | 4 | 4 |

**5 a)** Three solutions to the dynamic storage allocation [6] CO4 L3 storage problems are first-fit, best-fit and worst-fit. Consider a memory block which has partitions of the following sizes and in the following order: 46 Kbytes ,200 Kbytes ,350 Kbytes, 60 Kbytes, and 679 Kbytes. Determine in which partition a 55 Kbyte process should be placed under each scheme above. Justify your choice of partition in each case.

**b)** Explain the following terms in brief [8] CO4 L2  
1)Demand Paging 2)LRU 3)Belady's Anomaly

**6 a)** Describe the disk space allocation methods in the [6] CO5 L2 operating system (*2 marks each*)

**b)** Explain the Role based Access Control in Unix through [4] CO5 L2 an example.