

**OPERATING SYSTEM WITH LINUX  
(DSC2202)**

**Time Allotted : 2½ hrs**

**Full Marks : 60**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and  
any 4 (four) from Group B to E, taking one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group – A**

1. Answer any twelve:

**12 × 1 = 12**

*Choose the correct alternative for the following*

- (i) What OS to be chosen which is applicable to systems that require time bound response?  
(a) RTOS (b) Distributed OS  
(c) Embedded OS (d) Networked OS
- (ii) Which of the following command is used to count the total number of lines, words, and characters contained in a file?  
(a) wc (b) wccount (c) wc -c (d) countw
- (iii) Identify the false statement:  
(a) Threads take less time to terminate (b) Threads take less time  
(c) Threads share memory (d) Thread has its own PCB
- (iv) If fork is called n times successfully how many child process executed simultaneously?  
(a) n (b)  $2^n - 1$  (c)  $2^n$  (d) n-1
- (v) If a process is executing in its critical section, then no other process can be executing in their critical section. This condition is called  
(a) mutual exclusion (b) critical exclusion  
(c) synchronous exclusion (d) asynchronous exclusion.
- (vi) A state is safe, if  
(a) the system does not crash due to deadlock occurrence  
(b) the system can allocate resources to each process in some order and still avoid a deadlock  
(c) the state keeps the system protected and safe  
(d) all of these.
- (vii) Authentication and OTP are examples of  
(a) security Measures (b) threats  
(c) access matrix (d) global table

- (viii) The time required to create a new thread in an existing process is  
 (a) greater than the time required to create a new process  
 (b) less than the time required to create a new process  
 (c) equal to the time required to create a new process  
 (d) none of the above.
- (ix) Which of the following is hidden inside useful program and gets activated when the program contain them is executed  
 (a) logic bomb (b) Trojan horse  
 (c) backdoor (d) virus
- (x) When an intruder pretend to be a valid host in a communication, by breaching the authentication and then gain access for which they are not entitled is called  
 (a) spoofing (b) DoS  
 (c) Man-in-middle attack (d) none

*Fill in the blanks with the correct word*

- (xi) A problem encountered in multitasking when a process is perpetually denied necessary resources is called \_\_\_\_\_ .
- (xii) If no cycle exists in the resource allocation graph the system is \_\_\_\_\_ .
- (xiii) Semaphore is a/an \_\_\_\_\_ to solve the critical section problem.
- (xiv) The OS running on virtual machine is sometimes called guest OS is known as \_\_\_\_\_.
- (xv) \_\_\_\_\_ virus is designed such that it tries to hide itself in entirely from any detection.

### **Group - B**

2. (a) Explain the difference between multiprocessing, multiprogramming, multi-user and multitasking OS. [[C01](Remember/LOCQ)]  
 (b) Explain how multiprogramming operating system increases CPU utilization. [[C01](Analyze/IOCQ)]  
 (c) How a system call is executed? Explain with an example. [[C01](Analyze/HOCQ)]  
**6 + 3 + 3 = 12**
3. (a) What are the fundamental differences between mobile phone processing system and a multi- core desktop processing system? [[C01](Remember/LOCQ)]  
 (b) What do you mean by batch processing? How is it different from serial processing? [[C01](Remember/LOCQ)]  
 (c) What is the purpose of the command interpreter? What do you mean by OS kernel? [[C01](Remember/IOCQ)]  
**4 + 4 + 4 = 12**

### **Group - C**

4. (a) There are 3 processes P1,P2,P3 with process time 20,30 and 10 unit respectively. Each process uses the first 30% of its process time in CPU and then 50% in I/O and last 20% in CPU again. Find average waiting time, average turn- around time

and response time if system follows FCFS scheduling. Draw Gantt chart and find out CPU utilization and CPU Idle time.

[[CO2](Analyse/IOCQ)]

(b) What is aging? Which scheduling algorithm suffers from aging? What is the solution of aging?

[[CO2](Analyse/LOCQ)]

(c) What are co-operating processes? Discuss the advantages of co-operating processes.

[[CO2](Remember/LOCQ)]

$$6 + 3 + 3 = 12$$

5. (a) Consider the following set of processes, with the length of the CPU burst time is given in millisecond.

| Process | Arrival Time | Burst Time | Priority |
|---------|--------------|------------|----------|
| P1      | 0            | 10         | 5        |
| P2      | 2            | 6          | 1        |
| P3      | 3            | 3          | 3        |
| P4      | 5            | 9          | 4        |
| P5      | 6            | 7          | 2        |

Draw a Gantt chart. Illustrate the execution of these processes in pre-emptive priority (higher number implies a higher priority) scheduling. Find the completion time and response time. Find the average waiting time and average turnaround time.

[[CO2](Apply/LOCQ)]

(b) Compare all non pre-emptive algorithms.

[[CO2](Remember/LOCQ)]

(c) What is I/O burst and CPU burst? How do they affect the performance of multiprogramming?

[[CO2](Apply/IOCQ)]

$$5 + 3 + (2 + 2) = 12$$

### Group - D

6. (a) In a system, the following state of processes and resources are given:  
R2->P1, P1->R2,,P2->R3,R1->P2, R3->P3, P3->A4, P4-R3, R4->P4, P4->R1, R1->P5.  
Draw a RAG and wait-for-graph for the system and check the deadlock condition.

[[CO4](Analyse/LOCQ)]

(b) Consider the following system with the following information. Determine if the system is in safe state

| R1 | R2 | R3 | R4 |
|----|----|----|----|
| 10 | 5  | 7  | 8  |

| Process | Max |    |    |    | Allocation |    |    |    |
|---------|-----|----|----|----|------------|----|----|----|
|         | R1  | R2 | R3 | R4 | R1         | R2 | R3 | R4 |
| P1      | 4   | 2  | 0  | 2  | 4          | 2  | 0  | 2  |
| P2      | 1   | 0  | 0  | 0  | 1          | 0  | 0  | 0  |
| P3      | 3   | 1  | 2  | 1  | 0          | 1  | 3  | 1  |
| P4      | 1   | 0  | 2  | 0  | 0          | 0  | 0  | 0  |
| P5      | 0   | 1  | 1  | 3  | 1          | 0  | 1  | 2  |

Determine if the system will be in safe state if requests arrives from P1 for 2 instances of R2 and one instance of R4.

[[CO4](Remember/LOCQ)]

$$(2 + 2 + 2) + (3 + 3) = 12$$

7. (a) Write classical dining philosopher problem using semaphore? What is the drawback of this algorithm? Write an algorithm to solve the problem of classical dining philosopher problem. [[C04](Remember/HOCQ)]
- (b) Consider a system with following information. Determine if the system is in deadlock situation?

| R1 | R2 | R3 |
|----|----|----|
| 5  | 6  | 4  |

| Process | Max |    |    | Allocation |    |    |
|---------|-----|----|----|------------|----|----|
|         | R1  | R2 | R3 | R1         | R2 | R3 |
| P1      | 1   | 0  | 2  | 4          | 2  | 0  |
| P2      | 1   | 1  | 0  | 1          | 0  | 0  |
| P3      | 1   | 1  | 0  | 0          | 1  | 3  |
| P4      | 0   | 2  | 1  | 0          | 0  | 0  |
| P5      | 1   | 2  | 0  | 1          | 0  | 1  |

- (c) If P4 requests one instance of resource type R2. Find out whether the system is in deadlock state. [[C04](Analyse/LOCQ)]

$$[[C04](Analyse/IOCQ)]$$

$$(2 + 4) + 3 + 3 = 12$$

### Group - E

8. (a) What is stealth virus? Based on their technique to hide themselves describe stealth virus. [[C06](Analyse/LOCQ)]
- (b) Differentiate between virus, worms and bots. [[C06](Remember/LOCQ)]
- (c) What is session hijacking? [[C06](Remember/LOCQ)]
- $$(1 + 4) + 6 + 1 = 12$$
9. (a) What are the different relationships between role user and access right? [[C06](Analyse/HOCQ)]
- (b) Explain password authentication. Explain how password authentication is prone to attack? [[C06](Remember/LOCQ)]
- (c) What is malware? How DoS attack is implemented? [[C06](Remember/LOCQ)]
- $$3 + (2 + 3) + (2 + 2) = 12$$

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| Cognition Level         | LOCQ  | IOCQ  | HOCQ |
|-------------------------|-------|-------|------|
| Percentage distribution | 66.67 | 20.83 | 12.5 |