*Total number of printed pages–4*



**53 (IT 502) OPSY**

**2021**

# OPERATING SYSTEM

Paper : IT 502

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*

1. Answer in short : 2×10=20

   *(a)* What is a spinlock ?

   *(b)* State the priority inversion problem.

   *(c)* What is a critical region ?

   *(d)* What is a thread ?

   *(e)* What is a safe state ?

   *(f)* What is process control block ?

*Contd.*

(g) What are the disadvantages of single contigious memory allocation ?

(h) What is demand paging ?

(i) What is semaphore ?

(j) What are the functionalities of reincarnation server and init processes ?

2. (a) What is a process ? Explain the various states of processes with state transition diagram. 5

(b) Write the functions and syntaxes of *any five* processes and I/O related system calls. 5

(c) What is race condition ? What are the four different conditions needed to hold for avoiding race condition ? 5

(d) Give the Peterson's solution to the critical section problem. 5

3. (i) How does deadlock avoidance differ from deadlock prevention ? Write about a deadlock avoidance algorithm in detail. 4+6=10

(ii) Why should Page replacement be performed ? Compare FIFO, Optimal and LRU page replacement algorithms. 3+7=10

4. *(i)* What are the throughout and turnaround time ? Consider 5 processes and their CPU burst time, then discuss how shortest job first scheduling is more optimal than first come first serve. 10

*(ii)* Consider the following processes arrived for execution at the time indicated : 10

| **Process** | **Arrival time** | **Burst time (*ms*)** |
|---|---|---|
| P1 | 0 | 10 |
| P2 | 1 | 2 |
| P3 | 2 | 3 |
| P4 | 3 | 1 |
| P5 | 4 | 5 |

Draw the Gantt chart and calculate the average turnaround time for each process using Round Robin Scheduling Algorithm. 10

5. *(i)* Compare and contrast the following policies of resource allocation : 15

*(a)* All resources request together

*(b)* Allocation using global numbering

*(c)* Allocation using Banker's Algorithm

(ii) What is swapping and when is it used ? 5

6. Write short notes on : ***(any four)*** 5×4=20

(i) Readers-Writers Problem

(ii) Timesharing *vs* Multiprogramming

(iii) Process Control Block

(iv) Priority Inversion Problem

(v) Monolithic System.