**SEMESTER EXAMINATION-2021**
**CLASS – B.SC.5TH SEMESTER    SUBJECT: COMPUTER SCIENCE**
**PAPER CODE: BCS-E501**
**PAPER-TITLE: OPERATING SYSTEMS**

**Time: 3 hour**                                                                        **Max. Marks: 70**
                                                                                          **Min. Pass: 40%**

**Note:** Question Paper is divided into two sections: **A and B.** Attempt both the sections as per given instructions.


**SECTION-A**
**(Short Answer Type Questions)**


**Note**: Answer any five questions in about 150 words each. Each question carries six marks.                                                                        (5 x 6=30)

1. What are the four functions performed by an operating system? Discuss each in brief.
2. State the difference among the three terms: process, program and PCB.
3. Point out the role of device driver and device controller in handling the peripherals.

4. Justify the statement: Paging supports the system view whereas segmentation supports the user's view  of memory
5. How critical section is a problem in process synchronization? How is it solved using synchronized hardware

6. Given memory partitions of 100K, 400K, 150 K, 300 K and 600 K (in order), how would each of first- fit and best-fit algorithm allocate processes of 212 K, 315 K, 120 K and 420 K (in order)?
7. Give an overviewof internal fragmentation and external fragmentation in memory. Explain the technique to overcome the external fragmentation.
8. Describe the differences among short-term, medium-term, and long-term schedulers.
9.  Explain the following:     (a) File attributes   (b) File Operations

10. What is the role of access control lists in protection? Explain in brief.

# SECTION B
## (Long Answer Type Questions)

**Note:** Answer any four questions in detail. Each question carries ten marks.

(4 x 10=40)

11. Write down the essential features of the following types of operating system:
    (a) Client-Server
    (b) Time Sharing
    (c) Network

12. Consider the paging system with page table stored in memory.
    a. If a memory reference takes 250 nanoseconds, how long does a paged memory reference take?
    b. If we add TLBs, and 80% of all page-table reference are found in the TLBs, what is the effective memory reference time? (Assume that it takes 5 nanosecond to search the TLB)

13. Describe the essential features of layered and micro-kernel based architecture of operating system with suitable diagram.

14. Consider a system with a set of processes P1, P2 and P3 and their CPU burst times, priorities and arrival times being mentioned as below:

| Process | CPU burst time | Arrival time | Priority |
|---------|----------------|--------------|----------|
| P1      | 4              | 0            | 2        |
| P2      | 10             | 1            | 3        |
| P3      | 5              | 2            | 1        |

Assuming 1 to be highest priority, calculate the following:

(a) Draw the Gantt Chart illustrating the execution of these processes using SJF and priority scheduling.
(b) Average waiting time using SJF and priority scheduling
(c) Time around time of each process using SJF and priority scheduling.

15. What do you understand by process synchronization? Discuss the dining philosophers problem and its possible solution.

16. Define the directory system. What are the different logical structures of directory system? Explain each with example.

17. What is the role of page replacement algorithms?  Consider the following reference string :1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

How many page fault will occur for LRU page replacement?Assume three frames are empty.

18. Explain the following:
   (a)    System call
   (b)    Deadlock conditions
   (c)    Mutex
   (d)    Process scheduling Queue