[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5710 **J**

Unique Paper Code : 2513012005

Name of the Paper : Operating Systems

Name of the Course : **B.Sc. (H) Electronics (DSE)**

Semester : IV – Under NEP UGCF Mode

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **seven** questions in all. Question **1** is compulsory. Attempt **four** more questions from the remaining **six** questions.
3. **All** questions carry equal marks.

1. Compulsory Question

   (a) Differentiate between multiprogramming and multitasking. (3)

   (b) List the major responsibilities of the operating system in memory and file system management. (3)

   (c) What are the different types of CPU scheduling algorithms? List any two with their merits. (4)

   (d) What is fragmentation? Differentiate between internal and external fragmentation. (4)

   (e) Briefly explain the concept of disk scheduling. Name any two disk scheduling algorithms. (4)

2. (a) Explain the architecture of a clustered system. How is it different from a multiprocessor system? (9)

   (b) Discuss the role of an operating system in the management of : (9)

   (i) I/O devices

   (ii) Mass storage

   (iii) Security and Protection

P.T.O.

3. (a) Compare and explain any two of the following CPU scheduling algorithms with suitable examples : (10)
   (i) FCFS
   (ii) SJF
   (iii) Round Robin

   (b) What is a critical section problem? Explain how semaphores can be used to solve it. (8)

4. (a) Define deadlock. Discuss the conditions necessary for a deadlock to occur. (8)

   (b) Explain any **two** techniques for deadlock : (10)
   (i) Prevention
   (ii) Avoidance (with Banker's algorithm)
   (iii) Detection and Recovery

5. (a) Explain the concept of paging and segmentation. Compare them with the help of diagrams. (8)

   (b) What is virtual memory? Discuss the working of demand paging with an example. (5)

   (c) Illustrate how LRU and FIFO page replacement algorithms work with a reference string example. (5)

6. (a) What are the different directory structures used in operating systems? Explain any two. (8)

   (b) Describe the following in detail : (10)
   (i) File allocation methods
   (ii) Free-space management techniques in file systems

7. (a) Explain and compare the following disk scheduling algorithms: (12)
   (i) FCFS
   (ii) SSTF
   (iii) SCAN
   (iv) C-SCAN

   (b) How can performance be improved using different disk scheduling policies? Support your answer with suitable examples. (6)