[Time: 2½ Hours] **[Marks: 75]**

Please check whether you have got the right question paper.

N.B:
1. **All** questions are **compulsory.**
2. **Make suitable assumptions** wherever necessary and **state the assumptions** made.
3. Answers to the **same question** must be **written together.**
4. Numbers to the **right** indicate **marks.**
5. Draw **neat labeled diagrams** wherever **necessary.**
6. Use of **Non-programmable** calculators is **allowed.**

1. Attempt **any three** of the following: **15**
a. Define Operating System. Explain the role of OS as extended machine.
b. Write a short note on fifth generation Operating System.
c. Explain the micro kernel approach of Operating System design.
d. List and explain any five system calls used in process management.
e. Explain process states and possible transitions among these states using diagram.
f. List the three categories and goals of scheduling algorithms.

2. Attempt **any three** of the following: **15**
a. Explain the concept of running multiple programs without memory abstraction.
b. Write a note on swapping.
c. Explain page table and Structure of a Page Table Entry using suitable diagram.
d. Write a short note on Single-Level & Hierarchical Directory Systems.
e. Define file. Explain any four operations associated with file.
f. Explain disk quotas.

3. Attempt **any three** of the following: **15**
a. Write a note on device controller.
b. Explain RAID in details with its different levels (any four).
c. Write a short note on Touch Screen.
d. What are Preemptable and Non-preemptable Resources? Explain.
e. Define Deadlock. List the four conditions that must hold for there to be a deadlock.
f. Explain recovery from deadlock through preemption and rollback.

4. Attempt **any three** of the following: **15**
a. Explain type- 1 and type -2 hypervisor using suitable diagram.
b. Write a note on clouds.
c. What are the requirements of virtualization?
d. Write a note on I/O virtualization.
e. Explain using suitable diagram multicomputer hardware interconnection technology.
f. Write any five comparisons between multiprocessor and distributed system.

5. Attempt **any three** of the following: **15**
a. Explain using suitable diagram the kernel structure of Linux operating system.
b. Explain the booting of Linux operating system.
c. List and explain the design goals of android operating system.
d. List Win 32 calls for managing processes and threads.
e. Explain using suitable diagram NTFS master file table and its attribute.
f. Briefly explain windows power management.