Operating System
Sessional-1

Ans 1)

a) An operating system is basically a collection of software that manages computer hardware resources and provides common services for computer programs.

Time-sharing operating system is one of the important type of system. It enables many people, located at various terminals, to use a particular computer system at the same time. Processors time is shared among multiple users simultaneously is termed as time-sharing.

b)

Multiprogramming	Multitasking
- In multiprogramming, multiple programs execute at a same time on a single device.	- In multitasking, a single resource is used to process multiple tasks.
- The process resides in the main memory	- The process resides in the same CPU.
- It uses batch OS. The CPU is utilized completely while execution.	- It is time sharing as the task assigned switches regularly.
- the processing is slower, as a single job resides in the main memory while execution	- It follows the concept of content switching.

c) An operating system is a program on which application programs are executed and acts as a communication bridge (interface) between the users and the computer system.
The main task an operating system carries out is the allocation of resources and services, such as the allocation of memory, devices, processors and information.

Important functions of an operating system:

(i) Security
(ii) Error detecting
(iii) Control over system performance
(iv) Memory management
(v) Processor management
(vi) File management
(vii) Device management
(viii) Coordination of software and users.

d) Real-time operating system are used in enviornments where a large number of events, mostly external to the computer system, must be accepted and processed in a short time or within deadlines.

Such applications are industrial control, flight control, telephone equipment and real-time simulations.

With a RTOS, the processing time is measured in tenth of seconds. This system is time-bound and has a fixed deadline.

Ex:- Airline traffic control systems, reservation systems, Robot etc.

e) Thread

— A thread is a path of execution within a process. A process can contain multiple threads. It is also known as lightweight process.

The idea is to achieve parallelism by dividing a process into multiple threads.

For example:- in a browser, multiple tabs can be different threads. MS word uses multiple threads: one thread to format the text, another thread to process inputs etc.

Ques 2)

B) Fragmentation

- Fragmentation is an unwanted problem in the operating system in which the processes are loaded and unloaded from memory, space and free memory space is fragmented.

Processes can't be assigned to memory blocks due to their small size and the memory blocks stay unused. It is also necessary to understand that as programs are loaded and deleted from memory, they generate free space or a hole in the memory. This resulting in inefficient memory use.

The conditions of fragmentation depends on the memory allocation system.

Types

(i) Internal Fragmentation
(ii) External Fragmentation

⇒ Internal Fragmentation

When a process is allocated to a memory block and if the process is smaller than the amount of memory requested, a free space is created in the given memory block. Due to this, the free space of the memory block is unused, which causes internal fragmentation.

⇒ External Fragmentation

It happen when a dynamic memory allocation method allocated some memory but leaves a small amount of memory unusable. The quantity of available memory is substantially reduced if there is too much external fragmentation.

There is enough memory space to complete a request, but it is not contiguous.

Ques 3,

A) Memory Management

— Memory is the important part of the computer that is used to store the data. Its management is critical to the computer system because the amount of main memory available in a computer system is very limited.
Moreover, to increase performance, several processes are executed simultaneously.

- Memory management is used to keep track of the status of memory locations, whether it is free or allocated.
- It permits computers with a small amount of main memory to execute programs larger than the size of available memory.
- It is responsible for protecting the memory allocated to each process from being corrupted.
- It enable sharing of memory space between processes.

Types

① Single contiguous Allocation
— It is the easiest memory management. In this, all types of computer's memory except a small portion which is reserved for the OS is available for one application.

② Paged memory Management
— This method divides the computer's main memory into fixed-size units known as page frames.

③ Segmented Memory Management
— This method does not provide the user's program with a linear and contiguous address space.

④ ~~Partitioned~~ Partitioned Allocation
— It divides primary memory into various memory partitions, which is mostly contiguous areas of memory.