

23/4/18

Indian Institute of Engineering Science and Technology, Shibpur  
Dual Degree (B.Tech. & M.Tech.) 6<sup>th</sup> Semester End-Term Examination, April 2018  
Department of Computer Science and Technology  
Operating Systems (CS 601)

Full Marks: 70

Time: 3 hours

- Attempt any five questions. All questions carry equal marks.
  - Answers should be precise, to the point and in your own words as far as practicable.
  - Make your own assumptions as and when necessary and state them at proper places.
1. (a) With the help of a suitable diagram explain the general ideas of logical address and physical address. In this context state how the address of a program variable may change during compilation, loading, and execution of a program.  
(b) Explain the benefits of demand paging. [8 + 6]
  2. (a) Consider the command "*cp file1 file2*" under Unix operating system to copy a file *file1* to another file *file2*. Explain how different modules of the kernel are involved to execute this command.  
(b) Mention the objectives to be fulfilled while designing the organization of files and directories in a filesystem. [7 + 7]
  3. (a) In the context of a Computer System explain the roles of "*Hardware Interface*", "*BIOS Interface*", and "*System Call Interface*".  
(b) Explain with examples the different allocation strategies for file systems along with their merits and demerits. [7 + 7]
  4. (a) Both processes and threads can perform tasks through execution of programs. Briefly state for what type of tasks we should go for a new process and for whom we should go for a new thread.  
(b) Explain the properties of semaphore with respect to Linux Operating System.  
(c) Compare "*pipe*" and "shared memory" as interprocess communication tools. [6 + 4 + 4]
  5. (a) Explain why *files* and *open files* are treated separately within the kernel.  
(b) Explain how device files in Unix enable us to use the same file-interface over input/output devices.  
(c) Justify why it is needed to differentiate between character devices and block devices at kernel level. [5 + 5 + 4]

6. (a) Present a comparative study between deadlock prevention and avoidance.  
(b) "*Presence of a cycle in the resource allocation graph in a system with multiple instances of resources does not necessarily indicate a deadlock.*" - Explain with example(s).  
(c) Explain the different approaches for deadlock recovery along with their merits and demerits.

[6 + 4 + 4]

7. Write short notes on any two from the following.

- (a) Disk Scheduling  
(b) Domain of Protection and Linux  
(c) Block size and fragmentation in a filesystem

[7 + 7]