Indian Institute of Engineering Science and Technology, Shibpur

B. Tech. (CST) 6th Semester End-Term Examination, May 2023

Operating Systems (CS 3201) Time: 3 hours

Full Marks: 50

- **Attempt any five (5) 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, if necessary, and state them at proper places.**

1. (a) Enumerate and explain under what conditions a process goes into wait state and ready state.
   (b) Explain with suitable example(s) when and how the operating system code gets invoked in a running system. [5+5]

2. Explain with suitable diagram(s) what is performed at different levels of the **Filesytem Subsystem** of **Operating System** during *open*() and *read*() system calls. [10]

3. You are aware of the strategies for Deadlock **Prevention** and **Avoidance**. Assume that you are required to incorporate those strategies within the operating system. For each of those strategies propose exactly where within the operating system it can be incorporated. [10]

4. (a) How is Dynamic Memory Allocation (say, *malloc* in C or *new* in C++ programs) handled during execution of a program?
   (b) Explain with example(s) what you understand by the term **metadata of a file**. What are the different options for storing these metadata in the filesystem organization and what are the pros and cons of each of those options? [5+5]

5. (a) Why does Operating System have two different sets of system calls for character devices and blocks devices?
   (b) Conceptually, can a physical IO device be accessed as both character device and block device? Explain you answer.
   (c) Explain why filesystems are created on block devices and not on character devices. [3+3+4]

6. Write short notes on ~~any two of~~ the following.
   (a) pthread
   (b) **dup()** and **dup2()** system calls [5+5]