CENTRE: MAIN

COURSE CODE: IIT 3211

COURSE TITLE: OPERATING SYSTEMS

EXAM VENUE: LR 6   **STREAM: BSc. Computer Security & Forensics**

DATE: 9/12/2013   **EXAM SESSION: 11.30 – 1.30 PM**

TIME: 2 HOURS

Instructions:

1. **Answer question 1 (Compulsory) and ANY other 2 questions.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE

a) State the various actions an operating system performs when a new process is created.
[4 Marks]

b) Explain four fundamental states for a process. [4 Marks]

c) List typical functionalities of an OS Kernel. [4 Marks]

d) What are disadvantages of the layered OS model based on Kernels that became primary motivation for a microkernel? [4 Marks]

e) Not every unsafe state leads to a deadlock. Give an example to show that the processes in an unsafe state complete their execution without entering a deadlock state. [4 Marks]

f) Explain the functionality of each of the following and give their differences: [6 Marks]
      (i) Short-term scheduler
      (ii) Medium-term scheduler
      (iii) Long-term scheduler components.

g) What four conditions must be fulfilled for a deadlock to occur? [4 Marks]

QUESTION TWO

a) Joe Smart says "If you want to schedule processes to minimize the TOTAL wait time of all processes, it is quite easy. Just use the Shortest Jobs First rule."
      i) Explain what Joe means. [2 Marks]
      ii) Prove or argue why Joe is right. [3 Marks]
      iii) Discuss the issues raised by this Smart idea and how we can resolve them. [3 Marks]

b) Compare and contrast process and thread [4 Marks]

c) One of the design decisions in OS memory management is the choice between swapping
.   and paging. Define each of these terms, and clarify their respective roles in OS memory
.   management. [4 Marks]

    d) State and explain two different techniques with which a file can be shared among different users. [4 Marks]

QUESTION THREE

a) Briefly describe each of the three different techniques for organizing the data blocks for each file in a file system, namely contiguous allocation, linked allocation, and indexed allocation. Identify their strengths and weaknesses. [6 Marks]

b) Define system calls and briefly describe any three system calls for performing different tasks [8 Marks]

c) Differentiate between pre-emptive and non-pre-emptive scheduling, give two examples of each. [6 Marks)

QUESTION FOUR

a) Draw the state diagram of a process from its creation to termination, including all transitions, and briefly elaborate every state and every transition. [8 Marks]

b)   Define the following   [6 Marks]

        (i) Process Control Block; (PCB)
        (ii) Multi programming;
        (iii)Time sharing.

C)   What are interrupts? How are they handled by the operating system?   [6 Marks]

QUESTION FIVE

a) Explain critical section problem in relation to process synchronization. List various requirements that critical section problem solution must satisfy.   [8 Marks]

b) Differentiate between the following   [6 Marks]

i). Shell and Kernel

ii) Deadlock and Starvation

c) Briefly discuss the virtual memory concept and page replacement algorithm. [6 Marks]