Motilal Nehru National Institute of Technology
Department of Computer Science & Engineering
Mid Term Examination 2018-19
Operating Systems (CA 3351), MCA- 3th Sem.

Duration- 1hour 30 minutes **Max. Marks: 20**

Attempt all questions. Assume if something missing.

1. An I/O-bound program is one that, if run alone, would spend more time waiting for I/O than using the processor. A processor-bound program is the opposite. Suppose a short-term scheduling algorithm favors those programs that have used little processor time in the recent past. Explain why this algorithm favors I/O-bound programs and yet does not permanently deny processor time to processor-bound programs. **(2)**

2. **(a)** What are the steps performed by an operating system to create a new process? What is process image? **(2)**
   (b) Define *thread*? What resources are typically shared by all of the threads of a process? **(2)**

3. Consider the following set of processes, with the length of the CPU burst and arrival time, given in milliseconds: **(2+2=4)**

Process	Arrival Time	Burst Time
P_1	0	12
P_2	1	3
P_3	2	1
P_4	3	4
P_5	5	6

   i. Draw the Gantt chart that illustrate the execution of these processes using the following scheduling algorithms: Shortest Remaining Time First (SRTF) and Round Robin (time quantum q=1).
   ii. Which of the following algorithm result in the minimum average waiting time and maximum throughput?

4. Consider a preemptive priority scheduling algorithm based on dynamically changing priorities. Larger priority numbers imply higher priority. When a process is waiting for the CPU (in the ready queue, but not running), its priority changes at a rate α; when it is running, its priority changes at a rate β. All processes are given a priority of 0 when they enter the ready queue. The parameters α and β can be set to give many different scheduling algorithms. Give proper justification for your answer. **(2+2=4)**
   a. What is the algorithm that results from $\beta > \alpha > 0$?
   b. What is the algorithm that results from $\alpha < \beta < 0$?

5. Consider six processes with burst time and arrival time as per scenario given below. Consider the largest Remaining time first (LRTF) scheduling algorithm. In LRTF, ties are broken by giving priority to the process with the highest process id.

a. Draw a Gantt chart to represent the processes execution flow. **(2)**

b. Find the average waiting time and throughput of the system. **(2+2=4)**

Processes	Arrival Time	Burst Time
P_0	0	7
P_1	2	4
P_2	3	1
P_3	4	6
P_4	6	4
P_5	7	8