BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : IV**
BRANCH: IT **SESSION : SP/19**

SUBJECT: IT4023 OPERATING SYSTEM CONCEPTS

TIME: 3 Hours **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) What is the key difference between Batch processing systems and Multi-programming systems? [2]
Q.1(b) What do you mean by System call? List various system calls. [4]
Q.1(c) Explain any three structures of operating systems. [6]

Q.2(a) What do you mean by context switch? [2]
Q.2(b) Define Thread. Explain various multithreading models. [4]
Q.2(c) Discuss various inter process communication techniques in detail. [6]

Q.3(a) What are the scheduling criteria? [2]
Q.3(b) Discuss the major issues in multi-CPU scheduling. [4]
Q.3(c) Consider the following processes in a system [6]

Process	Burst Time	Arrival time	Priority (1 is min)
P1	12	0	1
P2	8	1	3
P3	8	4	2
P4	2	5	4
P5	3	6	4
P6	5	8	3

Use Shortest Job First (preemptive), Priority (preemptive) and Round Robin (time quantum – 2 unit) algorithms to run the processes. Show Gantt chart and compute average waiting time.

Q.4(a) What is the critical section problem (CSP)? [2]
Q.4(b) Explain whether the following one is a good solution of CSP? If not, then discuss why? [4]

```
Process Pi
  do {
       flag[i] = true; // initially flag[i] = false for all i. flag[i] = true ⇒ Pi ready to enter CS
       while (flag[j]) ;
        --- critical section ---
       flag [i] = false;
        --- remainder section ---
      }
```

Q.4(c) Find a good solution of the CSP and prove that your solution satisfies all the required criteria. [6]

Q.5(a) What are the necessary conditions of deadlock? [2]
Q.5(b) Discuss how to prevent occurrence of these conditions. [4]
Q.5(c) Apply Bankers algorithm on the following data to find a safe sequence. Now, if P0 requests [2 1 1] more resources, will the system fulfil the request? [6]

	Allocation	Max	Total
	A B C	A B C	A B C
P0	0 1 0	7 5 3	10 5 7
P1	2 0 0	3 2 3	
P2	3 0 2	9 0 2	
P3	2 1 1	2 2 2	
P4	0 0 2	4 3 3	

PTO

Q.6(a)	Consider a logical address space of 8 pages of 1024 addressable words each, mapped onto a physical memory of 32 frames. How many bits are there in the logical and physical address?	[2]
Q.6(b)	Given six memory partitions {M1 .. M6} = {120, 200, 250, 300, 150, 600} and five processes of size {P1 .. P5} = {180, 190, 450, 260, 920}. Apply best fit and worst fit strategy to allocate these processes and show the process-partition (Pi → Mj) mapping.	[4]
Q.6(c)	Consider following page reference string to find page fault when 3 frames are given using (i) Optimal (ii) LRU (iii) Second Chance algorithms. Access the string (pages) one-by-one and show the content of the data structure used. 2, 1, 6, 2, 3, 4, 2, 1, 3, 5, 6, 2, 1, 2, 3, 4, 6, 3, 4, 2, 1, 2, 3, 6, 1.	[6]
Q.7(a)	Define File.	[2]
Q.7(b)	Discuss various file access methods.	[4]
Q.7(c)	Write short notes on (i) disk structure (ii) Thrashing.	[6]

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