M.Sc. DEGREE EXAMINATION, FEBRUARY 2010.

Second Semester

Computer Science

DCS 122 — OPERATING SYSTEMS

(Regulation 2007)

Time : Three hours
Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of multiprocessor systems?

2. What are the contents of PCB?

3. What are the three different types of threads?

4. Write the pseudo code for mutual-exclusion with swap instruction.

5. What are the necessary conditions for the occurrence of a deadlock situation?

6. Write any two differences between logical and physical addresses.

7. What is pure demand paging?

8. What are the different file operations?

9. Name the different disk scheduling algorithms.

10. What is bit vector method?
PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain briefly about distributed systems. (8)
(ii) Explain about computing environment. (8)

Or

(b) What is inter process communication? Explain in detail about it. (16)

12. (a) What is the meaning of the term busy waiting? Explain why spin locks are not appropriate for uniprocessor systems yet may be suitable for multiprocessor systems. (16)

Or

(b) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

<table>
<thead>
<tr>
<th>Process</th>
<th>Burst Time</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>P2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>P3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>P4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>P5</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at a time 0.

(i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non preemptive priority and RR (quantum = 1) scheduling. (8)

(ii) What is the waiting time of each process for each of the scheduling algorithms in part (i)? (2)

(iii) Which of the schedules in part (i) results in the minimal average waiting time? (2)

(iv) What is the turnaround time of each process for each of the scheduling algorithms in part (i)? (4)
13. (a) (i) Explain the following allocation algorithms: (12)
   (1) First Fit
   (2) Best Fit
   (3) Worst Fit.

   (ii) State the differences between internal fragmentation and external
        fragmentations with an example. (4)

Or

(b) Consider the following snapshot of a system for the resources ABCD: (16)

<table>
<thead>
<tr>
<th>Allocation</th>
<th>Max</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABCD</td>
<td>ABCD</td>
<td>ABCD</td>
</tr>
<tr>
<td>P0</td>
<td>0012</td>
<td>0012</td>
</tr>
<tr>
<td>P1</td>
<td>1000</td>
<td>1750</td>
</tr>
<tr>
<td>P2</td>
<td>1354</td>
<td>2356</td>
</tr>
<tr>
<td>P3</td>
<td>0632</td>
<td>0652</td>
</tr>
<tr>
<td>P4</td>
<td>0014</td>
<td>0656</td>
</tr>
</tbody>
</table>

Answer the following questions using the banker's algorithm:

(i) What is the content of the matrix Need?

(ii) Is the system in a safe state?

(iii) If a request from process P1 arrives for (0, 4, 2, 0) can the request
      be granted immediately?

14. (a) Explain in detail the Directory Structure and Implementation. (16)

Or

(b) Explain the following page replacement algorithms with suitable examples:

   (i) LRU (6)

   (ii) LRU Approximation page replacement (4)

   (iii) FIFO. (6)

15. (a) Explain Disk Management in detail. (16)

Or

(b) (i) Explain DMA in detail. (8)

(ii) Write a short note on polling. (8)