SECTION A: COMPULSORY QUESTION **{30 MARKS}**

Question 1

a) What is the function of the ready queue? (3mks)

a) What are the three major activities of an operating system in regard to memory management? (6mks)

b) Describe the two general roles of an operating system, and elaborate why these roles are Important? (4mks)

c) Name some advantages and disadvantages of user-level threads? (4mks)

d) Give an example where contiguous allocation of file blocks on disks can be used in practice? (4mks)

a) Explain the differences in the degree to which the following scheduling algorithms discriminate in favor of short processes: (6mks)

i. FCFS
ii. RR
iii. Multilevel feedback queues

e) What are the advantages of peer-to-peer systems over client-server systems? (3mks)

SECTION B: ANSWER ANY TWO QUESTIONS **{20 MARKS EACH}**

Question 2

a) Explain different operating system structures with neat a sketch? (8mks)

b) Describe the three state process model, describe what transitions are valid between the three states, and describe an event that might cause such a transition. (12mks)

Question 3

a) What is a critical region? How do they relate to controlling access to shared resources? (4mks)

b) What are three requirements of any solution to the critical sections problem? Why are the requirements needed? (6mks)

c) Explain the general strategy behind deadlock prevention, and give an example of a practical deadlock prevention method. (10mks)

81368

Question 4

a) What is the difference between external and internal fragmentation? **(4mks)**

b) What is the minimum number of page faults for an optimal page-replacement strategy for the following reference string with four page frames? **(5mks)**

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2

c) Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), how would each of the

i. first-fit, **(3mks)**

ii. best-fit, and **(3mks)**

iii. worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? **(3mks)**

iv. Which algorithm makes the most efficient use of memory? **(2mks)**

Question 5

a) Let processes P1, P2, and P3 arrive at the ready queue in that order and let the run times (CPU burst times) of these processes be as follows: Draw the Grant Chart, and calculate the waiting and average waiting time . If these processes arrived in the following order: P2, P3, P1, compare the results. (These processes are served by the CPU in FCFS order.) **(10mks)**

process	CPU BURST
P1	24
P2	3
P3	3

b) Assume there are 4 ready processes with their next CPU burst time as follows:

processes	Next CPU Burst Time
P1	6
P2	8
P3	7
P4	3

Using the SJF scheduling algorithm, draw the Grant Chart and calculate the waiting and average waiting time. Secondly, if the processes (in order P1, P2, P3, P4) are scheduled using the FCFS algorithm then what would be the scores? **(10mks)**