

**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**

**Department of Computer Science and Engineering (CSE)**

**SEMESTER FINAL EXAMINATION**

**WINTER SEMESTER, 2017-2018**

**DURATION: 3 Hours**

**FULL MARKS: 150**

**CSE 4501: Operating Systems**

Programmable calculators are not allowed. Do not write anything on the question paper.

There are 8 (eight) questions. Answer any 6 (six) of them.

Figures in the right margin indicate marks.

1. a) What is mode of operation in OS? Show the transition with diagram from one mode to another and explain. 1+4+2  
 b) Write down advantages and disadvantages of layered approach. 4+4  
 c) List the operating system services helpful for the user as well as required for efficient operation of the system itself. (List them separately) 7+3
  
2. a) Despite having worse hardware, why apple devices perform better than android devices? 5  
 b) What is PCB? Describe the process information stored in PCB. 1+7  
 c) Consider how to implement a mutex lock using an atomic hardware instruction. Assume that the following structure defining the mutex lock is available: 6+6  

```
typedef struct {
    int available;
} lock;
```

 (available == 0) indicates that the lock is available, and a value of 1 indicates that the lock is unavailable. Using this struct, illustrate how the following functions can be implemented using the test and set() and compare and swap() instructions:  
 • void acquire(lock \*mutex)  
 • void release(lock \*mutex)  
 Be sure to include any initialization that may be necessary.
  
3. a) What is a dispatcher? Write down the functionalities of a dispatcher. 1+3  
 b) Differentiate (at least three) between Preemptive & Non-preemptive scheduling. 6  
 c) How the burst time for the next process is predicted in SJF? Explain with necessary formula and figure. 10  
 d) What is multi-level feedback queue? What are the parameters to define such queue? 5
  
4. a) Define processor affinity & load balancing. 2+4+4  
 Differentiate:  
 i. Soft & Hard affinity  
 ii. Push & Pull Migration  
 b) Mention one of the major drawbacks of Priority Scheduling, give a real-life example. What is the method used to deal with this problem? 8  
 c) What is the thumb rule to determine quantum time for RR scheduling? Can RR be used as FCFS? If yes, describe how with example. 2+5



5. a) Why process scheduling is required?

b)

<u>Process ID</u>	<u>Burst Time</u>	<u>Arrival Time</u>
01	10	3
02	3	0
03	1	1
04	5	4
05	7	5

Draw process schedule diagram, determine start and finish time, average wait time and average turnaround time for the following scheduling algorithm: 4×6

- i. FCFS
- ii. Preemptive SJF
- iii. Non-Preemptive SJF
- iv. RR(QT = 5)

6. a) What is a thread? Describe single and multi-threaded structure with figures. 2+6
- b) Describe different multi-threading models with figures. 12
- c) List the benefits of multi-threading. 5
7. a) Differentiate among first fit, best fit & worst fit in terms of memory allocation. 12
- b) What is fragmentation? Describe different types of fragmentation with figures. What are the ways to handle them? 8
- c) Describe Segmentation. How is it different from paging? 3+2
8. a) List the advantages and disadvantages of paging. 7
- b) Discuss on different program threats and system threats. 10
- c) What are the main ways to allocate disk spaces to files? Briefly describe them. 8