

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-IV (OLD) - EXAMINATION – SUMMER 2018**

**Subject Code: 140702**

**Date: 28/05/2018**

**Subject Name: Operating System**

**Time: 10:30 AM to 01:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) (i) How do wide varieties of storage structure differ in operating system? **04**  
(ii) What are the five major activities of an operating system with regard to file management? **03**
- (b) Consider the four processes with the length of the CPU burst given in milliseconds: **07**

| Process | Arrival Time | Burst time |
|---------|--------------|------------|
| P1      | 0            | 8          |
| P2      | 1            | 4          |
| P3      | 2            | 9          |
| P4      | 3            | 5          |

Draw the Gantt chart assuming preemptive shortest job first scheduling. Calculate the average waiting time for preemptive scheduling.

The shortest Job first is a special case of the general priority scheduling algorithm. True or False? Justify your answer.

- Q.2** (a) How does a parent process create a child process? How does a parent process create an ordinary pipe (anonymous pipe) for communicating with child process? Write the steps. **07**
- (b) (i) What advantage is there in having different time quantum sizes at different levels of a multilevel queueing system? **04**  
(ii) If each resource type has several instances, then a cycle does not necessarily imply that a deadlock has occurred. Explain with resource allocation graph. **03**

**OR**

- (b) (i) Which scheduling algorithm result in starvation? **04**  
(ii) Assuming a 1 KB page size, what are the page numbers and offsets for the following address references (provided as decimal numbers): **03**
- a. 2375
  - b. 19366
  - c. 30000

- Q.3 (a) (i)** What is the problem with interrupt driven I/O ? How is this problem solved? **04**
- (ii)** What are system calls? What is application programming interface? **03**
- (b)** What are two differences between user level threads and kernel level threads? Under what circumstances is one type better than the other? **07**

**OR**

- Q.3 (a)** How bounded buffer can be used to enable processes to share memory? Write the producer process and write consumer process. **07**
- (b)** What is a critical section problem? Explain Peterson's solution for critical section problem. **07**

- Q.4 (a)** For which system Banker's algorithm is applicable? Apply banker's algorithm to the following snapshot taken at time  $t_0$  and find out process execution sequence that lands a system in safe state. **07**

|                | Allocation |   |   | Max |   |   | Available |   |   |
|----------------|------------|---|---|-----|---|---|-----------|---|---|
|                | A          | B | C | A   | B | C | A         | B | C |
| P <sub>0</sub> | 0          | 1 | 0 | 7   | 5 | 3 | 3         | 3 | 2 |
| P <sub>1</sub> | 2          | 0 | 0 | 3   | 2 | 2 |           |   |   |
| P <sub>2</sub> | 3          | 0 | 2 | 9   | 0 | 2 |           |   |   |
| P <sub>3</sub> | 2          | 1 | 1 | 2   | 2 | 2 |           |   |   |
| P <sub>4</sub> | 0          | 0 | 2 | 4   | 3 | 3 |           |   |   |

- (b)** What is demand paging? For given reference string: a, b, c, d, c, a, d, b, e, b, a, b, c, d and the size of the frame be 4. How many page faults occur in case of FIFO policy? How many page faults occur in case of LRU? What is Belady's anomaly? **07**

**OR**

- Q.4 (a)** How Dining philosopher problem can be solved? **07**
- (b)** Given five memory partitions of 100Kb, 500Kb, 200Kb, 300Kb, 600Kb (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb, and 426 Kb (in order)? Which algorithm makes the most efficient use of memory? **07**

- Q.5 (a)** Explain file system structure and also explain allocation methods. **07**
- (b)** Write different process states. What is context switching? What are the contents of process control block? **07**

**OR**

- Q.5 (a)** What is kernel and shell in Unix operating system? Explain file structure of UNIX operating system. Which command is used to get list of all files along with permissions on that file in UNIX? **07**
- (b)** What are the goals of interrupt handlers? Write disk scheduling algorithm. **07**

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