S–11241

Register No. | | | | | | | | |

BE Degree Examination April 2016

Fourth Semester

Computer Science and Engineering

14CST42 – OPERATING SYSTEMS

(Regulations 2014)

Common to BTech Information Technology

Time: Three hours Maximum: 100 marks

Answer all Questions

Part – A (10 × 2 = 20 marks)

1. What is the purpose of system call?
2. List the functions of the OS with respect to the Process management.
3. Identity the different methods of interprocess communication.
4. Differentiate between process and thread.
5. Recall the issues to be addressed while using resource pre-emption for eliminating deadlock.
6. When does external fragmentation occur?
7. What are the attributes of file?
8. Define thrashing.
9. Consider a disk where blocks 2, 4, 5, 8, 9, 15, 16, 18 and 21 are free and the rest of the block are allocated. The total number of blocks is 25. Represent the free space list as a bit vector.
10. What do you mean by inode?

Part – B (5 × 13 = 65 marks)

11. a. How do you classify a computer system according to the number of general purpose processors used? Illustrate with appropriate sketches. (13)

(OR)

b. i) Enumerate the system calls used for process management. Give a brief note of them. (7)

ii) Depict the view of operating system services. Present a brief outline on how these services are helpful to the users. (6)

12. a. Consider the following set of processes, with burst time given in milliseconds (13)

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	2
P4	1	4
P5	3	1

The processes are assumed to be arrived in order of P1, P2, P3, P4, P5 all at time 0.

i) Draw Gantt charts that illustrate the execution of these proesses using the following algorithm. FCFS, SJF nonpreemptive priority (small priority number implies a higher priority).

ii) What is the turnaround time of each process for each of the scheduling algorithms?

iii) What is the waiting time of each process for each of the scheduling algorithm in?

iv) Which of the algorithm results in minimum average waiting time?

(OR)

b. What is the critical section problem? List the three requirements to be addressed by a solution to the critical section problem. Elaborate in detail any one solution to the critical section problem. (13)

13. a. In the following system: (13)

Max

	R1	R2	R3
P1	3	6	8
P2	4	3	3
P3	3	4	4

Allocation

	R1	R2	R3
P1	2	3	3
P2	2	0	3
P3	1	2	4

Available

R1	R2	R3
7	7	10

i) What is the "need" matrix?

ii) Is the current allocation state safe?

iii) Would the request by Process p1(1,1,0) be granted?

(OR)

b. i) Assuming 1 kB page size, what are the page numbers and offsets for the following address references (provided as decimal number) (8)

2346, 1824, 11105 and 256.

ii) Why are segmentation and paging schemes combined into one scheme? State the advantages and disadvantages. (5)

14. a. i) Compare and contrast different schemes for defining the logical structure of a directory. (7)

ii) What happens when a process tries to access a page that is not brought to the memory so for? How is this problem handled? (6)

(OR)

b. Suppose that a disk drive has 200 cylinders numbered from 0 to 199. The drive is currently serving a request at cylinder 126 and the previous request was at cylinder 96. The queue of pending requests in FIFO order is (13)

84, 155, 103, 96, 197.

Starting from the current head position, what is the total distance that the disk arm moves to satisfy all the pending requests for the following algorithms

FCFS, SSTF, SCAN, LOOK, CSCAN, CLOOK.

15. a. Classify the methods for allocating disk space. Highlight the salient features of each of them with suitable diagrams. (13)

(OR)

b. i) Identify the main components of a linux operating system. Bring out the role of these components. (7)

ii) Compare the functionalities of kernel module of linux, OS with that of windows OS. (6)

Part – C ($1 \times 15 = 15$ marks)

16. a. Consider the following page reference string: (15)

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

How many page faults would occur for the LRU, FIFO and optimal page replacement algorithms assuming one, two, three, four and five frames. All the frames are initially empty, so the first unique page would cost one fault each.

(OR)

b. i) Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212K, 417K, 112K and 426K (in order)? Which algorithm makes the most efficient use of memory? (11)

ii) State the four necessary conditions that must hold for the occurrence of a dead lock. (4)