MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

BCA-301

OPERATING SYSTEM

Time Allotted: 3 Hours   Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1.   Answer *all* questions.   10×1 = 10

   (i)   In the memory hierarchy, _____ is the slowest accessible memory

      (A) main memory   (B) secondary memory
      (C) cache memory   (D) CPU registers

   (ii) A process control block of a process contains

      (A) process state   (B) CPU-scheduling information
      (C) accounting information   (D) all of these

   (iii) Threads of a process do not share

      (A) memory space   (B) execution stack
      (C) file descriptor   (D) none of these

(iv) Dispatcher of an operating system

    (A) invokes a pager during page fault

    (B) is a scheduler

    (C) gives control of CPU to the process selected by short-term scheduler

    (D) gives control of CPU to the process selected by long-term scheduler

(v) SJF stands for

    (A) Shortest Job Frequency   (B) Shortest Job Factoring

    (C) Shortest Job First   (D) None of these

(vi) SSTF stands for

    (A) Shortest Seek Time First   (B) Shortest Search Time First

    (C) Shortest Seek Timing First   (D) Shortest Sleek Time First

(vii) Information of a process is stored as

    (A) linked list   (B) queue

    (C) process control block   (D) none of these

(viii) Semaphore can be implemented as

    (A) stack   (B) tree

    (C) queue   (D) hash table

(ix) Necessary conditions for deadlock are

    (A) mutual exclusion   (B) no preemption

    (C) hold and wait   (D) all of these

(x) In paging, logical address is mapped to

    (A) page number and page offset   (B) frame number and frame offset

    (C) page number and offset   (D) frame number and page offset

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.   3×5 = 15

2. Explain State Transition Diagram of a Process.   5

3. What are the necessary and sufficient conditions for deadlock to occur? What is thrashing?   4+1

4. What do you mean by Race Condition with respect to Producer – Consumer Problem? Explain how Race Condition can be avoided.   3+2

5. A computer provides each process with 65536 bytes of address space divided into 4096 bytes. A particular program has text size of 32768 bytes, data size of 16386 bytes and stack size of 15870 bytes. Will this program fit in the address space? If the page size were of 512 bytes, would it fit? Give reasons for all your answers.   3+2

6. Different memory partitions of 150 K, 820 K, 360 K and 350 K (in the given order) are present. Explain how best fit algorithm can be used to place a process of 315 K. What are the advantages and disadvantages of using best fit over worst fit and first fit algorithms?   2+3

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.   3×15 = 45

7. (a) Describe producers and consumers problem with an unbounded buffer with a sample program.   8

   (b) What is Process Migration? Write down the steps followed during process migration.   3+4=7

8. (a) Write and explain the logic of the "Bully algorithm for election of a successor" in a distributed system.   7

   (b) Briefly describe about the common failures in distributed systems.   6

   (c) What are the necessary conditions for deadlock?   2

9.   Consider the following page reference sequence: 15

     7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

        • Assume that the main memory is initially empty

        • The number of page frames is 3

   Calculate the Hit Ratios by the following algorithms:

     (i) FIFO

     (ii) LRU

     (iii) Optimal

10. (a) Suppose that a disk drive has 5000 cylinders, numbered from 0 to 4999. The drive is currently serving a request at cylinder 143 and the previous request was at cylinder 125. The queue of pending requests, in FIFO order is: 12

     86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

   Starting from the current head position, what will be the total distance the disk arm moves following the disk scheduling algorithms:

     (i) FCFS

     (ii) SSTF

     (iii) SCAN

     (iv) LOOK

     (v) C-SCAN

     (vi) C-LOOK

   (b) What is Spooling?   3

11.   Write short notes on any *three* of the following: 3×5

   (a) The Take-Grant Model

   (b) Multiprocessor scheduling

   (c) Artifact-based Authentication

   (d) DES

   (e) Digital Signature.