[This question paper contains 8 printed pages]

Your Roll No. : ....

Sl. No. of Q. Paper : **140** I

Unique Paper Code : 42344304

Name of the Course : **B.Sc.(Prog.)/ B.Sc. Math. Science**

Name of the Paper : Operating Systems

Semester : III

Time : 3 Hours *Maximum Marks : 75*

Instructions for Candidates :

   (a) Write your Roll No. on the top immediately on receipt of this question paper.

   (b) **Section - A** is compulsory.

   (c) Attempt any **five** questions from **Section-B**.

   (d) **All** parts of a question must be attempted together.

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Section - A

(Compulsory)

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1. (a) What is a fault tolerant system ?

2

(b) What system calls have to be executed by a command interpreter or shell in order to start a new process?   2

(c) Explain the convoy effect in CPU scheduling.   2

(d) What is memory compaction?   2

(e) Give difference between primitive and non-primitive scheduling. State why strict non-preemptive scheduling is unlikely to be used.   3

(f) Name **three** criteria based on which we can compare various CPU scheduling algorithms?   3

(g) What is dynamic loading?   2

(h) Explain how locality of reference helps in getting reasonable performance in demand paging?   3

(i) Why threads are called light weight processes?   2

(j) What is absolute pathname? Explain with the help of an example.   2

(k) What is the difference between "cp" and "mv" command of Unix?   2

Section - B

(Attempt any five)

2. (a) Explain **three** benefits of multi-threaded programming.   3

(b) How does cache help to improve system performance? What problems do they cause?   4

(c) What are the **three** advantages of multiprocessor systems?   3

3. (a) What is the purpose of the command interpreter ? Why is it usually separate from the kernel ? 3

   (b) Consider a paging system with the page table stored in memory. 4

   (i) If a memory reference takes 50 nanoseconds, how long does a paged memory reference take ?

   (ii) If we add TLBs, and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time ? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entry is present.)

   (c) Explain the difference between internal and external fragmentation. 3

4. (a) Draw a process state diagram and explain the state transitions. 5

   (b) Write the shell script to perform the following : 1×5=5

   (i) List the details of directories in the current working directory.

   (ii) Remove a file interactively.

   (iii) Compare two files while listing the unique lines of both the files

   (iv) Count the number of users currently logged in the system

   (v) Give permission to a file such that only the owner has execute permission

5. (a) Explain the layered approach of the OS structure. What are the advantages and disadvantages of layered approach to system design ? 5

   (b) What is a page fault ? How is it handled ? 5

6. (a) What is the role of a dispatcher ? 2

(b) Explain how the following scheduling algorithms favor short processes : 3

    (i) FCFS

    (ii) RR

    (iii) Multilevel feedback Queue

(c) What is the hardware support required for demand paging ? 2

(d) Give three cases where the entire program need not be in memory for execution. 3

7. Suppose the following processes arrive for execution at the time indicated :

Process	Burst Time	Arrival Time
P0	7	0
P1	4	1
P2	2	1
P3	3	3
P4	4	4

(i) Draw Gantt charts illustrating the execution of these processes using FCFS, SJF, RR (time quantum = 3). 3

(ii) What is the turnaround time for process P0, P3 in each of the scheduling algorithms ? 3

(iii) What is the average waiting time for the processes in each of the scheduling algorithms ? 3

(iv) Which algorithm gives minimum average waiting time ? 1

8. (a) Consider a logical address space of 64 pages of 1,024 bytes each, mapped onto a physical memory of 32 frames. 4

    (i) How many bits are there in the logical address ?

    (ii) How many bits are there in the physical address ?

(b) What is degree of multiprogramming ? Which scheduler controls the degree of multiprogramming ? Why ?   3

(c) What is a privileged instruction ? Explain its use with the help of an example.   3