U.G. 4th Semester Examination - 2022

COMPUTER SCIENCE

[PROGRAMME]
Course Code : COM.SC-G-CC-L-401D
(Operating Systems)

Full Marks : 60   Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in
their own words as far as practicable.

GROUP–A

1. Answer any **ten** questions: 2×10=20

    a)   What is an Operating System?

    b)   What are the responsibilities performed by operating system?

    c)   Explain the need of Bootstrap program in operating system.

    d)   Differentiate between multiprogramming and multiprocessing operating systems.

    e)   What are the uses of job queue, ready queue, and device queue?

    f)   Why are threads called light-weight processes?

    g)   What is a distributed operating system?

    h)   What is virtual address translation?

    i)   Explain locality of reference.

    j)   What is thrashing?

    k)   Why process synchronization is important?

    l)   What is the function of a dispatcher?

    m)   Name some shells of UNIX operating system.

    n)   What are the different modes of operations available for vi-editor?

    o)   What is the difference between micro kernel and monolithic kernel?

GROUP–B

2. Answer any **four** questions: 5×4=20

    a)   Explain different system calls provided by an operating system.   5

    b)   What are the various multi-threading models? Give some benefits of multithreaded programming.   1+4

c) Consider the following page reference string:
1 1 1 2 2 4 3 4 4 5 4 4 3 3 4 3 5 5 4 6 3 6 6 2.
If the number of free frames in memory is 3 then find the number of page faults for the following page replacement strategies: FIFO and Least Recently Used (LRU).   2.5+2.5

d) Write a shell script to find the factorial of a positive integer number. Number should be taken as command line argument.   5

e) Discuss the address translation process in paging scheme with suitable diagram.   5

f) Explain the following UNIX commands: grep, cut, tr.   5

GROUP–C

3. Answer any **two** questions: 10×2=20

a) Prepare a Gantt chart considering the arrival times and execution times for the following processes applying SRTF and RR with time quantum 5 as processes scheduling policies. Calculate the average waiting time, average turnaround time and CPU throughput for each case.   5+5

Process	Execution time	Arrival time
P1	18	0
P2	12	12
P3	7	20
P4	15	25

b) i) What is multiprocessing system?

ii) How operating system is protected from user access?

iii) Explain context switching.

iv) What is system program?

v) Discuss job of short-term scheduler.
     2+2+2+2+2

c) i) What do you mean by starvation and aging of process?

ii) Explain variable partitioning and fixed partitioning scheme of memory management.

iii) Explain process hierarchy.
     2+(2.5+2.5)+3

d) Write short notes on any **two** of the following:

$$5 \times 2 = 10$$

    i)   Loops in shell script

    ii)   Batch processing and times sharing system

    iii) Priority Scheduling

    iv) Write back and write through

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