QPC: RJ20BCA055 AY 21 / AY 22 Reg. No | | | | | | | | | | |

VZL

GIET UNIVERSITY, GUNUPUR – 765022

B. C. A (Third Semester) Examinations, January 2024

BCA20103 – Fundamental of Operating System

Time: 3 hrs Maximum: 70 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 =10 Marks)**

Q. 1 Answer ***ALL*** questions CO # PO #

a. To access the services of the operating system, the interface is provided by the _____ CO1 PO1

i. API ii. System calls
iii. Library iv. Assembly instructions

b. In a timeshare operating system, when the time slot assigned to a process is completed, the process switches from the current state to? CO1 PO1

i. Terminated state ii. Suspended state
iii. Ready state iv. Ready state

c. Page fault occurs when CO2 PO1

i. when a requested page is in the memory ii. when a exception is thrown
iii. when a requested page is not in the memory iv. when a page is corrupted

d. The essential content(s) in each entry of a page table is / are CO2 PO1

i. page frame number ii. access right information
iii. virtual page number iv. both virtual and page frame number

e. What are the minimum no.s of processes that can a deadlock have among themselves CO4 PO2

i. 4 ii. 3
iii. 2 iv. 1

f. What is a deadlock in an operating system? CO4 PO1

i. a scheduling algorithm ii. system crash
iii. A situation where a process cannot proceed because it is waiting for a resource held iv. process termination

g. How can deadlock prevention be achieved? CO4 PO1

i. By ensuring that at least one of the necessary conditions for deadlock cannot hold ii. Increasing the number of resources
iii. Ignoring the deadlock iv. Allow the system to enter deadlock and then recover

h. Three bits used to control access the in UNIX are represented by : CO2 PO1

i. x ii. r
iii. all of the above iv. w

i. In a group, all users get _____ access to a file. CO3 PO2

i. different ii. none of the mentioned

iii. same iv. similar

j. Assume that there are 3 page frames which are initially empty. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6, the number of page faults using the optimal replacement policy is_____. CO2 PO1

i. 8 ii. 6

iii. 7 iv. 5

PART – B: (Short Answer Questions) (2 x 10=20 Marks)

Q.2. Answer ***ALL*** questions		CO #	PO #
a.	Differentiate between system software and application software. What are the principles of the following replacement algorithms i) FIFO ii) LRU iii) optimal.	CO1	PO1
b.	Define system calls and Virtual machine.	CO1	PO2
c.	What is the advantages of threads compared to processes?	CO2	PO1
d.	How the problem of external fragmentation can be solved?	CO2	PO1
e.	What is demand paging?	CO2	PO1
f.	Suppose that we have free segments with sizes: 6, 17, 25, 14, and 19. Place a program with size 13kB in the free segment using first-fit, best-fit and worst fit.	CO2	PO2
g.	Mention the differences between i) Logical and physical address ii) Page table and segment table	CO2	PO2
h.	Mention various File Operations.	CO3	PO1
i.	What is a File?	CO3	PO1
j.	What are the various ways of aborting a process in order to eliminate deadlocks?	CO4	PO1

PART – C: (Long Answer Questions) (10 x 4= 40 Marks)

Answer *ALL* questions		Marks	CO #	PO #
3.a.	Evaluate Round Robin CPU Scheduling algorithm for given Problem, where Time slice =3 ms. Process P1 P2 P3 P4 Burst Time 10 5 18 6 Arrival Time 5 3 0 4. Find the avg. TAT and WT.	5	CO1	PO2
b.	Discuss the essential properties of the following types of systems: i) Time sharing systems ii) Multi-processor systems.	5	CO1	PO1
	(OR)			
c.	Discuss the services provided by the operating system for efficient system operation.	5	CO1	PO1
d.	"Operating system is resource manager"-Justify this statement with suitable functionality of OS.	5	CO1	PO1
4.a.	Explain the difference between External fragmentation and Internal fragmentation. How to solve the fragmentation problem using paging?	5	CO2	PO1

CO2 PO2

b.	Consider the following page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 How many page faults would occur for an optimal and FIFO? Explain Page replacement algorithm, assuming three frames and all the frames are initially empty.	5		
	(OR)			
c.	Explain how demand paging affects the performance of a computer system?	5	CO2	PO1
d.	Write in detail about Segmentation.	5	CO2	PO1
5.a.	What is a Critical Section problem? Give the conditions that a solution to the critical section problem must satisfy.	5	CO3	PO2
b.	What is Semaphore? Explain producer consumer problem using semaphore.	5	CO3	PO1
	(OR)			
c.	What is Directory? Explain the operations that can be performed on a Directory.	5	CO3	PO1
d.	Discuss in detail about file allocation methods.	5	CO3	PO1
6.a	Describe in detail conditions leading to Deadlocks.	5	CO4	PO1
b.	Consider the following system snapshot using data structures in the Banker's algorithm with resources A, B, C and D and process P0 to P4: Process Max A B C D- 6 0 1 2,1 7 5 0,2 3 5 6, 1 3 5 3, 13 5 6. Allocation A B C D- 1 0 0 1, 1 1 0 0, 1 2 5 4, 0 6 3 3, 1 2 1 2. Available A B C D- 3 2 1 1. Need A B C D. Using Banker's algorithm, answer the following questions: (i) How many resources of type A, B, C and D are there? (ii) Is the system in a safe state?	5	CO4	PO2
	(OR)			
c.	Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock.	5	CO4	PO1
d.	How can a system recover from a deadlock? Explain.	5	CO4	PO1

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