Total No. of printed pages = 4

EE 1816 OE 21

10/8/22

Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 6th Semester End-Term Examination

EE

OPERATING SYSTEMS

(New Regulations & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Tick the correct among the following : (10 × 1 = 10)

(i) In Operating Systems, which of the following is/are CPU scheduling algorithms?

(a) Priority

(b) Round Robin

(c) Shortest Job First

(d) All of the above

(ii) To access the services of the operating system, the interface is provided by the ____

(a) Library

(b) System calls

(c) Assembly instructions

(d) API

(iii) CPU scheduling is the basis of _____

(a) Multiprogramming operating systems

(b) Larger memory sized systems

(c) Multiprocessor systems

(d) None of the above

[Turn over

(iv) Where is the operating system placed in the memory?

(a) Either low or high memory (depending on the location of interrupt vector)

(b) In the low memory

(c) In the high memory

(d) None of the above

(v) What does OS X has?

(a) Monolithic kernel with modules

(b) Microkernel

(c) Monolithic kernel

(d) Hybrid kernel

(vi) The FCFS algorithm is particularly troublesome for _____

(a) Operating systems

(b) Multiprocessor systems

(c) Time sharing systems

(d) Multiprogramming systems

(vii) For an effective operating system, when to check for deadlock

(a) Every time a resource request is made at fixed time intervals

(b) At fixed time intervals

(c) Every time a resource request is made

(d) None of the above

(viii) The main memory accommodates _____

(a) CPU

(b) User processes

(c) Operating system

(d) All of the above

(ix) The operating system and the other processes are protected from being modified by an already running process because _____

(a) Every address generated by the CPU is being checked against the relocation and limit registers

(b) They have a protection algorithm

(c) They are in different memory spaces

(d) They are in different logical addresses

(x) The operating system maintains a _____ table that keeps track of how many frames have been allocated, how many are there, and how many are available.

(a) Memory

(b) Mapping

(c) Page

(d) Frame

2. (a) What is a Deadlock in OS? What are the necessary conditions for a deadlock? (4)

(b) What is a Scheduling Algorithm? Name different types of scheduling algorithms. (4)

(c) Consider byte addressable main memory size of 256 MB with cache size of 1 MB and block size is 128B using 2 -way set associative, Calculate PA split, Tag directory size, no. of comparators needed with its type. (7)

3. (a) What is Cache Mapping? Consider a direct mapped Cache size 32 KB with block size 32 bytes, the CPU generates 32 bit addresses. Calculate the number of bits required for cache indexing and tag bit respectively. (5)

(b) What is the difference between paging and segmentation? A 32 bit processor with a page size of 1024 bytes. Find: (5+5=10)

(i) Size of logical address space

(ii) Number of bits to represent page number and offset

(iii) Maximum size of LAS

(iv) Maximum number of pages in LAS

(v) Maximum length of page table of process

4. What is IPC? What are the different IPC mechanisms? Using SRTF design Gantt chart to calculate CT,TAT,WT and RT of the following process ($3 \times 5 = 15$)

(a)

Process no.	AT	BT	CT	TAT	WT	RT
P1	0	5				
P2	1	3				
P3	2	4				
P4	4	1				

(b) Use Round robin technique (given TQ=2)

Process no.	AT	BT	CT	TAT	WT	RT
P1	0	5				
P2	1	4				
P3	2	2				
P4	4	1				

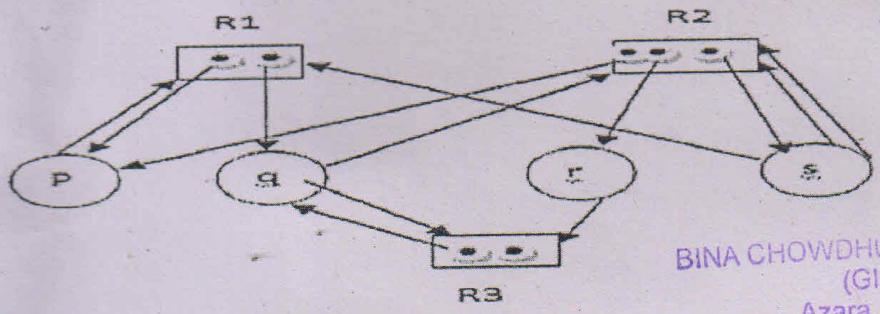
(c) Use HRRN technique

Process no.	AT	BT	CT	TAT	WT	RT
P1	1	3				
P2	3	6				
P3	5	8				
P4	7	4				
P5	8	5				

5. What is Bankers algorithm? Using Deadlock avoidance algorithm, Calculate Availability and remaining needs also find the safe sequence. (3+12)

Process	Allocation			Maximum need			Available	Remaining need
	A	B	C	A	B	C		
P0	1	0	1	4	3	1		
P1	1	1	2	2	1	4		
P2	1	0	3	1	3	3		
P3	2	0	0	5	4	1		

6. (a) Figure below shows multi instance RAG, Check is there any deadlock? Write the sequence of execution .What is the last availability. (8)



(b) In least recent used (LRU) page replacement algorithm reference string is given as 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Calculate the no. of page hits and page fault. (7)

7. (a) Consider a system which has LA of 7 bits and PA of 6 bits having page size of 8 words then calculate number of pages and number of frames. (5)

(b) What is virtual memory? Consider a virtual address space of 32 bits and page size of 4 KB, system is having a RAM of 128 KB, then what will be the ratio of page table and Inverted page table size if each entry in both is of size 4B? (5)

(c) What is the main purpose of an OS? What are the different types of OS? (5)