2 (a) Write names of any two-
(i) Dedicated operating systems
(ii) methods of IPC which can be used for related processes only. CO1 BL1

(b) What will be the difference(s) in the design of a non real time general purpose O/S and an embedded real time O/S ? (02) CO3 BL1

(c) What is done by system architects and O/S developers to ensure that programmers will not be able to perform low level operations directly (i.e., without using system calls or library functions) ? (02) CO1 BL2

(d) What is meant by 'context' of a process and 'context switching' ? Does context switching take place when a system call is encountered while executing a program ? If Yes, why ? If No, why not ? (02) CO1 BL2

(e) Suppose a command named 'printfile' is available in a windows based system to print a file on a printer. With the help of a diagram, illustrate different possible ways by which the 'printfile' command can access the printer. (03) CO2 BL2

3 (a) Explain Indexed allocation method of disk space allocation. Write its advantages and drawbacks as compared to linked allocation method. (03) CO1 BL2

(b) In a system, contiguous allocation method is being used for disk space allocation. In this system, a file f1 is consisting of 14 logical blocks. How many disk read and how many disk write operations will be required to be done for-
(I) adding 1 logical block in the middle of this file and writing data in that block ?
(II) deleting last two blocks of this file ?
Assume that –(i) the copies of permanent tables of the file system are available in main memory (ii) after the 14th block of the file, 5 logical blocks are available as free blocks on the disk. (04) CO2 BL2

(c) Suppose you have to read the data available in sector numbers 2 to 5 of surface 0, outermost track of a hard disk, and store this data in a file f5. Write a 'C' program for the same, using system calls of linux. Make suitable assumptions, if necessary, and state them. (04) CO2 BL3

4 (a) At some time instance it was found in a system that all the logical blocks of each of the three files- f1, f2 and f3 are contiguous on the disk. Based on this information, can you state which disk space allocation algorithm is being used in this system ? Justify your answer. (02) CO2 BL2

(b) In a FAT file system having total 5000 clusters, suppose the cluster numbering starts from 1; size of 1 cluster is equal to 2 sectors; and sector nos. 7, 8, 9, 11, 21, 22, 131, 141, 2001, 2002 are 'bad' sectors. In this file system, how many clusters are 'good' clusters ? (02) CO2 BL3

(c) In a 8 TB hard disk, FAT-32 file system has been created with clusters of 1 KB size. Will this file system support the 8 TB capacity of the disk (i.e., will it be able to completely utilize the disk capacity) ?
(i) In either case (Yes/No), calculate the max. size (capacity) of the hard disk which this file system will support.
(ii) If the size supported is less than 8 TB, can you suggest some way to support the 8 TB size ? (04) CO2 BL3

(d) Consider a disk queue with I/O requests for blocks on cylinder nos. 99, 184, 38, 123, 15, 125, 66, 68. Assuming that the r/w head is currently positioned at cylinder no. 54, find out that in which sequence the requests for I/O will be served if the disk scheduling is done using SCAN/elevator algorithm (assume that currently the r/w head is moving towards outermost cylinder). (02) CO3 BL3

(e) Write the reason of the following (max. in one or two sentences for each)-
(i) While typing the password from the keyboard, generally it is not displayed on the screen.
(ii) While attempting to copy a file in a hard disk, a message is received- "disk is not formatted" (although disk is already formatted). (02) CO2 BL2

Contd. 3

Q.5 (a) Draw a process state diagram showing various possible states of a process, possible transitions from one state to another, various schedulers and scheduling queues. (03) CO2 BL

(b) 'A thread is a light weight process'. Is this correct ? If Yes, explain how ? If No, explain why ? (02) CO2 BL

(c) Consider the details about four processes, as given below:

process	arrival time	burst time	priority
p1	05	20	5 (lowest priority)
p2	20	25	2
p3	34	10	3
p4	50	15	1

Calculate average Turn Around Time and average Waiting Time of these processes for following scheduling :
(i) SRJF (SRTF) (ii) non-pre-emptive priority based (iii) Round Robin (with time quantum = 6) (07) CO3 BL

Q.6 (a) Explain multilevel feedback queue algorithm of CPU scheduling. Why is this algorithm called the most general CPU scheduling algorithm ? (03) CO3 BL

(b) (i) In a segmentation based system, if segments 0 to 3 of a process are having sizes 200, 900, 1000 and 100 bytes respectively, then what logical address in the program will be converted to logical address in terms of segment no. and offset as: (s=2,d=07) by the compiler ?

(ii) For a Paging system with page size=1KB, logical address size=16 bits, and size of each memory location=1 byte, find out page no. and offset corresponding to logical address 1101100010100111. (03) CO2 BL

(c) Explain Paging technique of memory management in brief. Also draw a diagram showing how logical address is converted to physical address in this technique. (04) CO2 BL

(d) Draw a graph showing the relation between degree of multiprogramming and CPU utilization in a system which uses demand paging technique for memory management. Also mention the reason of the pattern shown in the graph. (02) CO2 BL

Q.7 (a) Give a comparison of files and un-named pipes, on various points. (03) CO3 BL

(b) In a demand paging system, page table entries are kept in associative memory. In this system, 93% of the time the required page table entry is found in the associative memory. Further, 25% of the time a page fault is generated and the time required to serve the page fault is 90 ms. If access time of main memory is 60 ns and the associative memory is four times faster than the main memory, calculate the effective memory access time for this system. (04) CO2 BL

(c) In the classical producer-consumer problem with single producer & single consumer and unbounded buffer-

(i) is there any non-shareable resource involved ? Why ?

(ii) is any synchronization required ? If Yes, show how is the required synchronization provided using semaphores. If No, explain why ? (03) CO2 BL

(d) Write the necessary and sufficient conditions for a deadlock to occur in a system. (02) CO2 BL

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APRIL 2023 EXAMINATION

II B.TECH./B.E. COMPUTER ENGG.

CO24508: OPERATING SYSTEMS

Time: 3 Hrs. Max. Marks : 70

Note: (1) Que. No. ONE is COMPULSORY. Answer any FOUR questions from the remaining.
(2) Answers should be brief and to-the-point.

Marks CO

Q.3 (a) Fill in the blanks :

(i) _____ is used to logically convert a computer system to a dumb terminal, in a multiuser system. (01) CO1 R

(ii) Boot Loader is stored in ---------- CO2 R

(iii) An algorithm similar to ---------- algorithm is used in linux for CPU scheduling. CO3 R

(iv) Through ---------- of a device, stored in the corresponding inode, its device driver is located. CO2 R

(v) _____ system call of linux can be used for setting non-blocking read mode for keyboard driver. (05) CO2 R

(b) Write any three possible reasons due to which-

(i) a program executing well on a system, when taken to another system, does not execute there. CO1 R

(ii) a user may not be able to open a file for writing some data in it, through his program. CO2 R

(iii) devices are treated as files by the operating systems. CO2 R

(iv) a process may never complete its execution. CO2 R

[Write the reasons only (no description required) against each of the above cases] (04)

(c) What is likely to happen if-

(i) 'defragmentation' of a disk is not done ? CO2 R

(ii) 'ageing' of a process is not done ? CO3 R

(iii) 'exit' system call is not used at the end of a program ? (03) CO2 R

(d) Suppose some corruption takes place in a hard disk and because of that following is corrupted-

(i) inode no. 2 in linux file system

(ii) FAT#2 in a FAT file system

(iii) a sub-partition table

For each of the above cases, write the consequences/effect of this corruption. (03) CO2 R

(e) What will be done by following sequence of commands written at shell prompt ($) in linux ?

```
$ sort | cmd1 a1 a2 | sort &
$ cmd2      2 > error_messages
```

Write some code in 'C', using system calls, to show the operations which the linux shell will perform to facilitate the execution of above commands (except parsing). (07) CO4 R

Contd. 2

DEPTT. OF COMPUTER ENGG.
MID-TERM TEST #1
CO24508: OPERATING SYSTEMS

CS 4 SEM

MAX MARKS : 25
TIME : 50 Minutes

Date: 28/03/2023

Que 1 Fill in the blanks:
(i) ..... is an example of an Embedded Operating System.
(ii) ..... can be called a soft real time system.
(iii) A ..... acts as an interface between an executing program (or, a programmer) and the operating system.
(iv) ..... instruction can be used in assembly language program to use system calls of linux. (04)

Que 2 Why is-
(i) a dedicated operating system more suitable for a particular application environment ?
(ii) 'linking' operation required to be done after compilation of a program ?
(iii) an operating system called an 'event driven' program ?
(iv) an 'exit' system call always used at the end of any program ? (04)

Que 3 An operating system is present on a system, but no commands and system calls are provided by this operating system to its users. Under this condition, what operations would you be required to perform for –
(i) executing your program p1 ?
(ii) creating a file f1 on the hard disk ?
(iii) deleting a file f2 ? (03)

Que 4 What will be the difference(s) in the design of-
(i) a uniprocessor O/S and a multiprocessor O/S ?
(ii) a non real time general purpose O/S and an embedded real time O/S ? (02)

Que 5 Suppose a software interrupt and a hardware interrupt occur at the same time. In such a situation, which of the two will be recognized first, by the CPU ? Why ? What action will be taken and by whom after the recognition of that interrupt ? (03)

Que 6 As a programmer you want to access a printer from your program, in a Windows based system. Through a diagram illustrate the different possible ways of accessing the printer. (03)

Que 7 Draw a process state diagram showing various possible states of a process, possible transitions from one state to another, various schedulers and scheduling queues. (03)

Que 8 Consider the code of a program p1 as given below:

```
i=fork();
if (i==0)
   { execl ("/usrs/CS_II/usr1/p2", "p2", NULL);
     printf ("hello1\n");
   };
j=fork();
printf ("hello2\n");
```

When this program will be executed, how many times hello1 and hello2 messages will be displayed ? (03)