Srinivasa Ramanujan Institute of Technology
(AUTONOMOUS)
Rotarypuram Village, B K Samudram Mandal, Ananthapuramu - 515 701

III B. Tech I Sem Semester End Examinations Regular Feb 2022

Subject Name: Operating Systems **Subject Code: 194GA05503**

Name & Signature of the Examiner: M. Narasimhulu,

AY: 2021-22	**Scheme of Evaluation**	SRIT R19

PARTA
(Compulsory Question)
***

1 Answer the following: (10 X 02 = 20 Marks)

a) System call is a Programming interface to the services provided by the Operating system. Open, read, and write are the examples. **2M**

b) A Collection of separate, possibly heterogeneous, systems networked together is reffered as distrbuted Systems. It uses mostly TCP/IP network Communications. **2M**

c)

SNO	Program	Process
1.	Program contains a set of instructions designed to complete a specific task.	Process is an instance of an executing program.
2.	Program is a static entity.	Process is a dynamic entity.
Note: Any Two relavent Differences **(2M)**		

2M

d) A race condition is an undesirable situation that occurs when a device or system attempts to perform two or more operations at the same time, but because of the nature of the device or system, the operations must be done in the proper sequence to be done correctly. **2M**

e) In computer operating systems, demand paging (as opposed to anticipatory paging) is a method of virtual memory management. It follows that a process begins execution with none of its pages in physical memory, and many page faults will occur until most of a process's working set of pages are located in physical memory. **2M**

f) Thrashing is caused by under allocation of the minimum number of pages required by a process, forcing it to continuously page fault. The system can detect thrashing by evaluating the level of CPU utilization as compared to the level of multiprogramming. It can be eliminated by reducing the level of multiprogramming. **2M**

g) List the file types: executable, object, Source code, batch, text, word processor, library, print or view, archive, multimedia **2M**

h) Rotational Latency is the amount of time it takes for the desired sector of a to rotate under the readwrite heads of the disk drive. **2M**

i) System threats refers to misuse of system services and network connections to put user in trouble. System threats can be used to launch program threats on a complete network called as program attack. System threats creates such an environment that operating system resources/ user files are misused. **2M**

j) Access Matrix is a security model of protection state in computer system. It is represented as a matrix. Access matrix is used to define the rights of each process executing in the domain with respect to each **2M**

object. The rows of matrix represent domains and columns represent objects. Each cell of matrix represents set of access rights which are given to the processes of domain means each entry(i, j) defines the set of operations that a process executing in domain Di can invoke on object Oj.

PARTB
(Answer all five units, 5 X 10 = 50 Marks)
UNIT1

2 a) Explanation about how os boots when the system power is on**(2M)**   5M

Explanation about multitasking, multiprogramming, DualMode Operation**(3M)**

b) User interfaces, program execution, I/O operations, fileSystem manipulation,   5M
communications,resource allocations, logging, projection & security **(1M),**

Explanation about diagram shown below(1M)
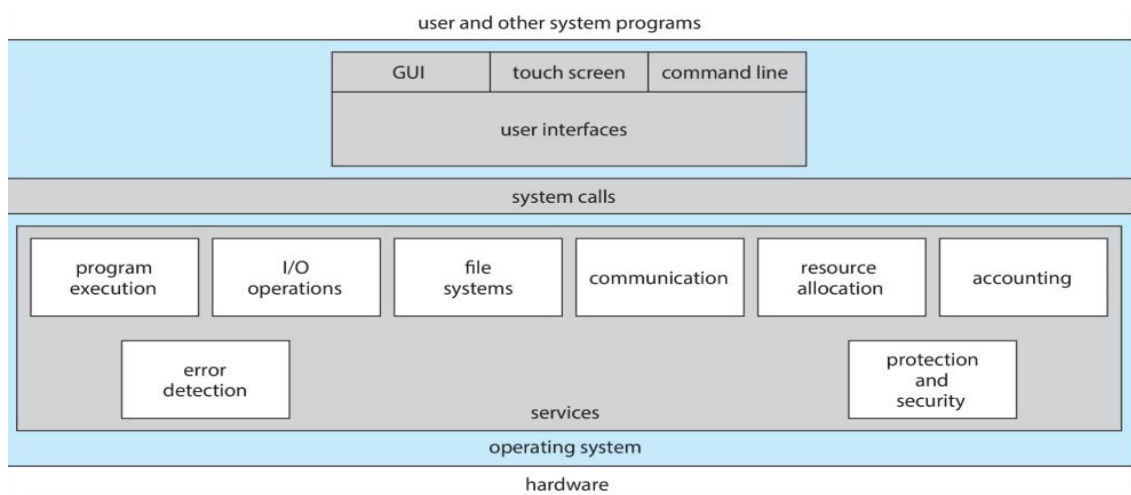
3M

(OR)

3 a) Explanation**(2M)** for the below diagram**(3M).**   5M
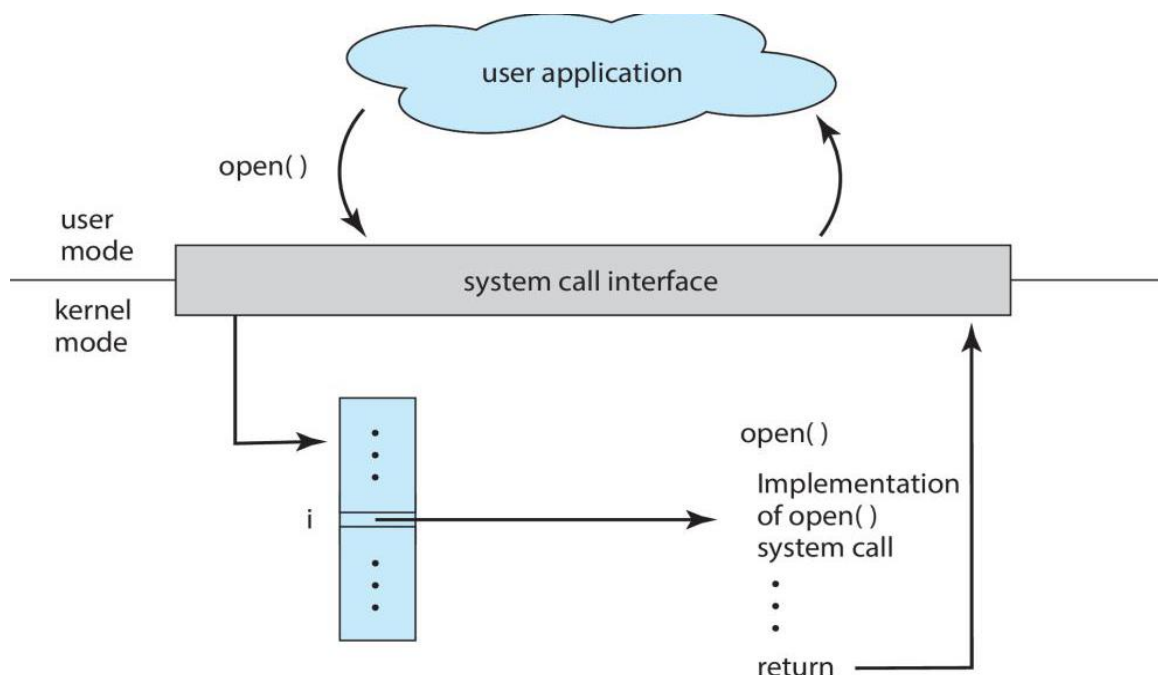
b) Type of Process control **(1M)** 5M

create process,terminate process, end, abort, load,execute, get process attributes, set process attributes, wait for time, wait event, signal event, allocate and free memory, dump memory if error, Debugger for determining bugs, single step execution, Locks for managing access to shared data between processes

Types of Device management**(1M)**

request device,release device, read, write ,reposition, get device attributes, set device attributes, logically attach or detach devices.

Examples of Process Control and Device Management system calls **+ Explanation (3M)**

	Windows	Unix
Process control	CreateProcess() ExitProcess() WaitForSingleObject()	fork() exit() wait()
Device management	SetConsoleMode() ReadConsole() WriteConsole()	ioctl() read() write()

UNIT2

4 a) 5M

b) Critical section problem scenario **(2M)** 5M
General structure to solve critical section problem**(1M)**
Explanation with a suitable example**(2M).**

(OR)

5 a) Peterson Algorithm and its Explanation**(2M)** 5M

Algorithm for Process Pi**(3M)**

```
while (true){

    flag[i] = true;
    turn = j;
    while (flag[j] && turn = = j)
            ;

        /* critical section */

    flag[i] = false;

    /* remainder section */

}
```
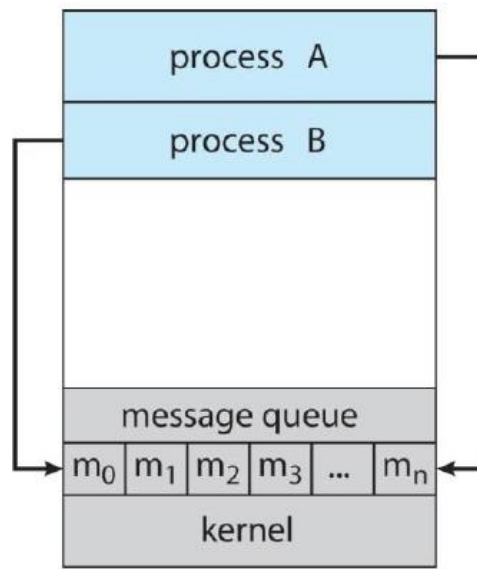
b) Message passing definition **(1M)** 5M

Diagram and its explanation**(4M)**

```
┌─────────────────────────────┐
│        process  A           │
├─────────────────────────────┤
│        process  B           │
├─────────────────────────────┤
│                             │
│                             │
│                             │
├─────────────────────────────┤
│       message queue         │
├──┬──┬──┬──┬─────┬──┤
│m₀│m₁│m₂│m₃│ ... │mₙ│
├──┴──┴──┴──┴─────┴──┤
│           kernel            │
└─────────────────────────────┘
```
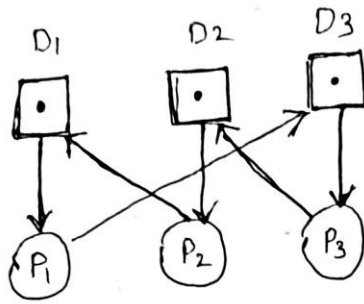
UNIT3

6 a) Conditions for Deadlock Mutual Exclusion, Hold and Wait, No preemption, Circular wait. These 4   5M
       conditions must hold simultaneously for the occurrence of deadlock. **(2M)**
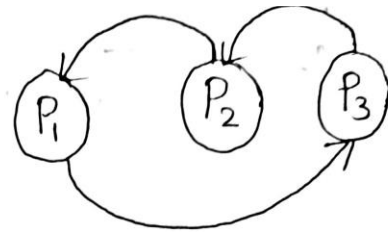   Explanation about these four conditions**(3M)**

   b)   5M
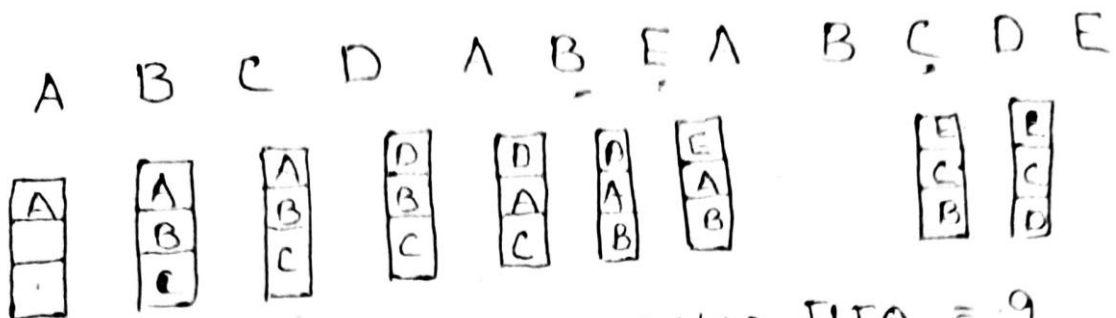

(a) Resource-allocation graph

(b) wait-for Graph

The above diagram have cycles which leads to deadlock. So the system is in dead lock state **(4M)**
Explanation on How cycle is occured. **(1M)**

(OR)

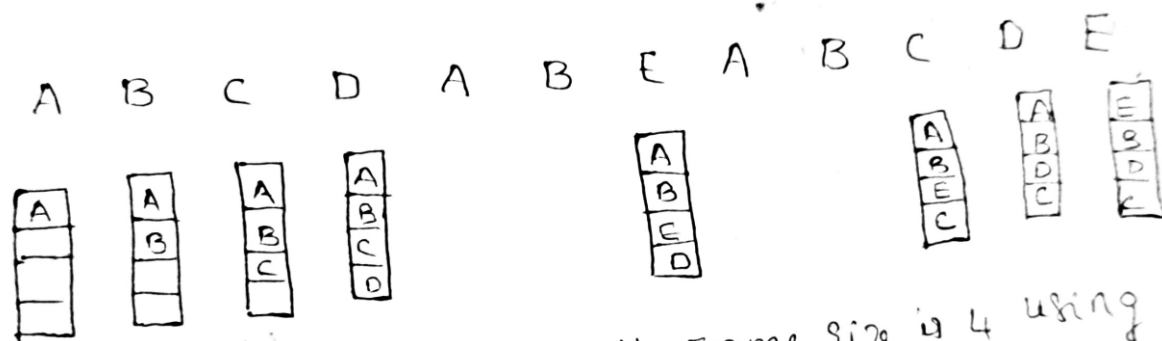7 a)   5M

No. of page faults using FIFO = 9

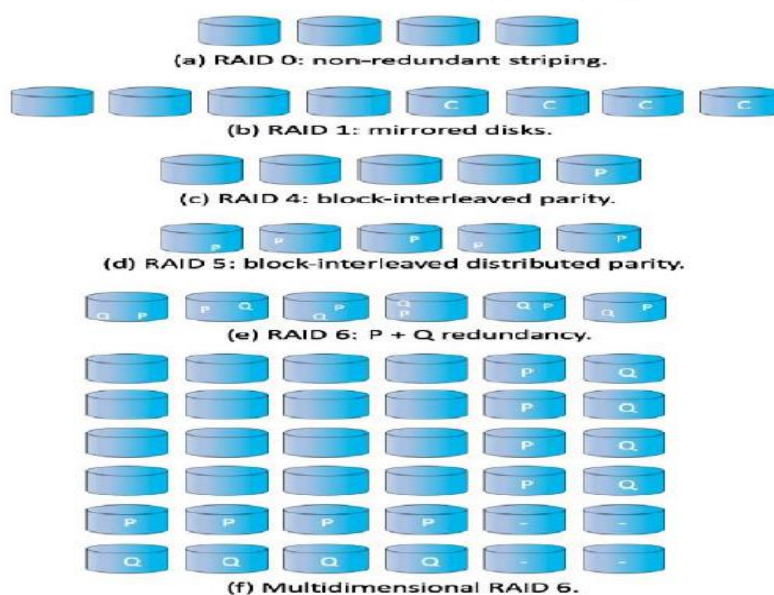b)   5M

A   B   C   D   A   B   E   A   B   C   D   E

No. of page faults with Frame size is 4 using

LRU = 8

UNIT4

8 a) i) Name, Indentifier, Type, Location, size, protection, Time, date and User identification, etc. **(1M)**   5M
          Description about each attribute **(1.5M)**

   ii) File Operations can be carried out using several systems calls. Some of the file opearations are
        create, write, read, reposition within a file also called seek, delete, truncate etc.,**(1M)**
        Description about each operation **(1.5M)**

   b) None : sequence of words, bytes   5M
       Simple record structure: Lines, Fixed length, Variable length
       Complex Structures: Formatted document, Relocatable load file
       Can simulate last two with first method by inserting appropriate control characters **(2M)**
       Description above file structures **(3M)**

(OR)

9 a) A collection of nodes containing information about all files is reffered as Directory struture**(1M)**   5M
       Searching, creating, deleting, renaming, listing, traversing are the operations performed on drectory
       structures**(1M)**
       Demostration on singlelevel, twolevel, treestructured and Acyclic graphic directory structures**(3M)**

   b) Diagram of RAID structure Levels shown below**(2M)**   5M
       Explanation about each level **(3M)**

(a) RAID 0: non-redundant striping.

(b) RAID 1: mirrored disks.

(c) RAID 4: block-interleaved parity.

(d) RAID 5: block-interleaved distributed parity.

(e) RAID 6: P + Q redundancy.

(f) Multidimensional RAID 6.

UNIT5

10 a) Implementing of Acess matrix are carried out in multiple ways. They are Defining a global table, Defining Access list for each object, Definining Capabilty list for domains, Implementing Lokkey Mechanisms. (2M)   5M

Description about all implemetaiton methods (3M)

b) Various options to remove the access right of a domain to an object like as follows: 5M
Immediate vs. delayed
Selective vs. general
Partial vs. total
Temporary vs. permanent
Access List Delete access rights from access list like as follows:
Simple : search access list and remove entry
Immediate , general or selective , total or partial , permanent or temporary.
Capability List Scheme required to locate capability in the system before capability can be revoked:
Reacquisition, Back pointers, Indirection, Keys. (3M)
Description briefly about all revocation of acess rights**(2M)**

(OR)

11 a) i) **Goals of Protection:** A protection model should exist to define a goals of protection. Suppose In one protection model, computer consists of a collection of objects, hardware or software. Each object has a unique name and can be accessed through a well defined set of operations. The goal of Protection is to ensure ensure that each object is accessed correctly and only by those processes that are allowed to do so. **(2.5M)**   5M

ii) **Principle of Protection:** The guiding principle of protection is to provide the least privilege for an object like programs, users and system which can able to perform their tasks.

This helps to limit the bug for that entity and can be abused. Assigining least privileges is static or dynamic. **(2.5M)**

b) Cryptography definition **(1M)**   5M

Explanation about securtiy tools like encrptytion, Authentication and Digital signatures **(4M)**