



Q.1. Give short answers of the following: (6x5=30)

- A) What is the difference between User Mode and System Mode?
- B) Explain dispatch latency and its causes and effects.
- C) What is starvation? Explain with the help of two examples.
- D) What is PCB? What are different types of information stored in PCB about a process? At the time of context-switch what role PCB plays?
- E) Write one solution for classical Producer-Consumer problem with only three shared variables (in, out and buffer).
- F) Write code for wait() and signal() operations of counting semaphore.

Q.2. Solve the following: (3x10=30)

i.

Recall Reader-Writer problem with readers priority and check the following code. Re by adding missing lines.

```
do {
    readcount++;
    if (readcount == 1)    wait(wrt);

    ...
    // reading is performed
    ...
    readcount--;
    if (readcount == 0)
        signal(wrt);
} while(1);
```

ii.

Consider a logical address space of 64 pages of 1,024 words each, mapped onto a physical memory of 32 frames.

- a. How many bits are there in the logical address?
- b. How many bits are there in the physical address?
- c. How many bits needed for offset?

iii.

A system has 4 processes and 5 resources. The current allocation and maximum needs are as follows:-

	Allocated					Maximum				
A	1	0	2	1	1	1	1	2	1	3
B	2	0	1	1	0	2	2	2	1	0
C	1	1	0	1	1	2	1	3	1	1
D	1	1	1	1	0	1	1	2	2	0

If Available matrix consist of [0,0,2,1,1], Check whether system is in safe state or not. Also write safe sequence if system is in safe state.

Show detail working of your solution.