

- N.B. :** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions from the remaining **six** questions.

1. (a) What is the relationship amongst the High level language, Assembly language and Machine language ? How systems software differ from application software ? 10
- (b) What conditions enforce to design multipass assembler ? What are advantages and disadvantages of single pass assembler ? 10

2. For the following hypothetical CPU containing instruction set of 4 instructions with their length as S1 (1 byte), S2 (2 bytes), S3 (3 bytes), S4 (1 byte). 10

- (a) Design instruction codes.
- (b) Generate Relative address for the following assembly language code :- 10

Label	opcode	operands
	S1	
	S2	xx
	S3	
xx	S4	
	S2	xxx
	S1	
xxx	S3	

- (c) Assuming 256 addressable words each of byte generate machine code for the above code. 10
3. (a) Describe the different between short term, mid term and long term scheduling when the schedulers are involved. 10
 - (b) Assume you have the following jobs to execute with one processor. 10

Job	Buret Time	Priority	Arrival Time
1	10	3	0
2	1	1	1
3	2	3	2
4	1	4	3
5	5	2	4

What is turnaround time of each job for first come first serve and SJF scheduling algorithms.

4. (a) Explain different page replacement algorithms. 10
- (b) Design physical address for the following paging system. A virtual address space of 1k, primary memory of 256 bytes, page and frame size of 128 bytes, Generate the physical address if the virtual address generated is. 10

- (1) 000000101
- (2) 1010000111

Con. 3400-CO-2992-08.

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The current page Table is—

Page	Available	Page Frame
0	Y	1
1	N	
2	N	
3	N	
4	N	
5	Y	0
6	N	
7	N	

5. (a) What is producer consumer problem ? Elaborate on different solutions. 10
- (b) What are semaphores ? How do they implement mutual exclusion ? What are different types of semaphores ? How can they be implemented ? 10
6. (a) What is deadlock ? Explain the conditions which causes deadlock can deadlock be avoided. 10
- (b) Explain strategies to deal with deadlocks. Suppose you have two resources of type R1 and one resource of type R2. Draw DRAG for the following situation and state whether the condition to deadlock or not ? 10
- Process P1 holds R1 and request R2.
Process P2 holds R2 and request R1.
Process P3 holds nothing and requests R1 and R2.
7. (a) Explain major functions of operating system. Is it possible to have computer without operating system ? 10
- (b) Explain different disk space allocation methods with their merits/demerits. 10