



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/MCA/SEM-3/MCA-301/2011-12**

**2011**

**OPERATING SYSTEM AND SYSTEM SOFTWARE**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :

10 × 1 = 10

- i) Which of the following is not application software ?
  - a) Spread sheet
  - b) Word processor
  - c) Unix
  - d) Desktop publishing.
  
- ii) Which of the following schemes suffers from external fragmentation ?
  - a) Segmentation
  - b) Paging
  - c) Paged segmentation
  - d) All of these.



- iii) Once a program is compiled, it can be loaded for execution
- a) only from the compiler starting address
  - b) anywhere in the main memory
  - c) user needs to specify where the compiled code is to be loaded
  - d) it is loaded starting from address 0 in the main memory.
- iv) An assembler translates
- a) high level language program to machine level language program
  - b) assembly level language program to high level language program
  - c) assembly level language program to machine level language program
  - d) high level language program to assembly level language program.
- v) A compiler translates
- a) high level language program to assembly level language program
  - b) high level language program to machine level language program
  - c) machine level language program to high level language program
  - d) assembly level language program to high level language program.



- vi) IPC stands for
- a) Internal Program Controller
  - b) Internal Process Control
  - c) Interprocess Communication
  - d) None of these.
- vii) If there are 32 segments, each of size 1K, then the logical address should have
- a) 13 bits
  - b) 14 bits
  - c) 15 bits
  - d) 16 bits.
- viii) Which one of the following is not a valid state of a process ?
- a) Load
  - b) Blocked
  - c) Ready
  - d) Running.
- ix) Compaction is used to solve the problem of
- a) external fragmentation
  - b) internal fragmentation
  - c) both of these
  - d) none of these.
- x) The problem of mutual exclusion occurs when
- a) processes share resources
  - b) processes do not share resources
  - c) all of these
  - d) none of these.



**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. a) What are the necessary and sufficient conditions for deadlock to occur ?  
b) What is thrashing ? 4 + 1
3. Different memory partitions of 150 K, 820 K, 360 K and 450 K ( in the given order ) are present. Explain how best fit algorithm can be used to place a process of 315 K. What are the advantages and disadvantages of using best fit over worst fit and first fit algorithms ? 2 + 3
4. Explain the working of a two pass assembler.
5. a) What is Process Control Block ? What does it contain ?  
b) What is lexical analysis ? 3 + 2
6. a) What are the tasks of a linker ?  
b) What are the tasks of a loader ? 3 + 2



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Explain the following :
- i) Waiting time
  - ii) Turn around time.
- b) Consider the following set of processes with a CPU burst time and arrival time given in milliseconds :

<b>Process</b>	<b>Burst time</b>	<b>Arrival time</b>
P1	10	0
P2	5	1
P3	15	1
P4	5	5
P5	20	10

Draw Gantt chart illustrating the execution of processes using shortest remaining time first and round robin ( quantum = 5 ms ) process scheduling algorithm. Also calculate the average turn around time and waiting time for each algorithm and hence comment on which of these algorithms is better and why.  $5 + 10$

8. a) A computer provides each process with 65536 bytes of address space divided into 4096 bytes. A particular program has text size 32768 bytes, data size of 16386 bytes and stack size of 15870 bytes. Will this program fit in the address space ? If the page size were 512 bytes, would it fit ? Give reasons for all of your answers.
- b) Explain with suitable example the segmentation technique. What are the advantages and disadvantages of segmentation ? Can the disadvantages of segmentation technique be removed if paged segmentation is used ? Justify your answer.  $7 + 8$



9. a) Consider the following snapshot of a system, where the names of the matrices have their usual meanings :

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	0	0	1	2	0	0	1	2	1	5	2	0
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6				
P4	0	6	3	2	0	6	5	2				
P5	0	0	1	4	0	6	5	6				

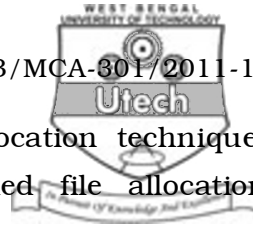
Answer the following question using Banker's Algorithm :

- i) What is the content of Need matrix ?
  - ii) Is the system in a safe state ? Show the steps to arrive at your answer.
  - iii) If a request from process P2 arrives for ( 0, 4, 2, 0 ), can the request be granted immediately ? How ?
- b) What are the requirements that a solution to critical section problem must satisfy ? ( 3 + 4 + 4 ) + 4
10. a) Consider the following page reference string :

7, 8, 9, 0, 7, 9, 1, 0, 8, 7, 9, 1

Assuming memory consisting of four (4) frames, calculate the hit ratio using (i) First In First Out ( FIFO ) and (ii) Least Recently Used ( LRU ) page replacement algorithms. Show each step.

- b) What is Belady's anomaly ? Why does it occur in case of one page replacement algorithm only ?
- c) How can Access Matrix be implemented ? 8 + 4 + 3



11. a) Briefly describe the indexed file allocation technique. Compare this technique with linked file allocation technique.
- b) i) What is Translation Look-aside Buffer ( TLB ) ?  
What are the disadvantages of using it ?
- ii) Find out effective Memory Access Time with an 80% hit ratio and following access times :
- TLB Access Time : 20 ns
- MM Access Time : 100 ns
- c) What are the different disk scheduling algorithms ?  
Mention at least four such algorithms.  $5 + ( 2 + 4 ) + 4$
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