

Name :

Roll No. :

Invigilator's Signature :

**CS/B.Tech(ECE)/SEM-7/EC-704A/2011-12
2011**

SYSTEM PROGRAMMING AND OPERATING SYSTEM

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 any *ten* of the following :

$$10 \times 1 = 10$$

- i) The execution of a program written in a high level language involves
 - a) Translation of the program
 - b) Linking of the program with other programs needed for its execution
 - c) Relocation of the program to execute from the specific memory area allocated to it
 - d) Loading of the program in the memory for the purpose of execution
 - e) All of these.

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vi) After I/O or event completion a process from waiting state goes to

- a) running b) terminated
- c) ready d) none of these.

vii) The statement in assembler that constructs memory words containing constants is

- a) READ b) DS
- c) DC d) ORIGIN.

viii) A macro definition consists of

- a) a macro prototype statement
- b) one or more model statement
- c) macro preprocessor statement
- d) all of these.

ix) Which of the following is not a condition of deadlock ?

- a) Mutual exclusion
- b) Circular wait
- c) Pre-emption
- d) None of these.



- x) A system has 3 processes sharing 4 resources. If each process needs a maximum of 2 units then
- a) Deadlock definitely will occur
 - b) Deadlock may occur
 - c) Deadlock never occurs
 - d) None of these.
- xi) If the page size is 8 kilobyte then no. of bits required to represent offset is
- a) 11
 - b) 12
 - c) 13
 - d) 8.
- xii) Compaction is the solution for
- a) internal fragmentation
 - b) external fragmentation
 - c) mutual exclusion
 - d) both (a) and (b).

GROUP – B

(Short Answer Type Questions)

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

2. a) What do you mean by LC processing in assembler ?
Exemplify & explain.
- b) Explain with a specific example how the problem of forward references is tackled by the assembler in case of single pass translation. $2 + 3$
3. a) What do you mean by a macro expansion ?
- b) Differentiate between positional & keyword parameters in case of a macro definition. $2 + 3$



4. a) What are the different services provided by an operating system ?
b) Is there any difference between multi-programming and multi-tasking ? 3 + 2
5. a) What is the difference between internal and external fragmentations ? Explain with example.
b) Can we solve the problem of internal fragmentation with paging ? Explain with example. 3 + 2
6. a) What do you mean by wait-for graph ? Why do we need it ?
b) What is the difference between paging and segmentation ? 3 + 2

GROUP – C

(Long Answer Type Questions)

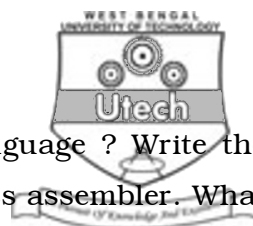
Answer any *three* of the following. 3 × 15 = 45

7. What is deadlock ? State Banker's algorithm. Consider the following snapshot of a system :

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_1	0 0 1	1 1 2	3 5 2
P_2	1 0 0	1 7 5	
P_3	1 1 5	2 3 5	
P_4	0 6 3	0 6 5	

Justify whether the system is in safe state or not. If a further request (0 2 1) is made by P_3 , illustrate whether that may be granted or not. What is starvation ?

2 + 4 + 4 + 3 + 2



8. What are the advantages of assembly language ? Write the advantages of 2 pass assembler over 1 pass assembler. What is compile and go loader ? How does it differ with absolute loader ?

4 + 4 + 3 + 4

9. a) Draw and explain the state diagram of a process.
 b) What is PCB ? What are the contents of it ?
 c) What is the difference between pre-emptive & non-pre-emptive schedulings ?
 d) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-pre-emptive scheduling and base all decisions on the information you have at the time the decision must be made :

Process	Burst Time	Arrival Time
P_1	8	0.0
P_2	4	0.4
P_3	1	1.0

What is the average turnaround time for these processes with FCFS and SJF scheduling algorithm ?

5 + (1 + 2) + 2 + (2 + 3)

10. a) Is there any difference between overlay and swapping ? Give reason for your answer.
 b) Why the sizes of pages are taken as power of 2 ?
 c) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. How many bits are there in the logical and physical address ?



d) Consider a paging system with the page table stored in memory.

- i) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take ? Why ?
- ii) If we add associative registers and 75 per cent of all page-table references are found in the associative registers, what is the effective memory reference time ? (assume that finding a page table entry in the associative registers takes 10 nanosecnods).

e) Can we maintain a single page table for all the processes in the system ? If "yes", then how, else give reason for your answer.

$$3 + 2 + 2 + (2 + 3) + 3$$

11. Write short notes on any *three* of the following : 3 × 5

- a) Semaphore and its applications
- b) Protection and security
- c) Solution of critical section problem
- d) Shell and kernel
- e) Simple batch system and spooling.

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