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.

ii) Which one of the following is called command interpreter ?

a) Kernel b) Shell

c) Dispatcher d) Scheduler.

iii) Round robin scheduling algorithm with infinite time quantum becomes

a) FCFS

b) SJF

c) Priority scheduling

d) Multilevel queue scheduling.

iv) Which of the following is the solution of starvation ?

a) Priority scheduling

b) Killing the process

c) Aging

d) None of these.

v) Mutual exclusion problem occurs between

a) processes that share resources

b) two disjoint processes that don't interact

c) processes that don't share resources

d) none of these.

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 × 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.