Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.Tech(ECE)/SEM-7/EC-704A/2012-13

2012

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 × 1 = 10

    i)   Pass-I of a two-pass assembler performs

         a)   separation of symbol, opcode, and operand fields

         b)   building of the symbol table

         c)   location counter processing

         d)   all of these.

    ii) A table that is designed to hold the values of formal parameters during the expansion of a macro call is

         a)   Macro name table (MNT)

         b)   Actual parameter table (APT)

         c)   Expansion time variables table (EVT)

         d)   Sequencing symbols table (SST)

iii) The state of a process after it encounters an I/O instruction is

a) Ready   b) Blocked/Waiting

c) Idle   d) Running.

iv) The number of processes completed per unit time is known as

a) Output   b) Throughput

c) Efficiency   d) Capacity.

v) Bankers algorithm for resource allocation deals with

a) Deadlock prevention

b) Deadlock avoidance

c) Deadlock recovery

d) Mutual exclusion.

vi) TLB stands for

a) Translating Lookaside Buffer

b) Transition Lookaside Buffer

c) Translation Local Buffer

d) Translation Lookaside Buffer.

vii) Logical memory is divided into fixed sized blocks called

a) Pages   b) Blocks

c) Holes   d) Frames.

viii) A process is a

a) Basic entity

b) Passive entity

c) Static entity

d) Active entity.

ix) A bad block is consist of one or more

a) Tracks

b) Platters

c) Sectors

d) Cylinders.

x) Switching the CPU to another process requires saving state of the old process and loading new process state which is called as

a) Process blocking

b) Context switching

c) Time sharing

d) None of these.

xi) Wait-for graph is used for

a) Deadlock prevention

b) Deadlock avoidance

c) Deadlock detection

d) All of these.

xii) Confidentiality of a message can be maintained by

a) Digital signature

b) Message Digest

c) Decryption

d) Encryption.

3

[Turn over

GROUP – B

(Short Answer Type Questions)

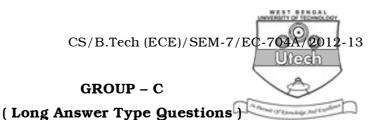Answer any *three* of the following.   3 × 5 = 15

2. a) What do you mean by back patching ? Discuss with an example.

    b) Exemplify and explain location counter processing. 2 + 3

3. a) Write an algorithm that outlines a macro expansion.

    b) Discuss about the following :

        (i)   translated origin

        (ii)   linked origin

        (iii) load origin.   2 + 3

4. a) Define critical section.

    b) Identify the requirements to be satisfied to solve the critical section problem.   2 + 3

5. a) Define seek time and rotational latency.

    b) Is there any difference between multiprogramming and multitasking OS ?   3 + 2

6. a) What is deadlock ?

    b) Describe the necessary and sufficient conditions for the occurrence of deadlock.   2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a) Discuss in detail the algorithm for the first pass of a two-pass assembler.

    b) Explain the two variants of intermediate code forms with a suitable example. $10 + 5$

8. a) What resources are used when a thread is created ? How do they differ from those used when a process is created ?

    b) What is PCB ? What are the contents of it ?

    c) What is the difference between preemptive and non-preemptive scheduling ?

    d) Consider the following set of processes, with the length of CPU burst given in milliseconds.

Process	Arrival Time	Burst Time	Priority
P1	0	5	2
P2	1	2	2
P3	1	4	1
P4	2	2	3
P5	3	3	4

Draw the Gantt chart for the execution of these processes using the following scheduling algorithms and determine the average waiting time for each process. (Lower priority value indicates higher priority)

(i)   SJF

(ii)   Priority

(iii)   Round Robin (time quantum = 3 ms).
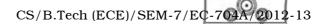
$(2 + 2) + (1 + 2) + 2 + 6$

9. a) Explain the difference between logical and physical address.

    b) Explain the difference between internal and external fragmentation.

    c) Is there any difference between compaction and coalescing ? Explain.

    d) Given fixed memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K (in order). How would each of the first-fit, best-fit and worst-fit algorithms place processes of 212 K, 417 K, 112 K and 426 K (in order) ? Which algorithm makes the most efficient use of memory ?

$2 + 3 + 3 + (6 + 1)$

10. a) Explain paging technique with TLB in brief.

    b) Discuss demand paging.

    c) What is Belady's anomaly ?

    d) Consider the following page reference string :

    1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 6, 3, 2, 1.

    How many page faults would occur for LRU, FIFO, & Optimal replacement algorithms, assuming four frames ? $4 + 3 + 2 + 6$

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

a) Program relocation and linking

b) Disk scheduling algorithm-SCAN

c) Short-term, medium-term, and long-term schedulers

d) Thrashing and its solution

e) Virus and worm.