Code: AC13   **Subject: OPERATING SYSTEMS**

AMIETE – CS (OLD SCHEME)

Time: 3 Hours   **DECEMBER 2011**   Max. Marks: 100

NOTE: There are 9 Questions in all.
- **Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.**
- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1   **Choose the correct or the best alternative in the following:**   **(2 ×10)**

   a.   What does RJE stand for?

   (A) Remote Job Entry   **(B)** Remote Job Enterprise
   (C) Real Job Entry   **(D)** Real Job Enterprise

   b.   Which of the following instructions is not privileged instruction?

   (A) Set value of timer.   **(B)** Read the clock.
   (C) Clear memory.   **(D)** Turn off interrupts.

   c.   How can command interpreters be implemented?

   (A) Whole procedures in memory.
   (B) Procedure calls programs into memory from disk.
   (C) both **(A)** and **(B)**
   (D) none of the above

   d.   The time needed to switch from one job to another is called _____.

   (A) Context switch   **(B)** Job switch
   (C) Process switch   **(D)** Starvation

   e.   Number of jobs in the current mix of running/waiting jobs is the _____.

   (A) degree of multiprocessing   **(B)** degree of multiprogramming
   (C) degree of jobs   **(D)** degree of scheduling

   f.   Setting the actual addresses used by each nonrelocatable address of a program is called _____.

   (A) Loading   **(B)** Linking
   (C) Binding   **(D)** Locating

g. A dashed line from process to resource, indicating potential request of resource by the process is called _____.

(A) Claim edge   (B) Resource edge
(C) Demand matrix   (D) Available vector

h. Fixed-size block of physical memory, each block of same size as page is a _____.

(A) Fragment   (B) Frame
(C) Segment   (D) Partition

i. An _____ is a list for each object consisting of the domains with a nonempty set of access rights for that object.

(A) Capability list   (B) Access List
(C) Linked list   (D) Capacity list

j. In Windows 2000 all processor dependent code is isolated in a dynamic link library (DLL) called

(A) Kernel System   (B) Network File System
(C) Hardware Abstraction Layer   (D) Object Manager

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

Q.2 a. Describe the differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage of multiprocessor systems?   **(4)**

b. What is DMA? For what types of operations is DMA useful? Explain your answer.   **(4)**

c. List five services provided by an operating system. Explain how each provides convenience to the users. Explain also in which cases it would be impossible for user-level programs to provide these services.   **(8)**

Q.3 a. What two advantages do threads have over multiple processes? What major disadvantage do they have? Suggest one application that would benefit from the use of threads, and one that would not.   **(6)**

b. What are the differences between user-level threads and kernel-supported threads? Under what circumstances is one type "better" than the other?   **(6)**

c. What is a PCB? Explain.   **(4)**

Q.4 a. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

(i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling.
(ii) What is the turnaround time of each process for each of the scheduling algorithms in part (i)?
(iii) What is the waiting time of each process for each of the scheduling algorithms in part (i)?
(iv) Which of the schedules in part (i) results in the minimal average waiting time (over all processes)?   **(12)**

b. What is the meaning of the term busy waiting? What other kinds of waiting are there? Can busy waiting be avoided altogether? Explain your answer.   **(4)**

Q.5 a. Define Critical-Section problem. What are the necessary requirements for a solution to the critical-section problem? Explain.   **(5)**

b. Consider the following snapshot of a system:

```
Allocation    A    B    C    D    Max: A    B    C    D
     P0       0    0    1    2          0    0    1    2
     P1       1    0    0    0          1    5    2    0
     P2       1    3    5    4          1    7    5    0
     P3       0    6    3    2          2    3    5    6
     P4       0    0    1    4          0    6    5    2
Available     A    B    C    D
              0    6    5    6
```

Answer the following questions using the banker's algorithm:
(i) What is the content of the matrix Need?
(ii) Is the system in a safe state?
(iii) If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?   **(6)**

c. Show the life-cycle of an I/O request with the help of a diagram.   **(5)**

Q.6 a. Why are page sizes always powers of 2? **(3)**

b. Consider the following page reference string:
7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1
How many page faults would occur for the following replacement algorithms, assuming three frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

LRU replacement
FIFO replacement
Optimal replacement **(9)**

c. What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem? **(4)**

Q.7 a. Compare and contrast:
(i) Sequential and direct access
(ii) Single-level and Two-level Directory **(8)**

b. Define: Seek time, Rotational latency and Disk bandwidth. Why rotational latency is usually not considered in disk scheduling? **(8)**

Q.8 a. Discuss four basic issues that the design of a communication network must address. **(4)**

b What is Encryption? Explain basic mechanism of encryption. Name two well known Encryption algorithms. **(6)**

c. How capabilities based revocation is different from access-list revocation. What are different schemes for implementing revocation for capabilities? **(6)**

Q.9 Write a brief note on the following (Any **FOUR**):

(i) Memory management of Linux system
(ii) Architecture of Windows-2000
(iii) Network topologies in terms of reliability
(iv) Election Algorithm
(v) Stateful file service **(4×4 = 16)**