AMIETE – CS/IT (NEW SCHEME) – Code: AC59/AT59

Subject: OPERATING SYSTEMS & SYSTEMS SOFTWARE

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

DECEMBER 2009

NOTE: There are 9 Questions in all.

- **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.**
- **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. While executing OS instructions the processor works in

(A) Privileged mode **(B)** User mode
(C) Dual mode **(D)** Network mode

b. The Application Programming Interface (API) contains

(A) Network protocols **(B)** System calls
(C) Error detection codes **(D)** Encryption data

c. 'Wait' and 'Signal' primitives belong to

(A) Semaphores **(B)** Queues
(C) Mailboxes **(D)** Pipes

d. Bankers algorithm is used in

(A) Deadlock detection **(B)** Deadlock prevention
(C) Deadlock avoidance **(D)** Inter process synchronisation

e. An optimal page replacement has

(A) High page fault rate and never suffer from Belady's anomaly
(B) Low page fault rate and always suffer from Belady's anomaly
(C) High page fault rate and always suffer from Belady's anomaly
(D) Low page fault rate and never suffer from Belady's anomaly

f. File Allocation Table (FAT) is used in

(A) MS-DOS **(B)** Both **(A)** & **(C)**
(C) OS/2 **(D)** Unix

g. The lexical and syntactic features of a programming language are specified by its

(A) Syntax **(B)** Semantics
(C) Grammar **(D)** None of these

h. A static binding is a binding

(A) Performed after the execution of a program begins

(B) Performed before the execution of a program begins
(C) Performed during the execution of a program
(D) None of these

i. A _____ parser constructs a parse tree for a source string through a sequence of reductions.

(A) Top down **(B)** Bottom Up
(C) Naive top down **(D)** None of these

j. The _____ of a program contains all information necessary to relocate and link the program with other programs.

(A) Source program **(B)** Binary programs

(B) compile-time

(C) Loader **(D)** Object modules

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

Q.2 a. What is an operating system and explain how do operating systems run more than one program at once? **(6)**

b. What is a Process? Explain the different process states. **(6)**

c. What is a Thread? Explain the various Multithreading Models. **(4)**

Q.3 a. What is scheduling? Differentiate between FIFO and RR scheduling. **(8)**

b. Suppose that a system is in an unsafe state. Show that it is possible for the processes to complete their execution without entering a deadlock state. **(4)**

c. Can a system detect that some of its processes are starving? If you answer "yes," explain how it can. If you answer "no," explain how the system can deal with the starvation problem. **(4)**

Q.4 a. Explain how do

(i) Processes inter-communicate
(ii) Synchronize their activity
(iii) Protect critical data (Critical sections) **(9)**

b. What is a file and what are the typical operations performed on files? **(4)**

c. How is free space managed? **(3)**

Q.5 a. Under what circumstances do page faults occur? Describe the actions taken by the operating system when a page fault occurs. **(4)**

b. Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming four frames? All frames are initially empty, so your first unique pages will all cost one fault each.

(i) LRU replacement (ii) FIFO replacement **(6)**

c. Describe the following allocation algorithms:

(i) First fit (ii) Best fit
(iii) Worst fit **(6)**

Q.6 a. Bring out the difference between system software and application software. **(6)**

b. Explain the classification of grammars. **(10)**

Q.7 a. Explain Top-Down parsing algorithm with the help of the following example:
Source String <id>+<id>*<id> to be parsed according to given grammar

E::=T+E|T
T::=V*T|V
V::= <id>

What advantages one will have due to elimination of backtracking in top down parsing? **(10)**

b. What is a macro? Describe various tables of a macro-preprocessor. **(6)**

Q.8 a. Explain the data structures used in assembler. **(6)**

b. Explain the architecture of Intel 8088. **(10)**

Q.9 a. Differentiate between:-

(i) Static and Dynamic Memory allocation
(ii) Call by value and Call by reference
(iii) Triples and quadruples
(iv) Local and Global optimization **(10)**

b. What is an interpreter? Explain the components of an interpreter. **(6)**