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

Subject: OPERATING SYSTEMS AND SYSTEMS SOFTWARE

Time: 3 Hours

JUNE 2011

Max. Marks: 100

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.**
- **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, selecting at least TWO questions from each part. 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. If the waiting time for a process is *p* and there are *n* processes in the memory then the CPU utilization is given by,

(A) p/n   (B) p^n (p raised to n)
(C) 1-p^n   (D) None of the above

b. If the no of pages in a 32 bit machine is 8kB then what is the size of the page table?

(A) 8 kb.   (B) 16 kB
(C) 4 KB   (D) Can't say

c. For what types of operations is DMA useful?

(A) For large & fast data transfers between memory & I/O devices.
(B) For large & slow data transfers between memory & I/O devices.
(C) For slow & small data transfers between memory & I/O devices.
(D) For small data transfers between processor and I/O device.

d. When a process is rolled out of memory, it loses its ability to use the CPU (at least for a while). Describe another situation where a process loses its ability to use the CPU, but where the process does not get rolled out.

(A) When an interrupt occurs.   (B) When thrashing occurs.
(C) When deadlock occurs.   (D) While swapping.

e. Interval between the time of submission and completion of the job is called

(A) Waiting time   (B) Turnaround time
(C) Throughput   (D) Response time

f. The "blocking factor" of a file is

(A) the number of blocks accessible to a file
(B) the number of blocks allocated to a file
(C) the number of logical records in one physical record
(D) none of the above

g. An assembler is

(A) programming language dependent.
(B) syntax dependant.
(C) machine dependant.
(D) complier dependant.

h. A parser which is a variant of top-down parsing without backtracking is

(A) Recursive Descend.   **(B)** Operator Precedence.
(C) LL(1) parser.   **(D)** LALR Parser.

i. In a two-pass assembler, the task of the Pass II is to

(A) separate the symbol, mnemonic opcode and operand fields.
(B) build the symbol table.
(C) construct intermediate code.
(D) synthesize the target program.

j. The syntax of the assembler directive EQU is

(A) EQU <address space>   **(B)** <symbol>EQU<address space>
(C) <symbol>EQU   **(D)** None of the above

PART A
Answer at least TWO questions. Each question carries 16 marks.

Q.2 a. Explain the following terms (**Any <u>TWO</u>**)

   (i) Batch Operating System
   (ii) Time Sharing System
   (iii) Real Time System.   **(4)**

   b. What is System Programs? What are the different categories of System
   programs?   **(2+3)**

   c. Define cooperating process? Discuss the two fundamental models of
   Interprocess communication? Give reasons for providing an environment that
   allows process cooperation?   **(2+2+3)**

Q.3 a. Assume you have the following jobs to execute with one processor, with the
   jobs arriving in the order listed here:

P	T(pi)	Arrival Time
0	80	0
1	20	10
2	10	10
3	20	80
4	50	85

(i) Suppose a system uses RR scheduling with a quantum of 15. Create a Gantt chart illustrating the execution of these processes?

(ii) What is the turnaround time for process p3?

(iii) What is the average wait time for the processes?   **(2+2+2)**

b. Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C, and D, and process P0 to P4:

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

Using Banker's algorithm, answer the following questions.

(i) What are the contents of the Need matrix?

(ii) Is the system in a safe state? Give reason for your answer.

(iii)If a request from process P4 arrives for additional resources of (1, 2, 0, 0) can the Banker's algorithm grant the request immediately? Show the new system state and other criteria.   **(2+2+2+4)**

Q.4 a. What is Critical-Section problem? What are the requirements that critical-section problem must satisfy for its solution?   **(2+3+3)**

b. Discuss the various attributes of a file? What are the methods that help in accessing the information stored in a file? Discuss them.   **(4+4)**

Q.5 a. Define Memory Allocation. What is the difference between contiguous and non-contiguous memory allocation   **(8)**

b. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212K, 417K, 112K, and 426K (in order)? Which algorithm makes the most efficient use of memory?   **(8)**

PART B
Answer at least TWO questions. Each question carries 16 marks.

Q.6 a. Discuss the different fundamental language processing activities?   **(5)**

b. Discuss the different criteria used to classify the data structures used for Language Processors?   **(5)**

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c. Define Grammar of a language. Identify the different classes of grammar. Explain their characteristics and limitations. **(6)**

Q.7 a. What are the problems that may arise during top-down parsing with backtracking? **(4)**

b. Write an algorithm to outline the macro-expansion using macro-expansion counter. **(4)**

c. What all information's the object module of a program contains? Consider the following assembly program. List all information's that the object module of the program contains. **(4+4)**

Statement	Address
START 500	
ENTRY TOTAL	
EXTRN MAX, ALPHA	
READ A	500)
LOOP	501)
.	
.	
.	
MOVER AREG, ALPHA	518)
BC ANY, MAX	519)
.	
.	
.	
BC LT, LOOP	538)
STOP	539)
A DS 1	540)
TOTAL DS 1	541)
END	

Q.8 a. Explain the elements of assembly language programming in detail. **(8)**

b. Explain the following: **(4+4)**

(i) Two pass translation and Single pass translation
(ii) Forward references and Cross references

Q.9 a. Discuss the issues involved that contributes to the semantics gap between a programming language domain and an execution domain? **(8)**

b. During a function call compiler takes care of certain points. List those points? **(4)**

c. Define interpreter? What are the different components of an interpreter? **(4)**