Code: AC59/AT59/AC110/AT110
Subject: OPERATING & SYSTEMS SOFTWARE

AMIETE – CS/IT *{Current & New Scheme}*

Time: 3 Hours   JUNE 2016   **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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. 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. A Process is instance of
   (A) a program in High level language kept on disk
   (B) contents of main memory
   (C) a program in execution
   (D) a job in secondary memory

   b. Real Time Systems are
   (A) Primarily used on Main frame Computers
   (B) Used for monitoring events
   (C) Used for program analysis
   (D) Used for real time interactive user

   c. Operating System environment increases CPU utilization by organizing jobs in such a manner that CPU has always one job to execute. This OS environment is
   (A) Multiprocessing   **(B)** Multiprogramming
   (C) Multitasking   **(D)** Time Sharing

   d. Concept of Interacting Process are based on the concepts of:
   (A) Multiprogramming   **(B)** Multitasking
   (C) Both (a) & (b)   **(D)** None

   e. Which of the following structure says that only lower level services are implemented in kernel space?
   (A) Microkernel   **(B)** Exokernel
   (C) Monolithic   **(D)** Layered

   f. if we are using Round Robin scheduling with a time quantum of 2 seconds, the turnaround time for the process P3 will be

Process	Burst Time
P1	5
P2	15
P3	10

(A) 29 seconds   (B) 23 seconds
(C) 13 hours   (D) 18 seconds

g. Banker's algorithm for recourse allocation deals with
(A) Deadlock avoidance   (B) Deadlock prevention
(C) Deadlock resolution   (D) Deadlock Detection

h. If the wait and signal operations in the semaphore are not executed automatically then
(A) Mutual Exclusion is never violated
(B) Mutual Exclusion is violated guaranteed
(C) Mutual Exclusion may be violated
(D) None

i. Lexical analysis is also known as:
(A) Syntax analysis   (B) Semantic analysis
(C) Parsing   (D) Scanning

j. In a two-pass assembler, which is not true as the task of the Pass I?
(A) Separate the symbol, mnemonic opcode and operand fields
(B) Build the symbol table
(C) Construct intermediate code
(D) Synthesize the target program

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

Q.2 a. Explain the process control block (PCB). Explain its contents through its diagram. **(7)**

b. What is the use of process table in process management? **(5)**

c. Describe the Fork-Join Primitives in the context of the implementing interacting processes. **(4)**

Q.3 a. Consider the set of jobs $< J_1, J_2, J_3, J_4, J_5 >$ assumed to arrive at time sequence as $< 0,1,2,6,12>$ with the length of the CPU processing time $< 7, 5, 3, 2, 3>$.

(i) Draw the Giant Chart illustrating their execution using Shortest Job First (SJF) and Shortest Renaming Time First (SRTF / SJF Preemptive) scheduling Algorithms.
(ii) Calculate the Average Turn Around time and Average waiting time for both above scheduling algorithms. **(4x2)**

b. Define Deadlock. State the four necessary conditions for a deadlock situation to occur in a system? **(4x2)**

Q.4 a. Discuss the critical section (CS) problem in detail. Also write the solution algorithm for readers-writers problem using semaphore. **(4+6)**

b. Discuss the actions of file system at open and close operations in detail. **(3+3)**

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Q.5 a. For the partitions of 200K, 600K, 150K, 300K, 700K (in-order) place the processes of size 127K, 575K, 198K and 685K (in-order) according to Best Fit ,First Fit and Worst Fit Algorithms. **(4+3+3)**

b. Explain the virtual memory using segmentation and consider the following segment table: **(6)**

Segment	Base	Length
0	375	102
1	770	115
2	222	70
3	515	276

For the following logical address, calculate the physical addresses and mention the reason for what the physical address is legal or illegal?
(a) 0, 101 (b) 2, 65 (c) 1, 185(d) 3, 270 (e) 2, 68 (f) 3, 475

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

Q.6 a. Define a language processor. Describe various types of language processors. **(2x2)**

b. Discuss the criteria in detail on the basis of which data structures used in language processing can be classified. **(4)**

c. Write short notes on: **(2x2)**
(i) Allocation Data Structures
(ii) Search Data Structures

d. Discuss the following terms briefly: **(4)**
(i) LEX
(ii) YACC

Q.7 a. Discuss the Bottom up parsing and top down parsing in detail? **(3x2)**

b. Discuss macro definition, macro call and macro expansion in detail. Why is nested macro expansion useful? **(6+4)**

Q.8 a. How assemblers handle forward reference instructions? Explain using suitable example. **(3x2)**

b. Write brief notes on the following given Assembler Directives. **(6)**
(i) ORIGIN
(ii) LTORG

c. What is OPTAB and what is SYMTAB? Explain their need in assembler. **(2x2)**

Q.9 a. Discuss the design and operation of the Interpreter for Basic (Interpreter Program) written in Pascal. **(7)**

b. Write the short notes on the following: **(3+3+3)**
(i) Call by reference and Call by value-result
(ii) Control Flow Analysis and Data Flow Analysis
(iii) Frequency Reduction and Strength Reduction Optimization

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