ROLL NO. _____

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

AMIETE – CS/IT *{NEW SCHEME}*

Time: 3 Hours **DECEMBER 2014** **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, 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. Multitasking is a logical extension of

(A) Multiprocessing **(B)** Batch Processing
(C) Multiprogramming **(D)** Real Time Processing

b. Rocket Launching and Telephone Switching equipments are the example of

(A) Real Time Operating System **(B)** Time Sharing Operating System
(C) Network Operating System **(D)** Distributed Operating System

c. A Language Processor which bridges an execution gap without generating a machine language program is

(A) Language Migrator **(B)** Interpreter
(C) De-translator **(D)** Preprocessor

d. A program in execution is a

(A) Preprocessing **(B)** Multiprocessing
(C) Process **(D)** Scheduling

e. In the CPU scheduling algorithms, Turnaround time is defined as:

(A) The interval from the time of submission to the time of completion of a process
(B) The amount of time takes to start responding
(C) The sum of periods spend waiting in the ready queue
(D) The time takes to output the response

f. The requirements must be satisfied for a solution of a critical section are:

(A) Mutual Exclusive **(B)** Progress
(C) Bounded waiting **(D)** All of these

g. SJF algorithm executes first the job

(A) Last entered in the ready queue **(B)** that has been in the queue the longest
(C) first entered in the ready queue **(D)** Which the least processor needs

h. *The* macro call *is* expanded *into a copy of the* macro during*:*

(A) Macro processing **(B)** Linker Processing
(C) Macro Pre-processing **(D)** Assembler Pre-processing

i. The job of merging the records from two files into one is performed by the system software which is?

(A) Security software **(B)** Networking software
(C) Utility program **(D)** Documentation system

j. In the Pass I of Assembler, Which data structure is not used:

(A) OPTAB **(B)** SYMTAB
(C) LITTAB **(D)** SRTAB

PART A

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

Q.2 a. Define process. What are the various states of a process? Also discuss the security problems in an OS. **(6)**

b. Compare and contrast Multiprogramming, Multitasking and Multiprocessing. **(6)**

c. Discuss the fundamental properties of the following operating systems:
(i) Batch operating system (ii) Time-sharing operating system **(4)**

Q.3 a. Consider a system with five processes < P0, P1, P2, P3, P4> and three resource types named P, Q and R. Resource type P has 12 Instances, Q has 9 and R has 11 instances. Suppose at time t0 we have the given situation as: **(8)**

Process	Allocation			Max			Available		
	P	Q	R	P	Q	R	P	Q	R
P0	2	5	4	4	6	5	1	2	1
P1	1	0	2	2	1	3			
P2	4	0	3	5	2	5			
P3	3	2	1	4	4	2			
P4	1	0	0	2	1	1			

(i) Show the content of Need Matrix.
(ii) Is the given system in safe state? If yes, then generate the Safe sequence using Banker's Algorithm.

b. Consider the set of Processes < A, B, C, D > assumed to have arrived at the time sequence <0, 1, 4, 6> having Burst time < 3, 6, 4, 2> respectively. Draw the Giant Chart illustrating their execution using Shortest Job First (SJF) Algorithm, Shortest Remaining Time First (SJF Preemptive Algorithm) and calculate the Average Turn Around time and Average waiting time for both scheduling algorithms. **(8)**

Q.4 a. Describe the implementation of semaphores in attaining process synchronization. Explain any two classical process synchronization problems. **(4+6)**

b. Explain the linked and indexed methods for allocating disk space to files. **(6)**

Q.5 a. Consider the following reference string: **(10)**

8 5 1 2 5 3 5 4 2 3 5 3 2 1 2 5 1 8 5 1

How many page faults will occur for First in First Out and Least Recently Used page replacement algorithms assuming three frames? Also calculate the page Fault rate in each case. Assume all frames are initially empty.

b. Explain the difference between contiguous memory allocation and non-contiguous memory allocation. **(6)**

PART B

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

Q.6 a. What are the various fundamental language processing activities? Discuss in detail. **(4)**

b. Explain the criteria to categorize data structures used for language processors. **(4)**

c. Explain Language Processor Development Tools through a graphic diagram. Mention the names of Language Processor Development Tools that are broadly used. **(8)**

Q.7 a. Distinguish between Bottom up parsing and top down parsing. Design an algorithm for Operator Precedence Parsing. **(8)**

b. Describe the data structure and algorithm for the first pass of the Linker. **(8)**

Q.8 a. Explain the structure of load-and-go assembler in detail. **(6)**

b. Write brief notes on the following given Assembler Directives:- **(6)**
(i) EQU
(ii) START & END

c. With the help of a diagram give the overview of two pass assembly. **(4)**

Q.9 a. What are the features that a compiler uses to implement function calls? **(4)**

b. Write short notes on the following:
(i) Local and Global optimization
(ii) Quadruples and Triples
(iii) Dynamic and Static Pointer **(12)**