ROLL NO. _____

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

AMIETE – CS/IT (Current & New Scheme)

Time: 3 Hours **DECEMBER 2015** **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. In resource partitioning approach, operating system decides a priori what resource should be allocated to a user computation. This approach is _____.
(A) dynamic allocation **(B)** linking
(C) static allocation **(D)** scanning

b. _____ arise when values of shared data are not accessed and updated in a mutually exclusive manner.
(A) Control synchronization **(B)** Data synchronization
(C) Process termination **(D)** Race conditions

c. _____examines the information in PCB's to select a process for execution and hands over its PCB to the dispatcher.
(A) Process dispatcher **(B)** Process scheduler
(C) Processes terminator **(D)** Event handler

d. One of the following condition is true for a deadlock to occur.
(A) circular wait does not exist **(B)** resources can be shared
(C) (A) and **(B)** **(D)** resources cannot be preempted

e. A _____ is a shared integer variable with non-negative values which can only be subjected to initialization and indivisible operations P, V.
(A) semaphore **(B)** deadlock
(C) abstraction **(D)** monitor

f. In language processing, _____ performs synthesis of target program and generates code.
(A) pass I **(B)** pass II
(C) pass III **(D)** pass IV

g. In data structures for language processing _____ avoids the problems associate with clustering effect by accommodating colliding entries in a separate table called the overflow table.
(A) binary search **(B)** tree search
(C) overflow chaining **(D)** heap search

h. Expansion of nested macro calls follow:
(A) First-in-last-out rule **(B)** Last-in-last-out rule
(C) First-in-first-out rule **(D)** Last-in-first-out rule

i. A _____program is a program which can perform the relocation of its own address sensitive instructions.
(A) relocation **(B)** non-relocation
(C) self-relocation **(D)** loop-relocation

j. Elimination of redundancies in program statements and rearranging of program statements without the change in logic are features of _____.
(A) code optimization **(B)** interpreters
(C) parameter passing **(D)** code fragmentation

PART A

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

Q.2 a. Explain the following systems: **(9)**
i. Batch processing systems
ii. Time sharing systems
iii. Real-time operating systems

b. Draw the process state diagram. **(3)**

c. What resources are used when a thread is created? How do they differ from those used when a process is created? **(4)**

Q.3 a. Most round-robin schedulers use a fixed size quantum. Give an argument in favour of small quantum and large quantum. Compare and contrast the types of systems and jobs to which both the arguments apply. **(4)**

b. Consider the following set of processes: **(6)**

Process Name	Arrival Time	Processing Time
A	0	7
B	1	5
C	2	2
D	3	4

Find the average turn round time for the FCFS, SJF and RR (time quantum = 4) non-preemptive CPU scheduling methods.

c. Mention any three measures for Deadlock detection and avoidance. **(6)**

Q.4 a. Explain the working of bounded-buffer problem in synchronization. **(6)**

b. Explain boot control block and volume control block used in file systems. **(4)**

c. Explain any two file sharing techniques. **(6)**

Q.5 a. Consider a paged virtual memory system with 32-bit virtual addresses and 1K-byte pages. Each page table entry requires 32 bits. It is desired to limit the page table size to one page. **(3+3+4)**

(i) How many levels of page tables are required?

(ii) What is the size of the page table at each level?

(iii) The smaller page size could be used at the top level or the bottom level of the page table hierarchy. Which strategy consumes the least number of pages?

b. Explain with a diagram how addresses are translated in a segmentation system. **(6)**

PART B

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

Q.6 a. Explain phases and passes of language processor. **(6)**

b. What is Intermediate Representation (IR)? What are the desirable properties of an IR? **(4)**

c. Explain the allocation data structures: stacks and heaps used in language processing. **(6)**

Q.7 a. Give the specifications of scanner with regular expression and respective semantic actions. **(6)**

b. What is macro? Identify and explain the different kinds of macro expansion. **(4)**

c. What are the different steps in execution of a program? Explain with the help of a diagram. **(6)**

Q.8 a. Explain the pass structures of assemblers. **(6)**

b. What are the advantages of assembler directives. **(4)**

c. What are the problems of single pass assembler and their respective solutions? **(3+3)**

Q.9 a. Explain the role of static and dynamic memory allocation used in compilers. **(5)**

b. Define expression trees and give their applications. **(5)**

c. Explain pure and impure interpreters. Give an illustration. **(3+3)**