ROLL NO. _____

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

AMIETE – CS/IT (Current & New Scheme)

Time: 3 Hours **JUNE 2017** **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. Operating system acts intermediate between
(A) user and computer hardware **(B)** user and programs
(C) memory and CPU **(D)** Disk and Cache

b. Thread is
(A) Lightweight Process **(B)** Heavyweight process
(C) Neutral Process **(D)** Single task

c. The no of states in Process state diagram is _____
(A) 3 **(B)** 4
(C) 5 **(D)** 6

d. Banker's Algorithm is used in _____ Process
(A) Deadlock Avoidance **(B)** Deadlock preemption
(C) Deadlock detection **(D)** Deadlock recovery

e. When is Round Robin(RR) Scheduling is same as Fist Come First Serve- FCFS Algorithm?
(A) When the CPU time of 1st process is less than given quantum in RR
(B) When CPU time of last process is less than given quantum in RR
(C) When all processes' burst time is less than given quantum in RR
(D) When all processes' burst time is greater than given quantum in RR

f. Which of the following is NOT true of deadlock prevention and deadlock avoidance schemes?
(A) In deadlock prevention, the request for resources is always granted if the resulting state is safe
(B) In deadlock avoidance, the request for resources is always granted if the result state is safe
(C) Deadlock avoidance is less restrictive than deadlock prevention
(D) Deadlock avoidance requires knowledge of resource requirements a priori

g. A critical section is a program segment
(A) which should run in a certain specified amount of time
(B) which avoids deadlocks
(C) where shared resources are accessed
(D) which must be enclosed by a pair of semaphore operations, P and V

h. When a program tries to access a page that is mapped in address space but not loaded in physical memory, then
(A) segmentation fault occurs **(B)** fatal error occurs
(C) page fault occurs **(D)** no error occurs

i. _____ approach performs reuse of memory and reclaims memory returned by programs only when it runs out of free memory to allocate
(A) Mutual exclusion **(B)** Garbage collection
(C) Resource allocation **(D)** Demand paging

j. Which of the following can be used as a criterion for classification of data
(A) nature of a data structure **(B)** purpose of a data structure
(C) lifetime of a data structure **(D)** All of these

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

Q.2 a. List the major activities of an operating system with regard to process management and memory management **(4)**

b. Distinguish between multiprogramming and multiprocessing systems **(6)**

c. What are the various actions an operating system performs when a new process is created? Explain four fundamental states for a process using a state transition diagram. **(6)**

Q.3 a. What is meant by scheduling? Explain Round robin scheduling. Define the following:
(i) Process (ii) Process Control Block (PCB)
(iii) Multi programming (iv) Time sharing **(2×4)**

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				Need				Available			
	A	B	C	D	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) How many resources of type A, B, C, and D are there? **(1)**

(ii) What are the contents of the Need matrix? **(1)**
(iii) Is the system in a safe state? Justify. **(3)**
(iv) 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. **(3)**

Q.4 a. Define critical regions. Give a solution for reader-writers problem using conditional critical regions. **(8)**

b. What criteria should be adopted for choosing type of file organization? **(8)**

Q.5 a. Explain memory allocation model during the execution of a program. **(8)**

b. Describe the First fit, Best fit and Worst fit allocation algorithms. 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?

Program name	Size
C-	40KB
D	90KB
E	55KB
F	70KB

How much total fragmentation would be there when using
(i) first-fit
(ii) best-fit criterion for memory allocation. **(8)**

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

Q.6 a. Define language processing. Give example. **(8)**

b. Give generic procedure to search and locate the entry of symbol s in a search data structure. Give algorithm for binary search organization. **(8)**

Q.7 a. Define DFA and Regular expression. Give one example for each. **(8)**

b. Write a note on nested macro calls with example **(8)**

Q.8 a. Write a note on assembly language of Intel 8088. **(8)**

b. What is the role of assembler? Explain various tasks performed by the passes of a two pass assembler. **(8)**

Q.9 a. What is memory allocation? Explain static and dynamic memory allocation. **(8)**

b. Explain the computation of control structures with appropriate compilation action. **(8)**