AUTUMN MAKE UP MID SEMESTER EXAMINATION-2018

School of Computer Engineering

KIIT Deemed to be University, Bhubaneswar-24

Operating Systems

[CS3009]

Time: 1 $^{1}/_{2}$ Hours **Full Mark: 20**

Answer any four Questions including Q.No.1 which is Compulsory.
The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

Q1) Answer all questions. **[1×5]**

(a) Suppose a new process in a system arrives at an average of six processes per minute and each such process requires an average of 8 seconds of service time. Estimate the fraction of time the CPU is busy in a system with a single processor.

(b) What is a dispatcher? What are its functionalities?

(c) Suppose, *s* is a semaphore with the initial value of 2. There are four active processes A, B, C and D are executing in the following order: A: P(*s*), B: P(*s*), C: V(*s*), D: P(*s*), C: P(*s*). At the end how many processes will be blocked?

(d) "Page size is always taken as power of 2". Justify.

(e) What is the significance of length of time slice on the performance of Round Robin Scheduling?

Q2) (a) What is process synchronization? Why it is required? **[2.5]**

(b) Consider the following processes arrived in a system. **[2.5]**

Process	Next CPU Burst Time(ms)	Arrival Time
P0	5	5
P1	6	4
P2	7	3
P3	9	1

Calculate the average waiting time of the processes if the scheduling algorithm is Round Robin with time slice length as 3 ms.

Q3) (a)Given four memory partitions of 100K, 200K , 300K and 200K size(in order) and three processes of 174K, 212K and 190K(in order). In which partition the 190K process will be loaded if the allocation policy is Best fit? **[2.5]**

(b)What is internal and external fragmentation? Explain with example. **[2.5]**

Q4) Consider a system with five processes P0 to P4 competing for and 4 resource types that is, A, B, C and D. Resources type A has 6 instances, B has 4 instances, C has 4 instances and D has 2 instances. The initial resource allocation of the processes is as follows. **[2.5×2]**

Process	**Allocation**				**Max**			
	A	B	C	D	A	B	C	D
P_0	2	0	1	1	3	2	1	1
P_1	1	1	0	0	1	2	0	2
P_2	1	1	0	0	1	1	2	0
P_3	1	1	1	0	3	2	1	0
P_4	0	0	0	1	2	1	0	1

(a)Does this initial allocation lead to safe state? If yes show a safe sequence.

(b)A request <1,1,0,0> by Process P_4 is generated. Whether the request will be granted?

Q5)(a) Suggest a semaphore based deadlock free solution to dinning philosopher problem? Whether the solution is free from starvation? Justify. **[2.5]**

(b)A shared variable *v*, initialized to zero, is operated on by four concurrent processes A, B, X, Y as follows. Each of the processes A and B reads *v* from memory, increments by one, stores it to memory, and then terminates. Each of the processes X and Y reads *v* from memory, decrements by two, stores it to memory, and then terminates. Each process before reading *v* invokes the P operation (i.e., wait) on a counting semaphore S and invokes the V operation (i.e., signal) on the semaphore S after storing *v* to memory. If semaphore S is initialized to 1, then what is the value of *v* after all processes complete execution? **[2.5]**