**BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI – K. K. BIRLA GOA CAMPUS**

**First Semester 2013-2014**

Course Title : OPERATING SYSTEMS Course No ***CS C372 , IS C362, CS F 372 and IS F 372***

Component : Test II (Regular) Closed Book Component

**Weightage : 20%** **Max Marks: 40** **Date: 27-10-2013**

**Question 1:** Consider the following snapshot of the system with five processes P0 to P4 and 4 resource types A, B, C and D with instances 3, 14, 12 and 8 respectively. **[5+2]**

| **Process** | **MAX** | | | | | **ALLOCATION** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **A** | **B** | **C** | **D** | | **A** | **B** | **C** | **D** |
| **P0** | **0** | **0** | **1** | **2** | | **0** | **0** | **1** | **2** |
| **P1** | **1** | **7** | **5** | **0** | | **1** | **0** | **0** | **0** |
| **P2** | **2** | **3** | **5** | **6** | | **1** | **3** | **5** | **4** |
| **P3** | **3** | **6** | **5** | **2** | | **0** | **6** | **3** | **2** |
| **P4** | **0** | **6** | **5** | **7** | | **0** | **0** | **1** | **0** |

Using Banker's Algorithm

(a) check whether the system is safe or not. If the system is safe write the safe sequence. If not, name all the processes in unsafe state.

**ANS: Available = (1,5,2,0). Safe Sequence = <P0,P2,P1,P3,P4>**

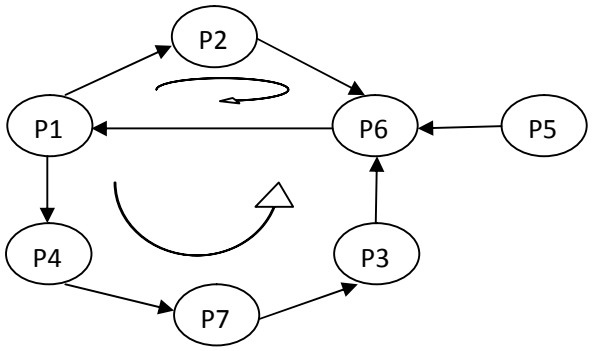
(b) if a request from process P1 arrives for (0,4,2,0) can the request be granted? Give reason in any case.

**ANS: YES, since request < need (0,4,2,0) < (0,7,5,0)**

**Question 2** : Consider the following snapshot at time t. Draw wait for graph and determine whether the system enter into deadlock [Yes/No]? **[4+2]**

| Process | Data items locked | Data items the process is waiting for | | Process | Data items locked | Data items the process is waiting for |
|---|---|---|---|---|---|---|
| P1 | X3, X10 | X7, X8 | | P5 | X2 | X1 |
| P2 | X7 | X1 | | P6 | X1, X5 | X3 |
| P3 | X6 | X5 | | P7 | X4, X9 | X6 |
| P4 | X8 | X4 | | | | |

**ANS:**




**Wait-for graph**

**YES, the system enters into deadlock since there exist cycle in the graph.**

**Question 3** : Consider the following segment table: **[6]**

| Segment | Limit | Base |
|---|---|---|
| 0 | 1500 | 1400 |
| 1 | 450 | 6300 |
| 2 | 375 | 4300 |
| 3 | 1111 | 3200 |
| 4 | 1005 | 4700 |

What are the physical addresses for the following logical addresses?

(i) 2, 63 (ii) 3, 876 (iii) 4, 1015

**ANS:**

(i) LA=<s,d>=<2,63>
Check d<limit, 63<375
Thus PA=base + d = 4300+63=4363 **[1.5M]**

(ii) LA=<s,d>=<3,876>
Check d<limit, 876<1111
Thus PA=base + d = 3200+876=4076 **[1.5M]**

(iii) LA=<s,d>=<4,1015>
Check d<limit, 1015 < 1005 NO
Thus invalid LA **[3M]**

**Question 4** : **[1.5+2+5.5]**

(A) List three methods to reduce the memory overhead of a paged system.

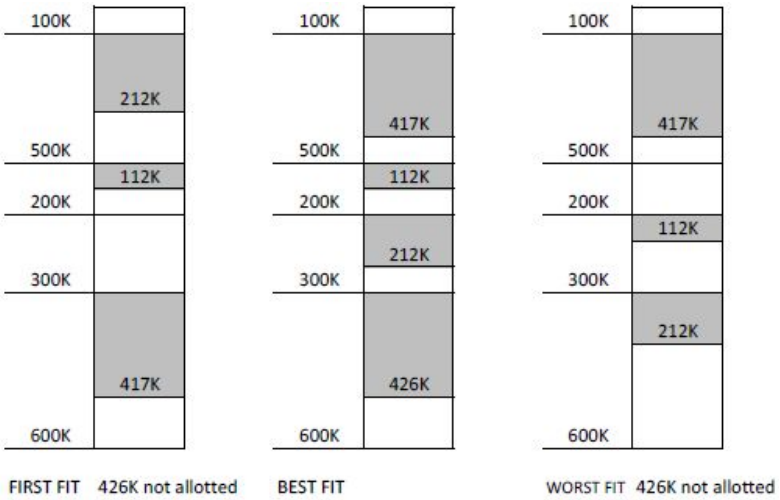
**ANS:**

1. **By increasing page size**
2. **By using inverted page table**
3. **By creating page table whose page entries exactly matches with the process page numbers and have page table length register.**

(B) Consider a logical address space of eight pages of 1024 Bytes each, mapped onto a physical memory of 32 frames. How many bits are there in the logical address and in the physical address?

**ANS: Logical address= 3+10=13 bits, Physical address= 5+10=15 bits**

(C) Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order), how would each of the (a) first fit (b) best fit and (c) worst fit algorithms place processes of 212K, 417K, 112K and 426K (in order) ? Which algorithm makes the best use of memory? Show holes that are created in each case.




**Best Fit allocation algorithm makes the best use of memory**