CMR INSTITUTE OF TECHNOLOGY

USN | | | | | | | | | | |

Internal Assesment Test - II

| Sub: | Operating Systems | | | | | | | Code: | 10CS53 |
|---|---|---|---|---|---|---|---|---|---|
| Date: | 03/11/16 | Duration: | 90 mins | Max Marks: | 50 | Sem: | V | Branch: | ISE |

Answer Any FIVE FULL Questions

| | | Marks | OBE CO | OBE RBT |
|---|---|---|---|---|
| 1(a) | Consider the following page reference stream:1 ,2 ,3 ,4 ,2 ,1 ,5 ,6 ,2 ,1 ,2 ,3 ,7 ,6 ,3 ,2 ,1 ,2 ,3,6.How many page faults would occur for LRU and Optimal replacement algorithms assuming 3 frames. | [05M] | CO3 | L3 |
| (b) | How many page faults would occur for LRU and FIFO replacement algorithms if the number of frames allocated are 5. | [05 M] | CO3 | L3 |
| (c) | Which one of the above is most efficient? | [01 M] | CO3 | L1 |
| 2(a) | What is page fault? With the help of a neat diagram explain the procedure for handling a Page fault. | [06 M] | CO3 | L1 |
| (b) | Explain basic concepts of demand paging. | [04 M] | CO3 | L5 |
| 3 | What is dynamic storage allocation problem? Explain different strategies used to solve the above problem | [10 M] | CO3 | L5 |
| 4 | Explain the following.<br>a) File Attributes b) Belady's anomaly c) Access Methods | [10 M] | CO3 | L5 |
| 5 | Explain segmentation memory management. Describe the hardware support that is required for its Implementation. | [10 M] | CO3 | L5 |
| 6(a) | Describe the necessary conditions for a deadlock situation to arise, in a system. | [04 M] | CO2 | L2 |
| (b) | "A cycle in the graph (RAG) is a necessary, but not a sufficient condition for the existence of deadlock" – Justify | [06 M] | CO2 | L5 |
| 7 | Assume that there are 5 processes, P0 through P4, and 4 types of resources A through D. At t0 we have the following snapshot. | | | |

| | Allocation | | | | Max | | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | A | B | C | D |
| P0 | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 0 |
| P1 | 1 | 2 | 3 | 1 | 3 | 6 | 5 | 2 |
| P2 | 1 | 3 | 6 | 5 | 2 | 3 | 6 | 6 |
| P3 | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 |
| P4 | 0 | 0 | 1 | 4 | 0 | 6 | 8 | 6 |

| Available | | | |
|---|---|---|---|
| A | B | C | D |
| 1 | 5 | 2 | 0 |

| | | | | |
|---|---|---|---|---|
| (a) | What is the content of the need matrix. | [03M] | CO3 | L1 |
| (b) | Use the safety algorithm to test if the system is in a safe state. | [03M] | CO3 | L3 |
| (c) | If the system is in a safe state, can the following requests be granted, why or Why not? Use the safety algorithm on each request as necessary.<br>a. P1 requests (2,1,1,0)<br>b. P1 requests (0,2,1,0) | [04M] | CO2 | L3 |

| Course Outcomes | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1: | Describe different functions, structures and design issues associated with OS. | 2 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| CO2: | Demonstrate various process management concepts including scheduling, synchronizing and deadlocks. | 2 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| CO3: | Explain memory management techniques like Paging, Segmentation | 2 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| CO4: | Explain the management techniques of file systems, protection and security. | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CO5: | Demonstrate various secondary storage concepts including disk scheluding methods | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CO6: | Explain the functionality with Linux operating system as case study. | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Cognitive level | KEYWORDS |
|---|---|
| L1 | List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc. |
| L2 | summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend |
| L3 | Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover. |
| L4 | Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer. |
| L5 | Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize. |

PO1 - *Engineering knowledge*; PO2 - *Problem analysis*; PO3 - *Design/development of solutions*; PO4 - *Conduct investigations of complex problems*; PO5 - *Modern tool usage*; PO6 - *The Engineer and society*; PO7- *Environment and sustainability*; PO8 – *Ethics*; PO9 - *Individual and team work*; PO10 - *Communication*; PO11 - *Project management and finance*; PO12 - *Life-long learning*

# Internal Assessment Test II – Nov 2016

SUB: OPERATING SYSTEMS
CODE: 10CS53
DURATION: 90 mins
MAX MARKS: 50

SEM: V
BRANCH: ISE

1 (a) LRU

| 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 4 | – | 4 | 5 | 5 | 5 | 1 | – |
| | 2 | 2 | 2 | | 2 | 2 | 6 | 6 | 6 | |
| | | 3 | 3 | | 1 | 1 | 1 | 2 | 2 | |

| 3 | 7 | 6 | 3 | 2 | 1 | 2 | 3 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1 | 7 | 7 | – | 2 | 2 | – | – | 2 |
| 3 | 3 | 3 | | 3 | 3 | | | 3 |
| 2 | 2 | 6 | | 6 | 1 | | | 6 |

No: of page faults: 15 (2 marks)

Optimal

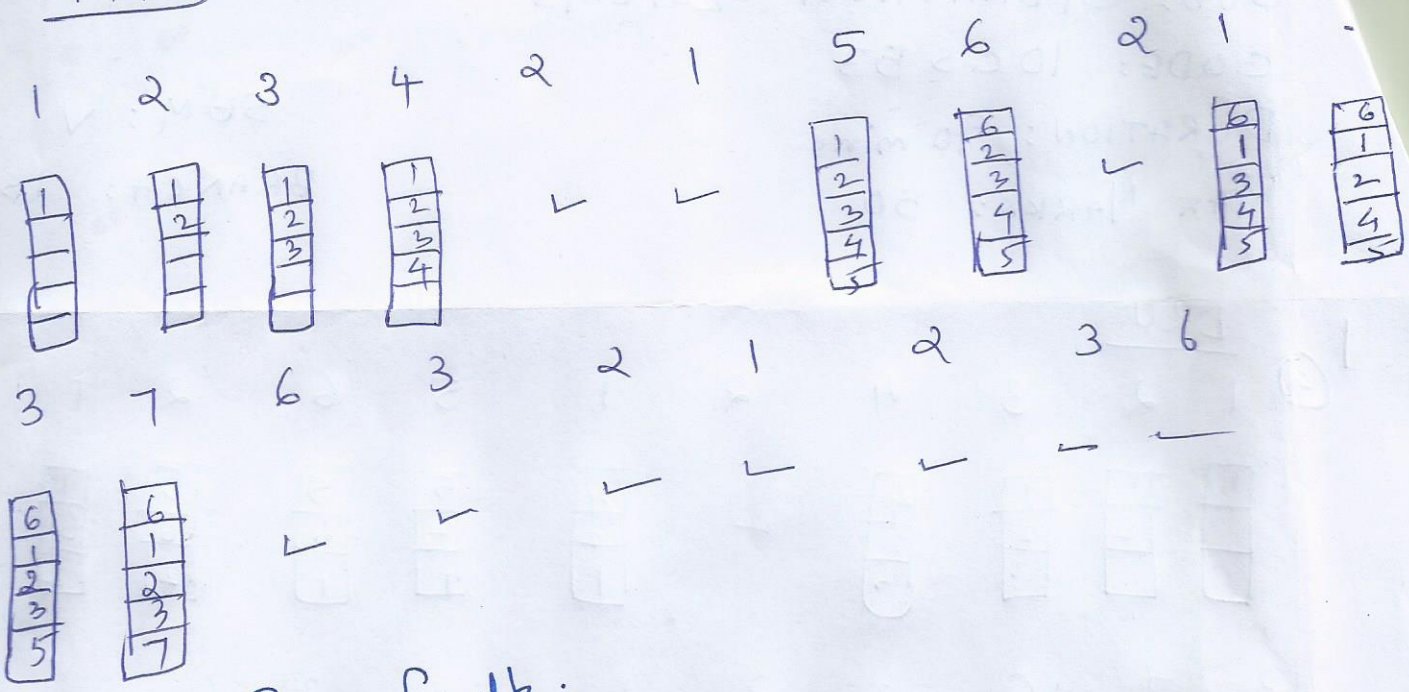
(b)

| 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | – | – | 1 | 1 | – | – | – |
| | 2 | 2 | 2 | | | 2 | 2 | | | |
| | | 3 | 4 | | | 5 | 6 | | | |

| 3 | 7 | 6 | 3 | 2 | 1 | 2 | 3 | 6 |
|---|---|---|---|---|---|---|---|---|
| 3 | 3 | – | – | 3 | 3 | – | – | 6 |
| 2 | 7 | | | 2 | 2 | | | 2 |
| 6 | 6 | | | 6 | 1 | | | 1 |

No: of Page faults = 11. (2 marks)

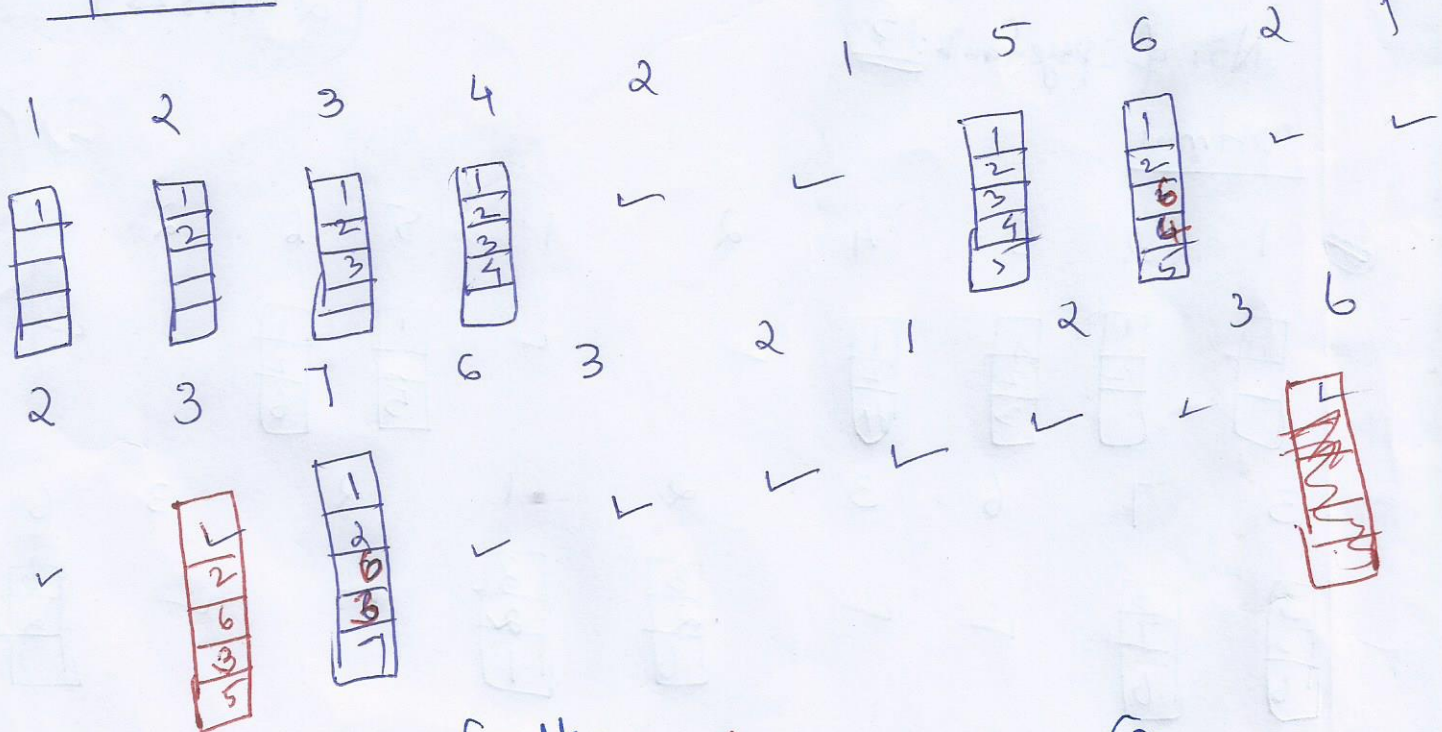
(b) FIFO




No: of Page faults:
10

(2 marks)

~~Optimal~~ LRU




No: of Page faults.
~~8~~ page faults.

(2 marks)

(c) ~~Most~~ efficient Case is ~~Optimal~~ LRU with 5 frame

(2 marks)

3 (a) Dynamic storage allocation (4 marks)

Diagram (1 marks)

5 Solutions (5 marks)

2 (a) Page faults handling steps

6 steps 3 marks

diagrams 3 marks

(b) Demand paging

explanation 2 marks

- Diagram 2 marks

4 (a) File attributes

6 attributes 3 marks

(b) Belady's anomaly

explanation with egs 4 marks

show the no of page faults for different frame numbers (say 3 & 4)

(c) Access methods

Sequential access 2 marks

Direct access 1 marks.

5. Segmentation

Definition with diagram 2 marks

Hardware diagram 2 marks

explanation 2 marks

eg diagram 2 marks

Explanation 2 marks.

6. (a) 4 necessary conditions for deadlock.

4 marks.

(b) → Cycle represents deadlock.

explanation with eg diagram — 3 marks

→ Cycle ~~dont~~ is not sufficient to represent deadlock.

explanation with eg diagram — 3 marks.

7

① NEED MATRIX

| | A | B | C | D |
|---|---|---|---|---|
| $P_0$ | 0 | 1 | 0 | 0 |
| $P_1$ | 2 | 4 | 2 | 1 |
| $P_2$ | 1 | 0 | 0 | 1 |
| $P_3$ | 0 | 0 | 2 | 0 |
| $P_4$ | 0 | 6 | 7 | 2 |

AVAILABLE

| | | | |
|---|---|---|---|
| 1 | 5 | 2 | 0 |

② $P_0$

| | | | |
|---|---|---|---|
| NA | 1 | 5 | 2 0 |
| | 0 | 1 | 1 0 |
| | 1 | 6 | 3 0 |

$P_3$

| | | | | |
|---|---|---|---|---|
| NA | 1 | 6 | 3 | 0 |
| | 0 | 6 | 3 | 2 |
| | 1 | 12 | 6 | 2 |

$P_2$

| | | | | |
|---|---|---|---|---|
| NA | 1 | 12 | 6 | 2 |
| | 1 | 3 | 6 | 5 |
| | 2 | 15 | 12 | 7 |

$P_4$

| | | | | |
|---|---|---|---|---|
| NA | 2 | 15 | 12 | 7 |
| | 0 | 0 | 1 | 4 |
| | 2 | 15 | 13 | 11 |

$P_1$

| | | | | |
|---|---|---|---|---|
| NA | 2 | 15 | 13 | 11 |
| | 1 | 2 | 3 | 1 |
| | 3 | 17 | 16 | 12 |

safe sequence is $< P_0, P_3, P_2, P_4, P_1 >$

system is in safe state.

③ (a) $P_1$ requests (2, 1, 1, 0)

As more than availability request can't granted.

(b) $P_1$ requests (0, 2, 1, 0)

| | A | B | C | D | MAX A | B | C | D |
|---|---|---|---|---|---|---|---|---|
| $P_0$ | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 0 |
| $P_1$ | 1 | 4 | 4 | 1 | 3 | 6 | 5 | 2 |
| $P_2$ | 1 | 3 | 6 | 5 | 2 | 3 | 6 | 6 |
| $P_3$ | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 |
| $P_4$ | 0 | 0 | 1 | 4 | 0 | 6 | 8 | 6 |

NEED

| | A | B | C | D |
|---|---|---|---|---|
| $P_0$ | 0 | 1 | 0 | 0 |
| $P_1$ | 2 | 2 | 1 | 1 |
| $P_2$ | 1 | 0 | 0 | 1 |
| $P_3$ | 0 | 0 | 2 | 0 |
| $P_4$ | 0 | 6 | 7 | 2 |

AVAILABLE

| A | B | C | D |
|---|---|---|---|
| 1 | 3 | 1 | 0 |

$P_0$ NA

| | | | |
|---|---|---|---|
| 1 | 3 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 1 | 4 | 2 | 0 |

(P3)

| | | | | |
|---|---|---|---|---|
| NA | 1 | 4 | 2 | 0 |
| | 0 | 6 | 3 | 2 |
| | 1 | 10 | 5 | 2 |

(P2)

| | | | | |
|---|---|---|---|---|
| NA | 1 | 10 | 5 | 2 |
| | 1 | 3 | 6 | 5 |
| | 2 | 13 | 11 | 7 |

(P4)

| | | | | |
|---|---|---|---|---|
| NA | 2 | 13 | 11 | 7 |
| | 0 | 0 | 1 | 4 |
| | 2 | 13 | 12 | 11 |

(P1)

| | | | | |
|---|---|---|---|---|
| NA | 2 | 13 | 12 | 11 |
| | 1 | 4 | 4 | 1 |
| | 3 | 17 | 16 | 12 |

Safe sequence

$< P_0, P_3, P_2, P_4, P_1 >$

System is safe state after granting the request also.

So the request from $P_1 (0, 2, 1, 0)$ can be granted.