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**P.E.S. College of Engineering, Mandya - 571 401**  
*(An Autonomous Institution affiliated to VTU, Belgaum)*  
**Fifth Semester, B.E. - Computer Science and Engineering**  
**Semester End Examination; Dec. - 2015**  
**Operating System**

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

**UNIT - I**

- 1 a. Differentiate between symmetric and asymmetric multiprocessing. 6  
 b. Discuss various services provided by an operating system. 8  
 c. Recall the key difference between trap and interrupt. 3  
 d. Classify the following applications by batch oriented or interactive;  
     i) Computing pi to million decimal 3  
     ii) Generating personal tax returns  
     iii) Flight simulation.
- 2 a. Explain the concept of virtual machine with a block diagram. 6  
 b. Illustrate how system calls are utilized. 8  
 c. Recall the key difference between mechanism and policy. 3  
 d. Identify and justify the privileged instructions;  
     i) Write the program counter 3  
     ii) Set the time of day clock  
     iii) Change processor priority.

**UNIT - II**

- 3 a. Discuss various process states with a neat block diagram. 6  
 b. Enumerate the difference between shared memory and message passing model. 6  
 c. For the processes listed below; draw the gantt chart, compute average waiting and turnaround time using;  
     i) SJF (Pre-emptive)                      ii) RR (q = 2)

Process	Arrival time	Burst time
A	0	3
B	1	6
C	4	4
D	6	2

- 4 a. Discuss various multithreading models. 6  
 b. Discuss the concept of process scheduling with the help of queuing diagram. 6

- c. For the process listed below, draw the gantt chart, compute average waiting time and turn around time using;
- i) FCFS
  - ii) SJF (Pre-emptive)

Process	Arrival time	Burst time
A	0	3
B	2	6
C	3	2
D	3	2

8

Note: For calculation purpose consider arrival time as integer.

**UNIT - III**

- 5 a. Discuss the solution to reader-writer problem using semaphores. 6
- b. Write the pertesons’s solutions to critical section problem. 4
- c. Given the process resource usage and availability as described below, draw the resource allocation graph, Is the system deadlocked?

Process	Current Allocation			Request			Resources Available		
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>			
P <sub>1</sub>	2	0	0	1	1	0	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>
P <sub>2</sub>	3	1	0	0	0	0	0	0	0
P <sub>3</sub>	1	3	0	0	0	1			
P <sub>4</sub>	1	3	0	0	0	1			

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Also compute the total resources available of each type (R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>).

- 6 a. Discuss any two classical problems in synchronization. 6
- b. Give the definitions of the two synchronization hardware. 4
- c. Consider the following snapshot of a system.

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P <sub>0</sub>	0	0	1	2	0	0	1	2	1	5	2	0
P <sub>1</sub>	1	0	0	0	1	7	5	0				
P <sub>2</sub>	1	3	5	4	2	3	5	6				
P <sub>3</sub>	0	6	3	2	0	6	5	2				
P <sub>4</sub>	0	0	1	4	0	6	5	6				

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Answer the following using Banker’s algorithm;

- (i) What is the content of need matrix? (ii) What is the total resources?
- (iii) Is the system safe? (iv) If a request from process P<sub>1</sub> arrives for (0, 4, 2, 0) can the request be granted immediately.

**UNIT - IV**

- 7 a. Distinguish between:
- i) Logical and physical address space 6
  - ii) Paging and segmentation
- b. Discuss any two techniques for structuring page table. 6
- c. Illustrate Belady's Anomaly in FIFO page replacement algorithm. 6
- d. On a simple paging system with a page table containing 64 entries of 11 bits (including valid/invalid bit) each, and a page size of 512 bytes, what is the size of physical address space? 2
- 8 a. Distinguish between:
- i) Internal and external fragmentation 6
  - ii) Static and dynamic linking.
- b. Explain the steps to handle a page fault with a neat block diagram. 6
- c. Given memory partitions of 100K, 500K, 200K, 300K and 600K in order, how would each of the first fit, best fit and worst fit algorithm place processes of 212K, 417K, 112K and 426K (in order)? 6
- d. On a simple paging system a page table containing 512 entries of 16 bits (including valid/invalid bit) each, and a page size of 1024 bytes, What is the size of physical address space?. 2

**UNIT - V**

- 9 a. Discuss basic operations on files. 6
- b. Explain linked allocation of disk space. 6
- c. On a disk with 1000 cylinders numbered 0 to 999, compute number of tracks the disk arm must move to satisfy all the request serviced was at 345 and the head is moving towards track 0. Perform computation using;
- (i) SCAN
  - (ii) SSTF
  - (iii) LOOK
- 8
- 10a. Discuss the two access methods of files. 6
- b. Write an explanatory note on virtual file system. 6
- c. Describe how access matrix can be effectively implemented. 8

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