Savitribai Phule Pune University

T.Y. B.C.A (Science)

Semester – V

C.B.C.S 2019 Pattern

BCA358

DSE III Lab

(Operating Systems and AI)

Q.1 Write a program that demonstrates the use of nice() system call. After a child process is started using fork(), assign higher priority to the child using nice() system call.   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n=3 as the number of memory frames.

Reference String :3, 4, 5, 6, 3, 4, 7, 3, 4, 5, 6, 7, 2, 4, 6

Implement FIFO   [20 marks]

OR

Write a C program to simulate Banker's algorithm for the purpose of deadlock avoidance. Consider the following snapshot of system, A, B, C and D are the resource type.

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

AVAILABLE			
A	B	C	D
1	5	2	0

a) Calculate and display the content of need matrix?

b) Is the system in safe state? If display the safe sequence.

c) If a request from process P arrives for (0, 4, 2, 0) can it be granted immediately by keeping the system in safe state. Print a message   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   Max Marks: 35+15=50

Q.1 Create a child process using fork(), display parent and child process id. Child process will display the message "Hello World" and the parent process should display "Hi".
[10 marks]

Q.2 Write the simulation program using SJF (non-preemptive). The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.[20 marks]

OR

Partially implement the Menu driven Banker's algorithm for accepting Allocation, Max from user.

a) Accept Available

b) Display Allocation, Max

c) Find Need and display It,

d) Display Available Consider the system with 3 resources types A,B, and C with 7,2,6 instances respectively.

Consider the following snapshot:

	ALLOCATION	REQUEST	TOTAL RESOURCES
p0	0 1 0	0 0 0	7 2 6
p1	2 0 0	2 0 0	
p2	3 0 3	0 0 1	
p3	2 1 1	1 0 0	
p4	0 0 2	0 0 2	

Answer the following questions:

a) Display the contents of Available array?

b) Is there any deadlock? Print the message   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Slip 2

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q. 1 Creating a child process using the command exec(). Note down process ids of the parent and the child processes, check whether the control is given back to the parent after the child process terminates.   [10 marks]

Q.2 Write the simulation program using FCFS. The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart,Turnaround Time   and   Waiting   time   for   each   process   and   average   times. [20 marks]

<div align="center">OR</div>

Q.2 Given an initial state of a 8-puzzle problem and final state to be reached

Initial State   **Final State**

Find the most cost-effective path to reach the final state from initial state using A* Algorithm in C/Python.   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write a program to illustrate the concept of orphan process (Using fork() and sleep())
[10 marks]

Q.2 Write the program to simulate Non-preemptive Priority scheduling. The arrival time and first CPU burst and priority for different n number of processes should be input to the algorithm. Assume the fixed IO waiting time (2 units). The next CPU-burst should be generated randomly. The output should give Gantt chart, turnaround time and waiting time for each process. Also find the average waiting time and turnaround time..   [20 marks]

OR

Q.2 Write a C program to simulate Banker's algorithm for the purpose of deadlock avoidance. Consider the following snapshot of system, A, B, C and D are the resource type.

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

AVAILABLE			
A	B	C	D
1	5	2	0

a) Calculate and display the content of need matrix?

b) Is the system in safe state? If display the safe sequence.

c) If a request from process P arrives for (0, 4, 2, 0) can it be granted immediately by keeping the system in safe state. Print a message   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   Max Marks: 35+15=50

Q.1 Write a program that demonstrates the use of nice () system call. After a child process is started using fork (), assign higher priority to the child using nice () system call.   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n as the number of memory frames. Reference String: 3, 4, 5, 6, 3, 4, 7, 3, 4, 5, 6, 7, 2, 4, 6

i. Implement FIFO   [20 marks]

<div align="center">OR</div>

Q.2 partially implement the Menu driven Banker's algorithm for accepting Allocation, Max from user.

a) Accept Available

b) Display Allocation, Max

c) Find Need and display It,

d) Display Available Consider the system with 3 resources types A,B, and C with 7,2,6 instances respectively.

Consider the following snapshot:

	ALLOCATION	REQUEST	TOTAL RESOURCES
p0	0 1 0	0 0 0	7 2 6
p1	2 0 0	2 0 0	
p2	3 0 3	0 0 1	
p3	2 1 1	1 0 0	
p4	0 0 2	0 0 2	

Answer the following questions:

a) Display the contents of Available array?

b) Is there any deadlock? Print the message   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

<div align="center">Slip 5</div>

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write a program to find the execution time taken for execution of a given set of instructions (use clock() function)   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n as the number of memory frames.

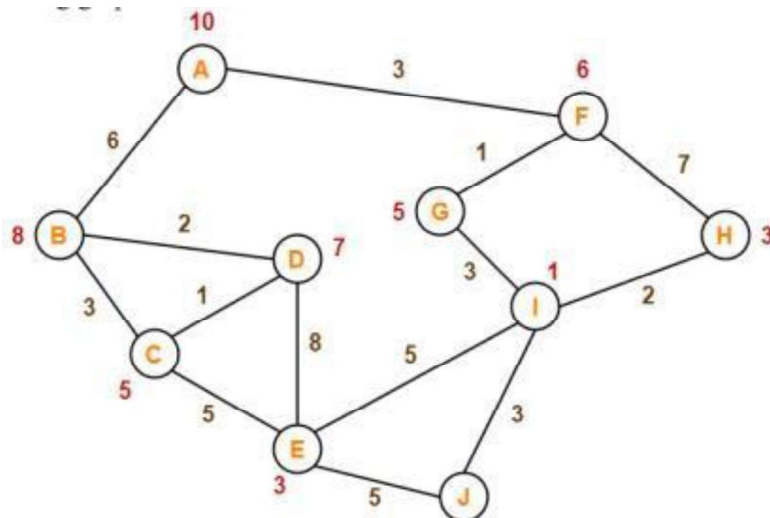Reference String :3, 4, 5, 6, 3, 4, 7, 3, 4, 5, 6, 7, 2, 4, 6

Implement FIFO   [20 marks]

<p align="center">OR</p>

Q.2 Consider the following graph

The numbers written on edges represent the distance between the nodes.

The numbers written on nodes represent the heuristic value.

Implement A* algorithm in C/Python for above graph and find out most cost-effective path from A to J.   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs. **Max Marks: 35+15=50**

Q.1 Write a program to create a child process using fork().The parent should goto sleep state and child process should begin its execution. In the child process, use execl() to execute the "ls" command. [10 marks]

Q.2 Write the simulation program using FCFS. The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times [20 marks]

OR

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n as the number of memory frames.

Reference String: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2

i. Implement LRU [20 marks]

Q3. Viva [5 Marks]

Q4. Internal Assessment [15 Marks]

Q.1 Write a C program to accept the number of process and resources and find the need matrix content and display it.   [10 marks]

Q.2 Implement AO* algorithm in C /python for following graph and find out minimum cost solution.
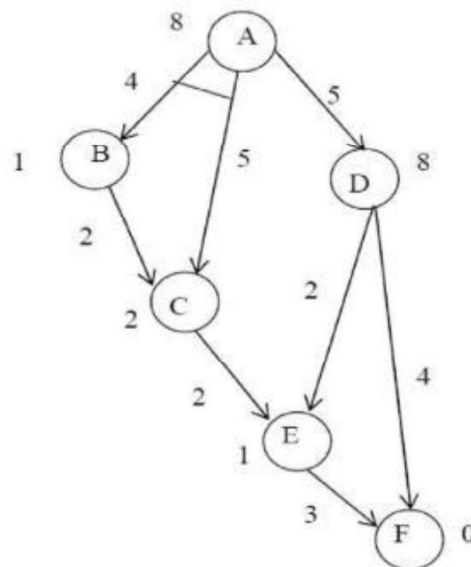
[20 marks]

OR

Q.2. Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n =3 as the number of memory frames.

Reference String : 12,15,12,18,6,8,11,12,19,12,6,8,12,15,19,8

Implement OPT   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Q.1 Write a program to create a child process using fork().The parent should goto sleep state and child process should begin its execution. In the child process, use execl() to execute the "ls" command.   [10 marks]

Q.2 Partially implement the Menu driven Banker's algorithm for accepting Allocation, Max from user.

 a) Accept Available

 b) Display Allocation, Max

c) Find Need and display It,

d) Display Available Consider the system with 3 resources types A,B, and C with 7,2,6 instances respectively.

Consider the following snapshot:

	ALLOCATION	REQUEST	TOTAL RESOURCES
p0	0 1 0	0 0 0	7 2 6
p1	2 0 0	2 0 0	
p2	3 0 3	0 0 1	
p3	2 1 1	1 0 0	
p4	0 0 2	0 0 2	

     [20 marks]

OR

Q.2 Write the program to simulate Round Robin (RR) scheduling. The arrival time and first CPU-burst for different n number of processes should be input to the algorithm. Also give the time quantum as input. Assume the fixed IO waiting time (2 units). The next CPU-burst should be generated randomly. The output should give Gantt chart, turnaround time and waiting time for each process. Also find the average waiting time and turnaround time.   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write a program to illustrate the concept of orphan process (Using fork() and sleep())

[10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n=3 as the number of memory frames.

Reference String : 12,15,12,18,6,8,11,12,19,12,6,8,12,15,19,8

 Implement OPT   [20 marks]

<div align="center">OR</div>

Q.2 Write the simulation program using FCFS. The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.   [20 marks]

Q3. Viva   [5 Marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Create a child process using fork(), display parent and child process id. Child process will display the message "Hello World" and the parent process should display "Hi".

[10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n as the number of memory frames.
Reference String: 0, 2, 1, 6, 4, 0, 1, 0, 3, 1, 2, 1

Implement FIFO   [20 marks]

OR

Consider the following graph
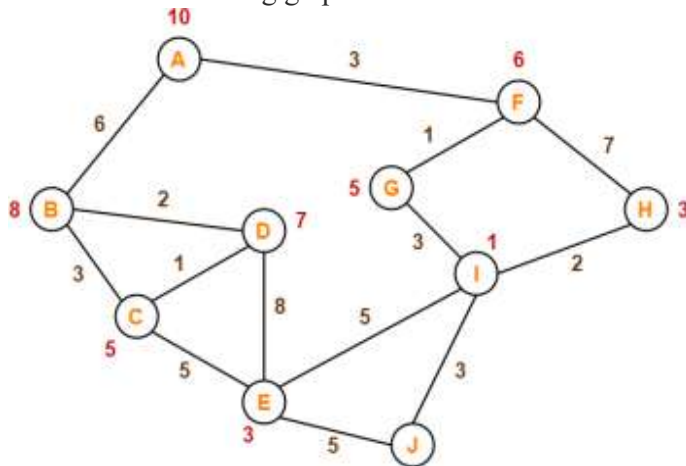
The numbers written on edges represent the distance between the nodes.
The numbers written on nodes represent the heuristic value.
Implement A* algorithm in C/Python for above graph and find out most cost-effective path from A to J.   [20 marks]

Q.3 Viva
[5marks]
Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 [10] Write a program to illustrate the concept of orphan process (Using fork() and

sleep()) .   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page

scheduling and total number of page faults for the following given page reference string.

Give input n as the number of memory frames.

Reference String : 12,15,12,18,6,8,11,12,19,12,6,8,12,15,19,8

   Implement OPT   [20 marks]

<div align="center">OR</div>

Q2. Write the simulation program using FCFS. The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.   [20 marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write a program that demonstrates the use of nice() system call. After a child process is started using fork(), assign higher priority to the child using nice() system call.   [10 marks]

Q.2 Write a C program to simulate Banker's algorithm for the purpose of deadlock avoidance. Consider the following snapshot of system, A, B, C and D are the resource type.

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

AVAILABLE			
A	B	C	D
1	5	2	0

a) Calculate and display the content of need matrix?
b) Is the system in safe state? If display the safe sequence.
c) If a request from process P arrives for (0, 4, 2, 0) can it be granted immediately by keeping the system in safe state. Print a message.   [20 marks]

OR

Write the simulation program using SJF(non-preemptive). The arrival time and first CPU bursts of different jobs should be input to the system. The Assume the fixed I/O waiting time (2 units).Thenext CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.   [20 marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Slip 13

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write a program to find the execution time taken for execution of a given set of instructions (use clock() function)   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n =3 as the number of memory frames.

          Reference String : 0, 2, 1, 6, 4, 0, 1, 0, 3, 1, 2, 1

            Implement FIFO   [20 marks]

<p align="center">OR</p>

Write the simulation program using SJF(non-preemptive). The arrival time and first CPU bursts of different jobs should be input to the system. The Assume the fixed I/O waiting time (2 units).Thenext CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.

         [20 marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write a program to create a child process using fork().The parent should goto sleep state and child process should begin its execution. In the child process, use execl() to execute the "ls" command.

[10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n as the number of memory frames.

Reference String :7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2

Implement LRU   [20 marks]

OR

Write the program to simulate Preemptive Shortest Job First (SJF) -scheduling. The arrival time and first CPU-burst for different n number of processes should be input to the algorithm. Assumethe fixed IO waiting time (2 units). The next CPU-burst should be generated randomly. The outputshould give Gantt chart, turnaround time and waiting time for each process. Also find the averagewaiting time and turnaround time.   [20marks]

Q3. Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   Max Marks: 35+15=50

Q.1 Write a program to find the execution time taken for execution of a given set of instructions (use clock()
function)   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n =3 as the number of memory frames.

Reference String : 12,15,12,18,6,8,11,12,19,12,6,8,12,15,19,8

Implement OPT   [20 marks]

OR

Given an initial state of a 8-puzzle problem and final state to be reached

Initial State   Final State

Find the most cost-effective path to reach the final state from initial state using A* Algorithm in C/Python.
Consider g(n) = Depth of node and h(n) = Number of misplaced tiles.   [20 marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q.1 Write the program to calculate minimum number of resources needed to avoid

deadlock.   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n=3 as the number of memory frames.

Reference String : 12,15,12,18,6,8,11,12,19,12,6,8,12,15,19,8

Implement OPT   [20 marks]

OR

Write the simulation program using FCFS. The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average
times.   [20 marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   **Max Marks: 35+15=50**

Q. 1 Write a C program to accept the number of process and resources and find the need matrix content and display it.   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n as the number of memory frames.

Reference String : 12,15,12,18,6,8,11,12,19,12,6,8,12,15,19,8

Implement OPT   [20 marks]

OR

Write the simulation program using SJF (non-preemptive). The arrival time and first CPU bursts of different jobs should be input to the system. The Assume the fixed I/O waiting time (2 units).Thenext CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.   [20marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Slip 18

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   Max Marks: 35+15=50

Q.1 Write a program to create a child process using fork().The parent should goto sleep state and child process should begin its execution. In the child process, use execl() to execute the "ls" command.   [10 marks]

Q.2 Write the program to simulate Non-preemptive Priority scheduling. The arrival time and first CPU burst and priority for different n number of processes should be input to the algorithm. Assume the fixed IO waiting time (2 units). The next CPU-burst should be generated randomly. The output should give Gantt chart, turnaround time and waiting time for each process. Also find the average waiting time and turnaround time.   [20 marks]

OR

Write a C program to simulate Banker's algorithm for the purpose of deadlock
avoidance. Consider the following snapshot of system, A, B, C and D are the resource type.

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

AVAILABLE			
A	B	C	D
1	5	2	0

a) Calculate and display the content of need matrix?

b) Is the system in safe state? If display the safe sequence.

c) If a request from process P arrives for (0, 4, 2, 0) can it be granted immediately by keeping the system in safe state. Print a message   [20 marks]

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]

Savitribai Phule Pune University

T.Y. B.C.A. (Science) (Semester-V) Practical Examination

BCA 358: DSE III Lab (Operating Systems and AI)

Duration: 3Hrs.   Max Marks: 35+15=50

Q.1 Write a program to create a child process using fork().The parent should goto sleep state and child process should begin its execution. In the child process, use execl() to execute the "ls" command.   [10 marks]

Q.2 Write the simulation program to implement demand paging and show the page scheduling and total number of page faults for the following given page reference string. Give input n=3 as the number of memory frames.

   Reference String : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2

   i. Implement LRU   [20 marks]

OR

                                    [20 marks]

Write the simulation program using FCFS. The arrival time and first CPU bursts of different jobs should be input to the system. Assume the fixed I/O waiting time (2 units). The next CPU burst should be generated using random function. The output should give the Gantt chart, Turnaround Time and Waiting time for each process and average times.

Q.3 Viva   [5marks]

Q4. Internal Assessment   [15 Marks]