University of Mumbai

Examinations Summer 2022

Course Code: **40505**

Course Name: **Operating System**

Semester : IV

Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following is not an operating system?
Option A:	Windows
Option B:	Linux
Option C:	Dos
Option D:	Oracle
2.	Windows uses graphics to make program use to use, such graphics is known as
Option A:	GUI
Option B:	IR
Option C:	DOS
Option D:	IBM
3.	Which of the following is not the state of a process?
Option A:	New
Option B:	Old
Option C:	Waiting
Option D:	Running
4.	What will happen when a process terminates?
Option A:	It is removed from all queues
Option B:	It is removed from all, but the job queue
Option C:	Its process control block is de-allocated
Option D:	Its process control block is never de-allocated
5.	Which of the following algorithm is used in real time system?
Option A:	FCFS
Option B:	Round Robin
Option C:	SJF
Option D:	Priority Scheduling
6.	If the resources are always preempted from the same process _____ can occur
Option A:	Deadlock
Option B:	System crash
Option C:	Starvation
Option D:	Aging

7.	Which algorithm is used to avoid a deadlock?
Option A:	Karl's algorithm
Option B:	Round-robin algorithm
Option C:	Elevator algorithm
Option D:	Banker's algorithm
8.	CPU generates
Option A:	Physical address
Option B:	Logical address
Option C:	Base Address
Option D:	Offset Address
9.	Virtual memory allows _____
Option A:	execution of a process that may not be completely in memory
Option B:	a program to be smaller than the physical memory
Option C:	a program to be larger than the secondary storage
Option D:	execution of a process without being in physical memory
10.	_____is not data transfer technique.
Option A:	Programmed I/O
Option B:	Interrupt Driven I/O
Option C:	Direct Memory Access
Option D:	Message Passing

Q2

A **Solve any Two** **5 marks each**

i. What is an operating system? Explain various functions of an operating system.

ii. Explain process state diagram in detail.

iii. Explain different file organization methods.

B **Solve any One** **10 marks each**

i. Consider the following set of processes, with the length of the CPU burst given in milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

a. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1).
b. What is the turnaround time of each process of the scheduling algorithms in part a?
c. What is the waiting time of each process of the scheduling algorithm?

ii.	Considering a system with five processes P_0 through P_4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t_0 following snapshot of the system has been taken:

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

a. What will be the content of the Need matrix?
b. Is the system in a safe state? If Yes, then what is the safe sequence?
c. Can the request be granted if process P_1 requests one additional instance of resource type A and two instances of resource type B

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the hardware support for paging with TLB in detail.
B	Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO is ordered as 80, 1470, 913, 1777, 948, 1022, 1750, 130. What is the total distance that the disk arm moves for following by applying following algorithms? 1. FCFS 2. SSTF 3. SCAN 4. C-SCAN 5. LOOK 6. C-LOOK
C	Define Semaphore. Explain different types of semaphore in detail.

Q4	
A	**Solve any Two** **5 marks each**
i.	Explain various I/O Buffering Techniques.
ii.	Define thread and discuss different types of threads.
iii.	Explain PCB with respect to context switching.
B	**Solve any One** **10 marks each**
i.	Define Deadlock. Explain the four necessary conditions to occur deadlock? Explain deadlock prevention technique.
ii.	Explain various characteristics of memory system in detail.

University of Mumbai
Examination Summer 2022

Program: EXTC
Curriculum Scheme: Rev2016
Examination: SE Semester IV
Paper Code: 40804, Course Code: ECC404 and Course Name: Signals and Systems
Time: 2 hour 30 minutes Max. Marks: 80

Q1 (20 Marks)	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The Laplace transform of the causal signal t^n u(t) is
Option A:	$n! /s^{n+1}$
Option B:	$n! /s^n$
Option C:	n /s^{n+1}
Option D:	n /s^n
2.	The Fourier transform of $x(t)=e^{-|t|}$ is
Option A:	$2/(1-\Omega^2)$
Option B:	$2/(1+\Omega^2)$
Option C:	$1/(2+\Omega^2)$
Option D:	$1/(2-\Omega^2)$
3.	The Z-transform of $x(n)=-na^n$ u(-n-1) is
Option A:	$az/(z-a)^2$
Option B:	$(z(z+a))/(z-a)^3$
Option C:	$a^2z^2/(z-2a)^2$
Option D:	$az/(z+2a)^2$
4.	The convolution of a finite sequence with an infinite sequence
Option A:	May be a finite or infinite sequence
Option B:	Is always a finite sequence
Option C:	Is always an infinite sequence
Option D:	Cannot be found
5.	If Z-transform of x(n) includes unit circle in its ROC, then the Fourier transform of x(n) can be expressed as
Option A:	$\sum_{n=-\infty}^{\infty} x(n)\, z^{-n}\|_{z=e^{-j\omega}}$
Option B:	$\sum_{n=0}^{\infty} x(n)\, z^{-n}\|_{z=e^{-\omega}}$
Option C:	$\sum_{n=-\infty}^{\infty} x(n)\, z^{n}\|_{z=\omega}$
Option D:	$\sum_{n=-\infty}^{\infty} x(n)\, z^{-n}\|_{z=e^{j\omega}}$
6.	Find the inverse Laplace transform of 1

Option A:	1
Option B:	δ(t)
Option C:	δ[n]
Option D:	u(t)
7.	Find the Fourier transform of - δ (t)
Option A:	1
Option B:	δ (f)
Option C:	-δ (f)
Option D:	-1
8.	Find the z transform of $(0.1)^n$ x[n]
Option A:	X(0.1z)
Option B:	0.1 X(z)
Option C:	X(10z)
Option D:	10 X(z)
9.	The DTFS coefficients of a real and odd periodic signal are
Option A:	Real and odd
Option B:	Imaginary and even
Option C:	Real and even
Option D:	Imaginary and odd
10.	_____ should lie on the left half of s-plane for stability of a causal system.
Option A:	ROC
Option B:	Imaginary axis
Option C:	Zeros
Option D:	Poles

Q2 (20 Marks)	**Solve any two out of three. 10 marks each**
A	Find energy and average power of $A\cos\omega_0 t$
B	Find the autocorrelation function of $A\sin\omega_0 t$ and determine the average power from that.
C	Find the inverse Fourier transform of $X(j\Omega) = \frac{5}{1+j\Omega} - \frac{2.5}{0.98+j\Omega}$

Q3 (20 Marks)	**Solve any two out of three. 10 marks each**
A	Draw the direct form-I and II structures and signal flow graph of an IIR system with transfer function H (z) = ($2z^3 - 5z^2 + 7z - 12$) / (z-0.25) ($z^2 - z + 0.5$)
B	Find the Z-transform of $x(n) = \frac{a^n \sin(n+1)\,\omega_0}{\sin(\omega_0)}\,u(n), \qquad \lvert a\rvert < 1$
C	Using Laplace transform, determine the forced response of the system

	represented by the following equation: $d^2y(t)/dt^2 + 9\ dy(t)/dt + 20\ y(t) = 0.2\ dx(t)/dt + 2\ x(t)$, Input $x(t) = 6\ u(t)$

Q4 **(20 Marks)**	**Solve any two out of three. 10 marks each**
A	Find the ZT of $x[n] = e^{jwn}a^n\ u[n]$ and sketch the RoC
B	Find the IZT of $X[z] = z+2/(2z^2 -7z +3)$ for all possible ROCs using partial fraction method.
C	Find the Laplace transform of $x(t) = e^{bt}\ u(t)$, where $b > 0$, and sketch the RoC.