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SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FIRST/SECOND SEMESTER M.TECH DEGREE SEMESTER END EXAMINATIONS

SEPTEMBER 2025

Course:	**ADVANCED OPERATING SYSTEMS**			
Course Code:	**MCS201**	**Program:**	**M.Tech in Computer Science & Engineering**	
Max Marks:	**100**		**Duration:**	**03 Hours**

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		**Module - 1**	**Marks**	**CO**	**RBTL**
Q1	**a**	Explain the basic architecture of a multiprocessor system Based on whether a memory location can be directly accessed by a processor or not	**4**	**1**	**L2**
	b	Briefly explain different issues in process synchronization	**8**	**1**	**L2**
	c	Apply memory management concepts to identify design issues in Multiprocessor operating systems	**8**	**1**	**L3**
		Module – 2			
Q2	**a**	Identify causes of distributed deadlocks and how they differ from centralized deadlocks.	**4**	**1**	**L2**
	b	Construct a scenario using Ricart-Agrawala algorithm for mutual exclusion	**8**	**1**	**L3**
	c	Break down the Bully algorithm and identify possible failure scenarios.	**8**	**1**	**L4**
		Module – 3			
Q3	**a**	Describe two important goals of a distributed file system	**4**	**2**	**L2**
	b	Address the various issues in design and implementation of a distributed file system	**8**	**2**	**L3**
	c	Illustrate central server algorithm to implement DSM (distributed shared memory)systems	**8**	**2**	**L3**
		OR			
Q4	**a**	Give requirements for load distributing	**4**	**2**	**L2**
	b	Illustrate read replication and full replication algorithms to implement DSM(distributed shared memory)systems	**8**	**2**	**L3**
	c	Analyze design steps for building distributed file systems	**8**	**2**	**L4**

Module – 4					
Q5	**a**	Explain the following concurrency control algorithms i. Centralized locking algorithm ii. INGRES Primary-site locking algorithm	**10**	**2**	**L2**
	b	Illustrate the following basic timestamp ordering algorithms with example i. Multi-version Timestamp Ordering Algorithm ii. Conservative timestamp ordering algorithm	**10**	**2**	**L3**
OR					
Q6	**a**	Explain concurrency control model of database systems and provide problem of concurrency control	**10**	**2**	**L2**
	b	Illustrate the following basic timestamp ordering algorithms with example i. basic timestamp ordering algorithm ii. Thomos write rule (TWR)	**10**	**2**	**L3**
Module – 5					
Q7	**a**	Explain the architecture of Android OS and its major layers.	**6**	**3**	**L2**
	b	Describe various sleep states in mobile systems and their significance in power saving.	**6**	**3**	**L2**
	c	Illustrate the structure and benefits of hybrid kernels using iOS XNU as an example.	**8**	**3**	**L3**
OR					
Q8	**a**	Explain how the Linux kernel supports mobile operating systems.	**6**	**3**	**L2**
	b	Analyze how the Android Runtime (ART) improves app performance compared to Dalvik.	**6**	**3**	**L2**
	c	Compare and contrast the power management features of Android and iOS.	**8**	**3**	**L3**

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FIRST/SECOND SEMESTER M.TECH DEGREE SEMESTER END EXAMINATIONS

SEPTEMBER 2025

Course:	**DATA SCIENCE AND MANAGEMENT**				
Course Code:	**MCS202**	**Program:**	**M.Tech in Computer Science & Engineering**		
Max Marks:	**100**			**Duration:**	**03 Hours**

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		Module - 1	Marks	CO	RBTL
Q1	a	What is Data Science and Big Data.	4	1	L1
	b	With a neat diagram, explain the Data Science Process.	8	1	L2
	c	Consider a suitable example and explain k-Nearest Neighbours (k-NN) Algorithm.	8	1	L2
		Module – 2			
Q2	a	Explain the following with suitable example: i. Filters ii. Wrappers iii. Dimensionality Reduction iv. Principal Component Analysis v. Decision Trees	10	2	L2
	b	List out any five basic plots available in Matplotlib library. Mention what type of data is suitable for each of these plots. Illustrate with neat diagram Anatomy of a Matplotlib Figure and Plotting data points with multiple markers.	10	2	L2
		Module – 3			
Q3	a	Compare RDBMS to MapReduce.	4	3	L2
	b	Write code snippet of a Java MapReduce example program that calculates the maximum temperature in a dataset using Hadoop?	8	3	L2
	c	Write a neat diagram that shows the Anatomy of a File Read and Anatomy of a File Write in HDFS.	8	3	L2
		OR			
Q4	a	What is Hadoop. List the important tools it is made up off.	4	3	L1
	b	i. Sketch the MapReduce data flow with multiple reduce tasks. ii. Demonstrate how HDFS commands are used to copy the file from local file system to HDFS and HDFS to local file system.	8	3	L3
	c	Brief out the features of Hadoop HDFS. Explain the functions of Name node and Data node.	8	3	L2

Module – 4					
Q5	**a**	With a neat sketch illustrate how YARN runs an application.	**4**	**4**	**L2**
	b	Illustrate the working of FIFO Scheduler, Capacity Scheduler and Fair Scheduler with a neat diagram showing the cluster utilization over time.	**8**	**4**	**L3**
	c	Illustrate by writing a sample code snippet to compress the data from input file and decompress the file using API's.	**8**	**4**	**L3**
OR					
Q6	**a**	What is YARN ? List out the benefits of using it over MapReduce - 1	**4**	**4**	**L1**
	b	What the advantages of file compression. How it is implemented in Hadoop. List out any four Hadoop compression codecs	**8**	**4**	**L2**
	c	What is serialization and de-serialization. Illustrate by writing a code snippet to write the log file as Sequential File.	**8**	**4**	**L3**
Module – 5					
Q7	**a**	Write out the general form of map and reduce functions in Hadoop MapReduce.	**4**	**5**	**L1**
	b	Illustrate the working of Flume agent and a logger sink connected by a file channel with a neat sketch.	**8**	**5**	**L3**
	c	By drawing a neat diagram, explain how Two Flume agents connected by an Avro sink-source pair works.	**8**	**5**	**L2**
OR					
Q8	**a**	What is Apache Flume? How it is helpful in handling streams of data.	**4**	**5**	**L1**
	b	Illustrate with a neat diagram showing how Flume agent with a spooling directory source and fanning out to an HDFS sink and a logger sink.	**8**	**5**	**L3**
	c	List out the separators, its properties (name, type, default value) that are used in a Streaming MapReduce job.	**8**	**5**	**L2**

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FIRST/SECOND SEMESTER M.TECH DEGREE SEMESTER END EXAMINATIONS

SEPTEMBER 2025

Course:	**NETWORK PROGRAMMING**			
Course Code:	**MCS203**	**Program:**	**M.Tech in Computer Science & Engineering**	
Max Marks:	**100**		**Duration:**	**03 Hours**

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		Module - 1	Marks	CO	RBTL
Q1	a	List and describe the various forms of Client/Server model used for handling multiple clients.	4	1	L2
	b	Explain the steps involved in implementing a TCP time-of-day client.	8	1	L2
	c	Construct the OSI and Internet protocol suite models, and differentiate between them based on their structure and functionality.	8	1	L3
Module – 2					
Q2	a	List the contents of the IPv4 socket address structure.	4	2	L1
	b	Illustrate and explain the timeline of events that occur during communication between a TCP client and server.	8	2	L2
	c	Compare the IPv4 and IPv6 socket address structures, and apply your understanding to identify how they differ in terms of fields and usage.	8	2	L3
Module – 3					
Q3	a	List the scenarios where I/O multiplexing.	4	3	L1
	b	Outline on five I/O models that are available under Unix.	8	3	L2
	c	Determine the conditions under which a socket is considered ready for reading, and explain how this knowledge is applied in network programming.	8	3	L3
OR					
Q4	a	What is batch input and buffering?	4	3	L1
	b	Summarize under What Conditions Is a Descriptor Ready.	8	3	L2
	c	Illustrate the Asynchronous I/O model and explain how it is applied in handling I/O operations in network programming.	8	3	L3

Module – 4					
Q5	**a**	Define the ways to place a timeout on an I/O operation involving a socket.	**4**	**4**	**L1**
	b	Explain the three primary reasons why Unix domain sockets are used.	**8**	**4**	**L2**
	c	Identify and explain the use of various flags in I/O functions, and demonstrate how they are applied.	**8**	**4**	**L3**
OR					
Q6	**a**	Show the Unix domain socket address structure.	**4**	**4**	**L1**
	b	Outline the differences and restrictions in the socket functions when using Unix domain sockets.	**10**	**4**	**L2**
	c	Build the recoded version of Unix Domain Stream Protocol echo client.	**6**	**4**	**L3**
Module – 5					
Q7	**a**	List and define the two main modifications made to the concurrent server design.	**4**	**5**	**L1**
	b	Identify the strengths and weaknesses of various client designs.	**8**	**5**	**L3**
	c	Analyse the TCP client program for testing various servers.	**8**	**5**	**L4**
OR					
Q8	**a**	What is preforking? Show a scenario where the parent has preforked N children and two clients are currently connected.	**4**	**5**	**L1**
	b	List nine different server designs and outline any two server how each operates in handling client requests.	**8**	**5**	**L3**
	c	Analyze performance effect by considering too many children and distribution of connections.	**8**	**5**	**L4**

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FIRST/SECOND SEMESTER M.TECH DEGREE SEMESTER END EXAMINATIONS

SEPTEMBER 2025

Course:	**BLOCK CHAIN TECHNOLOGY**			
Course Code:	**MCS204A**	**Program:**	**M.Tech in Computer Science & Engineering**	
Max Marks:	**100**		**Duration:**	**03 Hours**

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		**Module - 1**	**Marks**	**CO**	**RBTL**
Q1	**a**	Define blockchain technology and list its main components.	**4**	**1**	**L2**
	b	Describe the network view of Block chain with a neat diagram	**8**	**1**	**L2**
	c	Illustrate the distributed system with a neat diagram	**8**	**1**	**L2**
		Module – 2			
Q2	**a**	Define Cryptography. Explain the services provided by the cryptography.	**5**	**1**	**L2**
	b	Describe the various methods of decentralization.	**7**	**1**	**L2**
	c	Discuss asymmetric cryptography with suitable diagram.	**8**	**1**	**L2**
		Module – 3			
Q3	**a**	What are the main types of transactions in Bit coin? Explain Briefly.	**6**	**2**	**L1**
	b	Discuss different types of wallets	**6**	**2**	**L2**
	c	Describe the Transaction structure in the Bit coin.	**8**	**2**	**L2**
		OR			
Q4	**a**	What is Bit coin, and what are public and private keys?	**4**	**2**	**L1**
	b	Write a short note on i) Namecoin ii) Litecoin iii) Primecoin iv) Zcash	**8**	**2**	**L2**
	c	Apply how the Ethereum Virtual Machine (EVM) executes a smart contract by applying EVM operations, using a diagram to support your explanation	**8**	**2**	**L3**
		Module – 4			
Q5	**a**	What is the Ethereum Virtual Machine (EVM)? with neat diagram.	**5**	**2**	**L1**
	b	Explain the lifecycle of a smart contract on Ethereum	**7**	**2**	**L2**
	c	Apply the key components of the Ethereum high-level ecosystem and their interconnections.	**8**	**2**	**L3**

		OR			
Q6	**a**	What is an Ethereum client? Name and describe at least two widely used Ethereum clients.	**5**	**2**	**L1**
	b	Describe any five standard fields in Ethereum transactions	**7**	**2**	**L2**
	c	Discuss contrast Ricardian contracts with smart contracts	**8**	**2**	**L2**
		Module – 5			
Q7	**a**	Which technology ensures tamper-proof patient records	**4**	**3**	**L1**
	b	Explain the application architecture of the room rent IoT application with a neat diagram	**8**	**3**	**L2**
	c	Explain the components of IoT architecture and illustrate them with a simple diagram	**8**	**3**	**L2**
		OR			
Q8	**a**	List the ways blockchain can help secure IoT devices	**4**	**3**	**L1**
	b	Describe the key features of cross-border payments and peer-to peer loans in your own words	**8**	**3**	**L2**
	c	Explain the main ideas behind financial crime prevention.	**8**	**3**	**L2**

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FIRST/SECOND SEMESTER M.TECH DEGREE SEMESTER END EXAMINATIONS

SEPTEMBER 2025

Course:	**ADVANCES IN SOFTWARE ENGINEERING**			
Course Code:	**MCS205B**	**Program:**	**M.Tech in Computer Science & Engineering**	
Max Marks:	**100**		**Duration:**	**03 Hours**

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No		Module - 1	Marks	CO	RBTL
Q1	a	Describe in detail the work-product, activities, task and resources.	4	1	L2
	b	Apply the key developmental activities such as requirements analysis, design, implementation, testing, and maintenance to a real-world software project scenario. Explain how each activity supports the successful production and delivery of the software.	6	1	L3
	c	Analyze the developmental activities help in the production of software?	10	1	L4
		Module – 2			
Q2	a	List and explain the requirement elicitation activities.	4	2	L2
	b	How would you apply the concept of functional requirements to plan and guide the development process of a new software application?	6	2	L3
	c	Analyze the roles of generation of information, integration, and review in Assigning Responsibilities.	10	2	L4
		Module – 3			
Q3	a	Explain the a closed architecture in the Reference Model of Open Systems Interconnection (OSI Model).	4	3	L2
	b	Apply key principles of system design to a given scenario and decide how responsibilities should be assigned among components or modules. Justify your decisions with respect to design principles like cohesion, coupling, and separation of concerns.	6	3	L3
	c	Analyze the UML component diagram of the WebServer to explain how the provided and required interfaces interact, and evaluate the role of the HttpService class in realizing the HTTP interface.	10	3	L4
		OR			
Q4	a	Illustrate the steps involved in the System Design Activities.	4	3	L2
	b	How would you use UML activity diagrams to represent and explain the key activities involved in the system design phase of software development?	6	3	L2
	c	Analyse the strategies required for selecting a hardware configuration and a platform and Allocating objects and subsystems to nodes with an example.	10	3	L4

Module – 4					
Q5	**a**	Describe an inheritance UML Class diagram with an example.	**4**	**4**	**L2**
	b	Apply the Bridge Design Pattern to abstract different database vendors with UML class diagram illustrating.	**6**	**4**	**L3**
	c	Analyze the structure and relationships of model elements used during software testing by constructing a UML class diagram. Explain how the components interact and how their design supports effective test planning and execution.	**10**	**4**	**L4**
OR					
Q6	**a**	Recite the principles in detail that involved to avoid introducing new errors.	**4**	**4**	**L2**
	b	Apply the Liskov substitution Principle to a real-world object-oriented programming example. Demonstrate how a subclass can be substituted for its superclass without altering the program behaviour.	**6**	**4**	**L3**
	c	Analyze the situation “define a stable architecture to deal with complexity, but we also want to allow flexibility to deal with change later in the development process.” Provide a solution to the above conflict problem.	**10**	**4**	**L4**
Module – 5					
Q7	**a**	State all the Laws by LEHMAN on system evolution.	**4**	**5**	**L2**
	b	Apply the principles of software configuration change control to a scenario where multiple modifications are proposed. Explain how this process helps manage the impact of changes on system integrity and ensures version consistency.	**6**	**5**	**L3**
	c	Analyze the factors which mandate the software change even after the system is released, installed and operated in the target environment, update to the system is still needed.	**10**	**5**	**L4**
OR					
Q8	**a**	Define reverse engineering. Analyze the components of a reverse engineering with neat diagram as per the Chikofsky and Cross.	**4**	**5**	**L2**
	b	Apply the objectives of software reengineering to a legacy software system scenario. Explain how each objective contributes to improving system maintainability, performance, or scalability.	**6**	**5**	**L3**
	c	Analyze the capabilities of various software configuration management tools and compare how they support version control, change tracking, and team collaboration in software development.	**10**	**5**	**L4**