USN : 5th I.S./Rs. 40/- Course Code : 18CS51/18IS51

5th I.S./Rs. 40/-

Fifth Semester B.E. Semester End Examination, FEBRUARY_APRIL_2022

COMPUTER NETWORKS

Time: 3 hrs Max. Marks :100

Instructions :1.Answer any FIVE Full Questions selecting at least ONE Question from Each Unit.

MODULE 1

	L	CO	PO	M
1a. Demonstrate the Internet with an appropriate figure for the same having IXP, ISP access nets.	[3]	[1]	[1]	[8]
1b. Differentiate between Packet Switching and Circuit Switching	[2]	[2]	[1]	[6]
1c. Explain the following terms : 1.Delay 2.Throughput 3.Bandwidth	[2]	[1]	[1]	[6]

OR

2a. Demonstrate the interaction between the end systems in an internet	[3]	[1]	[1]	[10]
2b. Illustrate in detail the two types of multiplexing done in networking	[3]	[1]	[1]	[10]

MODULE 2

3a. Explain stepwise the non-persistent HTTP protocol	[2]	[2]	[3]	[10]
3b. Apply working of P-to-P architecture for file Distribution Application (Bit Torrent)	[3]	[2]	[2]	[10]

OR

4a. Compare Client server architecture with P2P architecture.	[3]	[2]	[1]	[10]
4b. Demonstrate the interaction that happens in SMTP between A and B for sending and receiving the Emails	[3]	[2]	[3]	[10]

MODULE 3

5a. Demonstrate the error detection technique using checksum for the following three 16-bit words at both sender and receiver side. 0110011001100000 0101010101010101 1000111100001100	[4]	[3]	[2]	[10]
5b. Explain Go-Back-N (GBN) in detail.	[2]	[3]	[1]	[10]

OR

6a. Summarize how three-way handshake happen in TCP.	[2]	[3]	[1]	[10]
6b. Illustrate TCP and UDP segment structures	[2]	[3]	[1]	[10]

MODULE 4

Question	L	CO	PO	M
7a. Explain the IPv4 packet format	[2]	[4]	[1]	[10]
7b. Demonstrate the working of typical virtual circuit network.	[3]	[4]	[1]	[10]
OR				
8a. Explain the IPv6 datagram format.	[2]	[4]	[1]	[10]
8b. Demonstrate the working of Internet Control Message Protocol along with message types used in it.	[3]	[4]	[1]	[10]

MODULE 5

Question	L	CO	PO	M
9a. Explain the Hierarchical topology of Data center networking with a neat diagram.	[2]	[5]	[1]	[10]
9b. Demonstrate and solve the CRC for error detection for the following data: Data : 1011 and Devisor :1001	[3]	[5]	[3]	[10]
OR				
10a. Explain the working of slotted ALOHA.	[2]	[5]	[1]	[10]
10b. Define Bit-level error detection and correction. Compare the single bit parity and 2D bit parity checking scheme used in error detection.	[4]	[5]	[1]	[10]

USN : [illegible]

Course Code : 18CS51/16CS54/16IS54

Fifth Semester B.E FASTTRACK Examination, AUGUST_SEPTEMBER_2021

COMPUTER NETWORKS

Time: 3 hrs

Max. Marks :100

Instructions :1.Answer any FIVE full Questions.

Question	L	CO	PO	M
1a. Demonstrate the DESIGN OF NETWORK showing 3 important components of it.	[3]	[1]	[1]	[10]
1b. Write a note on structure of the Internet having ISPs and IXPs in it.	[2]	[1]	[1]	[10]
2a. Contrast on Delay and throughput in Internet.	[2]	[1]	[3]	[10]
2b. Demonstrate the OSI reference model describing responsibilities of all layers.	[3]	[1]	[1]	[10]
3a. Compare client server architecture with P2P architecture.	[3]	[2]	[3]	[10]
3b. Contrast on DNS protocol with its commands.	[2]	[2]	[1]	[10]
4a. Compare the Persistent-HTTP and non-persistent HTTP.	[3]	[2]	[1]	[10]
4b. Explain the working of SMTP.	[2]	[2]	[1]	[10]
5a. Explain the services given by the transport layer to other layers .	[2]	[3]	[1]	[10]
5b. Demonstrate the working of UDP protocol along with its frame structure.	[3]	[3]	[1]	[10]
6a. Demonstrate the working of Selective repeat protocol.	[3]	[4]	[1]	[10]
6b. Explain in brief working of TCP protocol.	[2]	[4]	[1]	[10]
7a. Explain how routing and forwarding happens at network layer.	[2]	[4]	[3]	[10]
7b. Explain the working of router with its structure.	[2]	[4]	[1]	[10]
8a. Explain the IPV4 packet format.	[2]	[4]	[1]	[10]
8b. Demonstrate the working of typical virtual circuit network.	[3]	[4]	[1]	[10]
9a. Compare the hierarchical address with physical address.	[3]	[4]	[1]	[10]
9b. Demonstrate the CRC for error detection for the following data: Data: 1011 and devisor: 1001	[3]	[5]	[1]	[10]
10a. Explain the working of slotted ALOHA .	[2]	[5]	[3]	[10]
10b. Explain the working of CSMA .	[2]	[5]	[3]	[10]

KLS GOGTE INSTITUTE OF TECHNOLOGY BELAGAVI

USN : _____ Course Code : 16CS54/16IS54

Fifth Semester B.E FASTTRACK Examination, AUGUST_SEPTEMBER_2021

COMPUTER NETWORKS

Time: 3 hrs Max. Marks:100

Instructions : Answer any five full questions.

L CO PO M

1a. Define Data Communication? What are the fundamental characteristics of data communication?

[1] [1] [1] [5]

1b. Explain with a neat diagram the working of simplex, half duplex and full duplex

[2] [1] [1] [8]

1c. Explain the different layered tasks involved in sending a letter with a neat diagram?

[2] [1] [2] [7]

2a. Define Link? Explain point-to-point and multipoint connections with necessary diagrams?

[1] [1] [1] [5]

2b. Explain in brief the various categories of Network?

[2] [1] [1] [7]

2c. Explain in brief the OSI Layer with a neat diagram.

[2] [1] [1] [8]

3a. Explain in brief the following terms: i) Periodic Signal ii) Non-periodic Signal iii) Bandwidth-Delay Product iv) Propagation time v) Jitter

[2] [1] [1] [5]

3b. Explain with a neat diagram the three phases in the actual communication in a circuit-switched network? Also explain the delay caused in the network?

[2] [2] [2] [10]

3c. Calculate the attenuation (loss of power) where a signal travels through a transmission medium and its power is reduced to one half, i.e. P2= (1/2) P1.

[3] [2] [1] [5]

4a. Compare and explain the analog and digital signals with necessary diagrams?

[2] [2] [1] [5]

4b. Compute the propagation time and the transmission time for a 2.5 Kbyte message (assume an email), if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s

[3] [2] [1] [5]

4c. Explain with a neat diagram the three phases in the communication of a virtual-circuit network?

[2] [2] [2] [10]

5a. Explain in details the Burst error with suitable examples?

[2] [3] [2] [3]

5b. Assume that, in a Stop-and-Wait ARQ system, the bandwidth of the line is 1 Mbps, and 1 bit takes 20 ms to make a round trip. What is the bandwidth-delay product? If the system data frames are 1000 bits in length, what is the utilization percentage of the link?

[3] [2] [2] [10]

5c. Explain the Sliding window for sender and receiver window for Go-Back-N ARQ with a neat diagram?

[2] [3] [2] [7]

6a. Calculate the CRC encoder and decoder with proper steps where the dataword is 1001 and the divisor is 1011. Also check if the Syndrome has an error and justify your answer

[3] [3] [2] [12]

6b. Explain with a neat diagram the design of Stop-and-Wait protocol, also analyze the protocol?

[3] [3] [2] [8]

7a. Find the error, if any, in the following IPv4 addresses. Justify your answer.

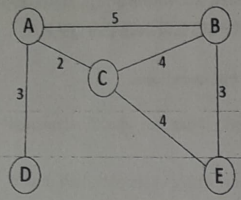
i. 111.56.045.78 ii. 221.34.7.8.20
iii. 75.45.301.14 iv. 11100010.23.14.67

[2] [4] [1] [5]

7b. Explain the working of Network Address Translation (NAT) with a neat diagram?

[2] [4] [2] [5]

7c. Explain the working of Distance Vector Routing algorithm in details for the following topology, show the touting table for each node:



[4] [4] [4] [10]

8a. Explain in structure of IPv6 address and also explain how address can be abbreviated in IPv6 with suitable example?

[2] [4] [4] [7]

8b. Compare and write the differences between IPv4 and IPv6 packet header?

[2] [4] [4] [8]

8c. Write a short note on Link State routing algorithm

[2] [4] [4] [5]

9a. What is User Datagram Protocol? Explain the User datagram format with a neat diagram

[2] [5] [2] [6]

9b. Write a short node on Domain Name Space.

[2] [5] [2] [6]

9c. Explain in details the working of Simple Mail Transfer Protocol (SMTP) in e-mails?

[2] [5] [4] [8]

10a. Explain with a neat diagram the Process-to-Process data delivery between two nodes?

[2] [5] [] [6]

10b. Explain the various scenarios used in E-mail with proper diagrams?

[2] [5] [4] [10]

10c. Write a short note on Post Office Protocol.

[2] [5] [3] [4]

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16CS/IS54

Fifth Semester B.E. Makeup Examination, January 2020

COMPUTER NETWORKS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Draw the figures/ diagrams compulsorily wherever necessary.*
2. *Attempt only ONE question from each UNIT*

UNIT - I

			L	CO	PO	M
1	a.	Explain the following terms. i. Data Flow. ii. Half and full duplex connections.	(2)	(1)	(1)	(10)
	b.	Identify and explain the different layers of the TCP/IP model and correlate the layers of TCP/IP to the layers of the OSI model.	(2)	(1)	(1)	(10)

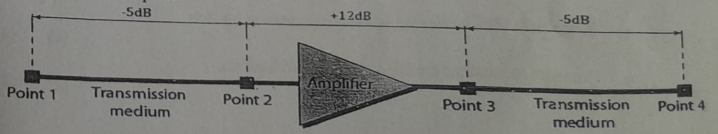
OR

2	a.	Compare and contrast between the following terms: i. LAN and WAN. ii. Mesh and Bus topology. iii. Physical address and Logical address. iv. Specific address and Port address.	(2)	(1)	(1)	(10)
	b.	List the different layers of the OSI reference model and explain the following layers in details i. Network Support Layers. ii. Transport Layer. iii. User Support Layers.	(1)	(1)	(1)	(10)

UNIT – II

			L	CO	PO	M
3	a.	Discuss the following terms with respect to performance on the network efficiency: i. Bandwidth ii. Throughput iii. Latency iv. Bandwidth Delay Product for LAN	(2)	(2)	(1)	(08)
	b.	What are the two approaches to packet-switching? Explain the three phases of the Virtual-Circuit network in detail with an example.	(1)	(2)	(1)	(12)

OR

4	a.	What are the different causes of transmission impairments? In figure below, a signal travels from point 1 to point 4. Calculate the resultant decibel value for the signal and specify whether the signal is attenuated or amplified.  	(1)	(2)	(1)	(08)

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Draw the graph for the following line coding schemes using the data stream of 01011010.
   i. NRZ-I.
   ii. Manchester.
   iii. Differential Manchester.

(2) (2) (2)

c. Write a short note on the following:
   i. Coaxial Cable
   ii. Fiber Optic Cable
   iii. Propagation Methods

(3) (2) (1)

UNIT - III

L CO PO

5 a. Solve using CRC method, if the data word is 1100 and generator polynomial is 1011 if
   a)Data word is unchanged at the receiver
   b)Data word is changed to 1110 during transmission

(3) (3) (2)

b. Explain Stop and Wait ARQ and show the flow diagrams for Lost frame and Lost Ack.

(2) (3) (1)

OR

6 a. Discuss the steps involved in generating a Checksum. Solve using checksum method if the dat is 8,9,10,7,12 and verify at the receiver.

(2,3) (3) (2)

b. Explain Go Back N ARQ using the flow diagram for a lost frame.

(2) (3) (1)

UNIT - IV

7 a. Change the following IP addresses from binary notation to dotted-decimal notation and also id the class to which they belong to.
   i. 01111111 11110000 01100111 11111001
   ii. 10101111 11000111 11111000 00011101
   iii. 11011111 10110000 00011111 01011101
   iv. 11100000 11110111 11000111 01111101

(2) (4) (2)

b. Find the:
   i. First address
   ii. Last address
   iii. Number of addresses

For the addresses 211.17.180.0/24 (assume the MASK as 11111111 11111111 11111111 000

(2) (4) (2)

c. Explain the IPv4 datagram format.

(2) (4) (1)

OR

8 a. Find theclass, netid and the hostid of the following IP addresses.
   i. 111.56.45.78
   ii. 191.255.25.10
   iii. 207.3.54.12
   iv. 178.120.40.90

(2) (4) (2)

b. Explain the IPV6 header format with its extension headers.

(2) (4) (1)

c. Compare and contrast the IPV4 and the IPV6 headers.

(2) (4) (1)

UNIT -V

L CO PO M

9 a. Explain the UDP datagram format. And describe the port numbers used with UDP for the following protocols.
   i. Echo.
   ii. Users.
   iii. Nameserver.
   iv. RPC.
   v. SNMP.

(2) (5) (1) (10)

b. What is Domain Name Space? Discuss the following terms with examples w.r.t. DNS in the Internet.
   i. Generic domains.
   ii. Country domains.
   iii. Inverse domains.

(1) (5) (1) (10)

OR

10 a. Explain the TCP segment format in detail.

(2) (5) (1) (10)

b. Explain the FTP in detail.

(2) (5) (1) (10)

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16CS/IS54

Fifth Semester B.E. Semester End Examination, Dec./Jan. 2019-20
COMPUTER NETWORKS

ne: 3 Hours

Max. Marks: 100

Instructions: 1. *Draw diagrams neatly wherever applicable*
2. *Answer any one question from each Unit*

UNIT - I

		L	CO	PO	M
a.	Define the term data communication. Explain data communication with respect to its fundamental characteristics and components.	(2)	(1)	(1)	(10)
b.	Explain the advantages and disadvantages of Mesh, Star and Bus topologies with neat diagrams.	(2)	(1)	(1)	(10)

OR

a.	Explain the functions of each layer involved in OSI model with a neat diagram.	(2)	(1)	(1)	(10)
b.	Explain the different categories of networks with neat diagrams.	(2)	(1)	(1)	(10)

UNIT – II

		L	CO	PO	M
a.	Discuss the different types of transmission impairment with neat diagrams.	(2)	(2)	(1)	(10)
b.	Discuss the different types of bands of Unguided media in detail.	(2)	(2)	(1)	(10)

OR

a.	Explain the different modes of Fiber Optic cable along with its advantages and disadvantages.	(2)	(2)	(1)	(10)
b.	Differentiate between Datagram Networks and Virtual Circuit networks with the help of neat diagram.	(2)	(2)	(1)	(10)

UNIT - III

		L	CO	PO	M
5 a.	Discuss the following terms: i. Single bit error. ii. Burst error. iii. Forward error correction. iv. Retransmission.	(2)	(3)	(1)	(04)
b.	Given the data-word 1111 with the given generator polynomial 1101, i. Show the generation of the code-word at the sender site (using binary division). ii. Show the checking of the code-word at the receiver site in both ways i.e. without error and with error (Assume the error at the MSB bit of the code-word).	(2)	(3)	(2)	(06)
c.	Define Framing and the reason for its need. Explain in detail the Stop-and-Wait ARQ protocol.	(2)	(3)	(1)	(10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

OR

6 a. Recall the steps undertaken by the sender and receiver for error detection in Internet Checksum. And for the following data items 0x466F, 0x726F, 0x757A, and 0x616E, find the Internet Checksum at:
   i. Sender Site.
   ii. Receiver Site if there is no error.
   iii. Receiver Site if the fourth data item is changed to 0x617E

(1) (3) (1) (08)

b. List the different protocols available for noisy channels. And explain the Go-Back-N ARQ protocol in detail.

(1) (3) (1) (12)

UNIT - IV

		L	CO	PO	M
7	a. What is IPv4 address? Explain the IPv4 classful addressing in detail.	(2)	(4)	(1)	(10)
	b. Explain IPv4 datagram format in detail with the help of a neat diagram.	(2)	(4)	(1)	(10)

OR

8	a. Explain the IPv6 datagram format with a neat diagram.	(2)	(4)	(1)	(10)
	b. Discuss the advantages of IPv6 over IPv4.Compare IPv4 and IPv6 headers.	(4)	(4)	(1)	(10)

UNIT -V

		L	CO	PO	M
9	a. Discuss File Transfer Protocol (FTP) in detail with the help of a neat diagram.	(2)	(5)	(1)	(10)
	b. Explain User Datagram Protocol (UDP) along with User datagram format and Pseudo header format and its use.	(2)	(5)	(1)	(10)

OR

10	a. Explain SMTP protocol in detail with the help of a neat diagram.	(2)	(5)	(1)	(10)
	b. Explain TCP segment format in detail with the help of a neat diagram.	(2)	(5)	(1)	(10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

USN : _____ Course Code : 18CS52/18IS52

Fifth Semester B.E. Semester End Examination, FEBRUARY_APRIL_2022

OBJECT ORIENTED MODELING AND DESIGN

Time: 3 hrs. Max. Marks :100

Instructions :1. Answer any FIVE Full Questions selecting at least ONE Question from Each Unit.

MODULE 1

		L	CO	PO	M
1a.	What is OO system Development Methodology? Explain.	[2]	[1]	[1]	[7]
1b.	Define models. Explain the purpose of building models.	[2]	[1]	[1]	[8]
1c.	Explain about relationship among the three models.	[2]	[1]	[1]	[5]

OR

2a.	Identify and list the relevant classes in Attendance management system of college, and also draw the class diagram and at-least one object diagram for any two classes for the same.	[3]	[2, 3]	[2]	[10]
2b.	With the help of UML diagrams, explain the following. (i) Bags & Sequences (ii) Association class (iii) Association End names iii) Multiplicity	[2]	[1]	[1]	[10]

MODULE 2

3a.	Analyze the working of Microwave Oven Home Appliance, Identify & describe States, Events for the same.	[4]	[2]	[3]	[10]
3b.	Define Events. List and explain different kinds of events.	[2]	[1]	[1]	[6]
3c.	Explain the following in context of state diagram behavior. i)Completion Transition ii) Sending Signals	[2]	[2]	[1]	[4]

OR

4a.	Define Submachine. Draw state diagram for Vending machine, and consider any one of the state as submachine, draw the sub-machine diagram for the same.	[3]	[2]	[3]	[10]
4b.	Define nested states. Draw nested state diagram for ATM banking system.	[3]	[2]	[3]	[10]

MODULE 3

5a.	Consider the E-mail System and Identify Actor and Use Cases. Develop a Use-case diagram for the same.	[3]	[2]	[2, 3]	[7]
5b.	Draw an Activity diagram for Online Bus Reservation system.	[3]	[2]	[3]	[8]
5c.	List and explain guidelines for use-case models.	[2]	[2]	[1]	[5]

OR

6a.	With the help of UML diagram, explain the following concepts with respect to Activity models. i) Sending and receiving signals ii) Swimlanes iii) Object Flows	[2]	[2]	[1]	[10]

6b. Explain Sequence diagram with Transient objects. Draw the sequence diagram for online food order system like Zomato, and also identify transient object & their operation for the same.

[3] [2] [3] [10]

MODULE 4

7a. Draw the domain state model for Account class in an ATM example also explain steps involved in building it.

[3] [3] [2] [10]

7b. Explain the following in context of domain class model

i) Finding classes
ii) Preparing Data Dictionary
iii) Finding Associations

[2] [3] [1] [10]

OR

8a. Explain about shifting the level of abstraction with relevant example.

[2] [3] [1] [8]

8b. Explain about Grouping classes into packages also identify classes and packages in ATM banking application.

[3] [3] [2] [7]

8c. Distinguish between Domain analysis and application analysis.

[2] [3] [1] [5]

MODULE 5

9a. How activity diagram can be used in the Application interaction model. Construct an Activity diagram for ATM card verification process.

[3] [3] [3] [10]

9b. List and explain steps involved in constructing Application class model

[2] [3] [1] [10]

OR

10a. What do you mean by Class design? Identify the steps involved in the class design.

[2] [3] [1] [10]

10b. Explain the following in context of Application interaction model by analyzing Library management system of the college.

i) Determining system boundary
ii) Finding use-cases
iii) Find actors
iv) Draw the sequence diagram. Considering one use case.

[3] [3] [2] [10]

USN : _____ Course Code : 16CS65

Sixth Semester B.E FASTTRACK Examination, AUGUST_SEPTEMBER_2021

OBJECT ORIENTED MODELING AND DESIGN

Time: 3 hrs Max. Marks :100

Instructions:- Answer any Five full Questions.

L CO PO M

1a. What is OO system Development Methodology? Explain.

[2] [1] [1] [10]

1b. Define modelling. List and Explain purpose of modelling.

[2] [1] [1] [10]

2a. Draw the class diagram for figure class has different dimensions (0,1,2). Show at least one example classes for each of the dimensions.

[3] [1] [3] [10]

2b. Explain the following with examples:
i)Multiplicity ii)Association classes
iii)Qualified Association

[2] [1] [1] [10]

3a. Define state diagram. Design a state diagram for telephone line.

[3] [2] [3] [10]

3b. What are nested states? Explain the concept of nested states with an example

[2] [2] [1] [10]

4a. Analyze the working of Microwave Oven Home Appliance, Identify & describe States, Events for the same.

[4] [2] [3] [10]

4b. Design a state diagram for ATM Banking system.

[3] [2] [3] [10]

5a. Design use case diagram for Amazon E-commerce Application & also list at-least 04 use cases and 2- actors for the same.

[3] [2] [3] [10]

5b. Design Activity diagram for Attendance management system of the college.

[3] [3] [3] [10]

6a. List and Explain Guidelines for designing Use case diagram.

[2] [2] [1] [10]

6b. Explain the following with examples
i)Include Use case relationship
ii)Extend Use case relationship
iii)Generalization Use-case relationship

[2] [3] [1] [10]

7a. How do you eliminate unnecessary and incorrect classes during domain analysis? Explain briefly.

[2] [3] [1] [10]

7b. Explain the steps to be performed in constructing Domain state model.

[2] [2, 3] [1] [10]

8a. Explain the following related to Domain class model
i)Prepare Data dictionary
ii)Find Associations
iii)Group classes into Packages

[2] [3] [1] [10]

8b. Define Domain Interaction model? Explain the steps related to construct Domain Interaction Modelling.

[2] [3] [2] [10]

9a. Define Application Interaction model? Explain the steps related to construct Application Interaction Modeling.

[2] [3] [1] [10]

9b. List and Explain Steps involved in constructing Application class model.

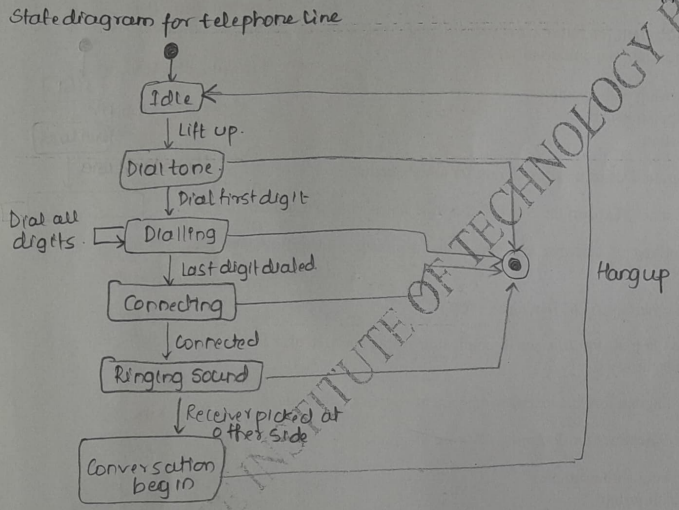
[2] [2] [1] [10]

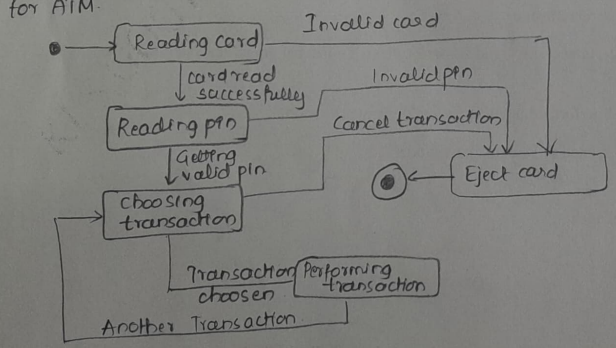
10a. Explain the following related to Application Interaction model
i)Add variations & Exceptional Scenarios
ii)Prepare Activity diagrams for Complex use cases

[2] [3] [1] [10]

10b. What is class design. List the steps involved in the process of class design.

[2] [3] [1] [10]





USN : _____ Course Code : 16CS65

Sixth Semester B.E Makeup Examination, Sept._Oct._2020

OBJECT ORIENTED MODELING AND DESIGN

Time: 3 hrs Max. Marks :100

Instructions :1. 1. Answer any Five full Questions selecting at least One Full Question from Each Unit. 2. Each Question carry Equal Marks. 3. Missing Data may be suitably assumed. 4. Draw Figures wherever necessary.

MODULE 1

L CO PO M

1a. Describe the themes of Object Oriented technology

[2] [1] [2] [6]

1b. Explain the three models of object oriented development and explain the relationship between them

[2] [1] [2] [6]

1c. Design a complete class diagram for the problem statement: A company consists of departments. Departments are located in one or more offices. One office acts as a headquarter. Each department has a manager who is recruited from the set of employees. Your task is to model the system for the company. Note: Apply domain knowledge wherever needed.

[3] [1] [3] [8]

OR

2a. Describe the object oriented methodology for software development.

[3] [1] [1] [6]

2b. Design a complete class diagram for the problem statement:An online hotel room booking System should support a customer to book a room of any type by making payments through either using the debit card or credit card. The customer should have the provision for choosing and canceling the room of interest.

[3] [1] [3] [8]

2c. Explain the concept of Inheritance and generalization. Apply the same to draw the family tree till 3 levels of generation starting from your generation

[3] [1] [1] [6]

MODULE 2

3a. Design a state diagram for a typical telephone line showing all the states and events in it.

[3] [2] [3] [8]

3b. List and explain the behaviors of state diagram with an examples for each.

[2] [2] [2] [8]

3c. Differentiate the events and guard condition with an example.

[4] [2] [2] [4]

OR

4a. Explain with examples representation of the concurrent state in state modeling.

[2] [2] [2] [6]

4b. List and explain the three types of state modelling events with an example for each.

[2] [2] [2] [6]

4c. Design the state diagram for a postal card delivery using speed post services. Show at least 5 or more states.

[6] [2] [2] [8]

MODULE 3

5a. Design an Activity model and explain the process for an ATM problem statement: The customer can perform various transactions using ATM card. The Before conducting any transactions the customer should be validated and then a session should be initiated. The

customer can also query for accounts details. The transaction data are maintained with bank, which they can share with Bank consortium. [3] [2] [2] [10]

5b. Design a use case diagram for a typical E-commerce website for ordering various types of items. Explain each of the identified use cases. [6] [2] [3] [10]

OR

6a. Design the sequence diagram for typical Email services (to send and open the Email) showing at least 10 or more interactions between the objects/entities/classes. [6] [2] [3] [10]

6b. Explain with example the include, extends and generalization relationships as applicable to use-cases [2] [2] [2] [10]

MODULE 4

7a. Explain the overview of analysis process as applicable for object oriented development. [2] [3] [2] [5]

7b. For a bank ATM case study, identify the list of relevant classes and list of Bad classes. Justify your selections [2] [3] [2] [8]

7c. Explain the process of retaining the right associations for any given problem statement. [2] [3] [2] [7]

OR

8a. Write the conditions for eliminating the unnecessary and incorrect attributes in domain class modeling and apply the same for ATM example [2] [3] [3] [10]

8b. Develop the final domain class model for ATM example showing the right attributes and inheritance/s [2] [3] [3] [10]

MODULE 5

9a. Apply the following steps in Application interaction modeling taking ATM case study.

1.Determining the system Boundary,
2.Finding the actors and use-cases,
3.Finding the initial and final events.

[3] [3] [3] [12]

9b. Demonstrate the Application class models with an Example. [3] [3] [2] [8]

OR

10a. Apply the following steps in Application interaction modeling taking ATM case study.

1.Preparing the Scenario for process transaction
2.Identifying the events.
3.Preparing the Activity diagram for Card verification Use-case.

[3] [3] [3] [12]

10b. List and explain the steps in class design [2] [3] [2] [8]

16CS/IS65

Sixth Semester B.E. Semester End Examination, May/June 2018-19

OBJECT ORIENTED MODELING AND DESIGN

3 Hours Max. Marks: 100

Instructions: 1. *UNIT – I and UNIT-III (Compulsory)*
2. *Use appropriate UML diagram*

	L	CO	PO	M
UNIT – I (Compulsory)				
Explain the four aspects object orientation with examples	(2)	(1)	(2)	(10)
Discuss the following concepts with proper UML notation 1) Class 2) Object 3) Multiplicity 4) Association 5) Ordering	(2)	(1)	(2)	(10)
UNIT – II	L	CO	PO	M
Define concurrency. Explain the different types concurrency used in state modeling.	(2)	(1)	(1)	(10)
Design the state diagram for an telephone line with at least 8 states in it and explain in brief each of the states	(4)	(2)	(2)	(10)

OR

Demonstrate the concept of nested states for following problem statement of a vending machine: Initially the vending machine is idle. When a person inserts the coins, the machine adds amount to the cumulative balance. After adding some coins, a person can select an item. If the item is empty or balance is insufficient, the machine waits for another selection. Otherwise, the machine dispenses the item and returns appropriate change.
Draw the main state diagram for vending machine and its submachine dispense. (3) (1) (2) (10)

Explain the different behaviors of state diagrams along with example for each one (2) (2) (1) (10)

	L	CO	PO	M
UNIT – III (Compulsory)				
Discuss Interaction Modeling. How it differs from state modeling	(3)	(2)	(3)	(05)
Consider the vending machine case study. List the actors and use cases. Draw the Use Case diagram.	(3)	(2)	(3)	(10)
What is sequence diagram? Explain briefly with an example.	(2)	(2)	(3)	(05)
UNIT - IV	L	CO	PO	M
How do you eliminate unnecessary and incorrect classes during domain analysis?	(2)	(3)	(3)	(10)
What do you mean by domain state model? Describe the steps required for constructing a domain state model.	(2)	(3)	(3)	(10)

OR

. Explain briefly domain and application analysis. (2) (3) (3) (05)

). List the steps involved in domain state model. Explain the process with appropriate example. (2) (3) (3) (10)

. Explain the domain interaction model. (2) (3) (3) (05)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

UNIT -V

			L	CO	PO	M
7	a.	Explain briefly with an example application interaction model.	(2)	(3)	(3)	(10)
	b.	Consider the example of ATM, elaborate the steps involved in Application Interaction model. Draw appropriate UML diagram.	(4)	(3)	(3)	(10)

OR

8	a.	How activity diagram can be used in the application interaction model. Draw Activity diagram for ATM card verification.	(3)	(3)	(3)	(10)
	b.	List steps involved in Application class model. Explain briefly	(2)	(3)	(3)	(10)

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16CS / IS65

Sixth Semester B.E. Makeup Examination, May/June 2018-19

OBJECT ORIENTED MODELING AND DESIGN

e: 3 Hours

Max. Marks: 100

Instructions: 1. *UNIT I and UNIT III are compulsory. Answer at least five questions by selecting at least one question from each other UNIT.*
2. *Draw the figure/ diagram compulsorily wherever necessary.*

UNIT – I (Compulsory)

			L	CO	PO	M
a.	Explain the stages of Object oriented software development methodology		(2)	(1)	(1)	(07)
b.	What is modeling? Discuss different models along with relation between them.		(2)	(1)	(1)	(08)
c.	Prepare a class diagram for a graphical document editor that supports grouping. Assume that a document consists of several sheets. Each sheet contains drawing objects, including text, geometrical objects and groups. A group is simply a set of drawing objects, possibly including other groups. A group must contain at least two drawing objects. A drawing object can be direct member of at most one group. Geometrical objects include circles, ellipses, rectangles, lines, and squares.		(4)	(2)	(2)	(05)

UNIT – II

			L	CO	PO	M
	List the significance of state modeling		(1)	(2)	(2)	(05)
	What is an event? Explain briefly different forms of event with an example.		(1,2)	(2)	(2)	(05)
	With proper UML notation for state diagram, explain different elements of the state diagram. Consider the atm_withdraw function. Draw the state diagram for the same.		(3)	(2)	(3)	(10)

OR

	Explain the various state diagram behaviors.		(2)	(2)	(2)	(10)
	What do you mean by signal generalization? Place the following signal classes into generalization hierarchy: pick, character input, line pick, circle pick, box pick, text pick and input signal.		(3)	(2)	(3)	(05)
	Explain with an example the concept of synchronization of concurrent activities.		(2)	(2)	(3)	(05)

UNIT - III (Compulsory)

			L	CO	PO	M
	Design the sequence diagram for an email server system that sends a text email to some destination email address via typical email service.		(4)	(2)	(2)	(08)
	Draw an activity diagram for admission process in a college. The process starts from seat allocation to and student's id distribution.		(4)	(2)	(2)	(07)
	Explain the use case "include" and "extend" relationships with an example for both.		(2)	(1)	(1)	(05)

UNIT - IV

			L	CO	PO	M
	Explain with an example the ways of keeping the right classes in domain class modeling		(2)	(3)	(1)	(10)
	Explain the different criteria in discarding the unnecessary and incorrect associations.		(2)	(3)	(1)	(10)

OR

6 a. Demonstrate the different criteria's for eliminating the unnecessary and incorrect attributes in domain class modeling (3) (3) (1) (10)

b. Illustrate with an example the steps to organize the classes by using inheritance to share commor structure (2) (3) (1) (10)

L CO PO M

UNIT -V

7 a. Design a Use-case diagram and explain the use cases for an ATM problem statement: The custome can perform various transactions using ATM card. The Before conducting any transactions th customer should be validated and then a session should be initiated. The customer can also query fo accounts details. The transaction data are maintained with bank, which they can share with Banl consortium. (4) (3) (2) (10)

b. Demonstrate the different steps in the application class modeling for ATM example defined i **previous question** (4) (3) (2) (10)

OR

8 a. In brief, explain the steps involved in the class design (2) (3) (1) (10)

b. Elucidate in brief the steps involved in the application interaction modeling (2) (3) (1) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

19102/2022

USN : _____

Course Code : 18IS53

Fifth Semester B.E. Semester End Examination, FEBRUARY_APRIL_2022

INTERNET OF THINGS

Time: 3 hrs. Max. Marks :100

Instructions : 1. Draw diagrams/illustrations if necessary.
2. Answer any FIVE Full Questions selecting at least ONE Question from Each Unit.
3. Assume suitable information/data when needed.

L CO PO M

MODULE 1

1a. Contrast minicomputer and microcontroller. [2] [1] [2] [5]

1b. Explain two level cache system with a neat diagram. What is the average memory access time of a machine whose hit rate is 96%,with a cache access time of 3ns and a main memory access time of 70ns. [3] [1] [1, 2] [10]

1c. Contrast between supervisor mode and user mode. [2] [1] [2] [5]

OR

2a. Explain different condition codes in ARM. [2] [1] [2] [5]

2b. Contrast Memory mapped I/O and Bust wait I/O in ARM. [2] [1] [3] [5]

2c. Explain Exceptions, Traps and CPU power consumption in case of embedded system design. [2] [1] [2] [10]

MODULE 2

3a. Explain IoT protocols at different layers with a neat diagram [2] [2] [2] [10]

3b. Illustrate four IoT communication models with a neat diagram [2] [2] [1, 2] [10]

OR

4a. With a neat diagram explain communication with REST APIs. What are the architectural constraints of REST? [2] [2] [2] [10]

4b. Define IoT-Level-1and IoT level-2 with a neat diagram. [2] [2] [2] [10]

MODULE 3

5a. Explain IoT hardware and software. [2] [3] [1] [10]

5b. Make use of IoT system to automate the agricultural activities with respect to smart irrigation/maintaining soil pH. [3] [3] [1] [10]

OR

6a. Discuss domain specific IoTs- Health and lifestyle considering any two case studies. [2] [3] [2] [10]

6b List & explain the following in brief. a) IoT Sensors b) Actuators [2] [3] [2] [10]

MODULE 4

7a. Explain IoT-architectural reference model building blocks. [2] [4] [2] [10]

7b. Explain MQTT protocol in detail.

[2] [4] [2] [10]

OR

8a. Explain device discovery capabilities, registering a device, deregister a device in IoT environment. [2] [4] [1, 2] [10]

8b. Explain RPL protocol in detail. [2] [4] [2] [10]

MODULE 5

9a. Explain Xively cloud for IoT. [2] [5] [2] [10]

9b. Describe the architecture of a Django application. [2] [5] [2] [10]

OR

10a. Explain WAMP-autoBahn for IoT. [2] [5] [2] [10]

10b. Elaborate the usage of Amazon EC2 and Amazon Autoscaling for IoT. [2] [5] [2] [10]

USN : _____ Course Code : 18IS53

Fifth Semester B.E FASTTRACK Examination, AUGUST_SEPTEMBER_2021

INTERNET OF THINGS

Time: 3 hrs **Max. Marks :100**

Instructions :1. Answer any FIVE full Questions.

	L	CO	PO	M
1a. What is an embedded computer system? Outline complex systems and microprocessors.	[1]	[1]	[1]	[10]
1b. Explain BMW 850i brake and stability control system (ABS), with block diagram and working principle.	[1]	[1]	[1]	[10]
2a. Explain Characteristics of Embedded Computing Applications.	[2]	[1]	[1]	[10]
2b. Interpret Challenges in Embedded Computing System Design	[2]	[1]	[1]	[10]
3a. Define Internet of Things. List Characteristics of Internet of Things.	[1]	[2]	[1]	[10]
3b. Explain generic block diagram of an IoT.	[2]	[2]	[1]	[10]
4a. Explain IoT protocols.	[2]	[2]	[1]	[10]
4b. Illustrate with block diagram, any two IoT levels / deployment templates.	[2]	[2]	[1]	[10]
5a. Explain IoT Key Features, List Advantages & Disadvantages of IoT systems.	[2]	[3]	[1]	[10]
5b. Outline Domain Specific IoTs: 1.Home Automation,2.Cities, 3.Environment, 4.Energy	[2]	[3]	[1]	[10]
6a. Summarize Domain Specific IoTs: 1.Logistics, 2.Agriculture, 3.Industry,4.Health and Lifestyle.	[2]	[3]	[1]	[10]
6b. Demonstrate with reference to Internet of Things: 1.Hardware and Software2.Sensors, 3.Smart Wearable Devices, 4.Standard Devices..	[2]	[3]	[1]	[10]
7a. Explain Architecture Reference Model.	[2]	[4]	[1]	[10]
7b. Explain the Protocols: 1.6LowPAN,2.RPL, 3.CoAP, 4.MQTT.	[2]	[4]	[1]	[10]
8a. Illustrate Device Discovery capabilities: Registering a device, De-register a device.	[2]	[4]	[1]	[10]
8b. Outline Intel IoTivity, XMPP Discovery extension.	[2]	[4]	[1]	[10]
9a. Explain Cloud Storage models and communication APIs.	[2]	[5]	[1]	[10]
9b. Explain Web server for IoT and Cloud for IoT.	[2]	[5]	[1]	[10]
10a. Explain Python web application framework and designing a RESTful web API.	[2]	[5]	[1]	[10]
10b. Explain Amazon Web services for IoT.	[2]	[5]	[1]	[10]

USN : _____ Course Code : 18CS54/18IS54/16CS52

Fifth Semester B.E. Semester End Examination, FEBRUARY_APRIL_2022

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 hrs. **Max. Marks :100**

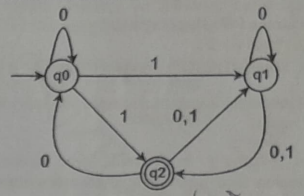
Instructions :1. Answer any FIVE Full Questions selecting at least ONE Question from Each Unit.

MODULE 1 **L CO PO M**

1a. Elaborate the formal definition of DFA. Define transition diagram and transition table. [2] [1] [1] [6]

1b. Design a DFA to accept all the strings with no more than 3 a's continuously. Each string in this language consists of a's and b's. [3] [1] [2] [7]

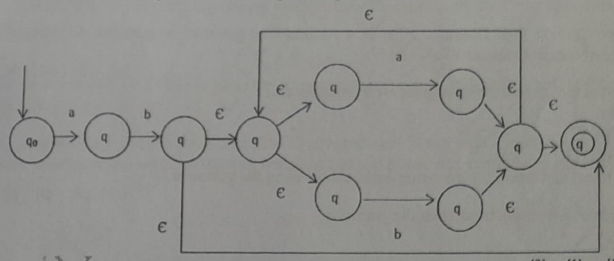
1c. Convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA) using subset construction.



[3] [1] [3] [7]

OR

2a. Convert the following Є-NFA to its equivalent DFA.



[3] [1] [1] [8]

2b. Define Epsilon closure with an example. [1] [1] [1] [4]

2c. Design an NFA that ends with 2 b's . Each string NFA accepts consists of a's and b's. Convert the resultant NFA to DFA using subset construction. [3] [1] [3] [8]

MODULE 2

3a. Define Regular Expression .Design epsilon NFA for the Regular Expression (11+0)*01(00+1)*. [2] [2] [1] [6]

3b. Define Distinguishable and indistinguishable states. Apply Table filling algorithm to minimize the DFA

δ	a	b
àq0	q1	q3
q1	q2	q4
q2	q1	q4
q3	q2	q4
*q4	q4	q4

[3] [2] [3] [8]

3c. Apply state elimination method to obtain the Regular Expression.

δ	0	1
à*q0	q0	{q1}
*q1	q1	{q2}
q2	q2	q2

[3] [2] [3] [6]

OR

4a. Write a regular expression for the following languages.
a. L= { vuv where u,v Є {a,b}* and |v|=2 }
L= { w | wЄ {a,b}*such that n_a(w) mod 2 =0 and n_b(w) mod 2 =0 }.

[2] [2] [3] [6]

4b. State and prove Pumping Lemma for Regular Languages and apply the same to justify the following Language to be not regular.
L={$a^n b^n$ | n>=0}

[2] [2] [1] [8]

4c. Let R be Regular Expression then prove that there exists some Non Deterministic Automata . Justify.

[2] [2] [1] [6]

MODULE 3

5a. Define Context Free Grammar. Obtain a context free grammar to generate a language consisting of uncqual number of a's and b's.

[2] [3] [2] [6]

5b. Consider the context free grammar with productions.
S→aB | bA
A→aS | bAA | a
B→bS | aBB | b
Write leftmost derivation for the string aaabbabbba using the grammar.

[3] [3] [3] [6]

5c. Eliminate unit productions from the grammar
S → AB
A → a
B → C | b
C → D
D → E | bC
E → d | Ab

[3] [3] [12] [8]

OR

6a. Define sentential form with an example.

[1] [3] [1] [4]

6b. Show that the following grammar is ambiguous.
S→ aB|bA
A→ aS|bAA|a
B→ bS|aBB|b

[2] [3] [2] [8]

6c. Eliminate Useless symbols in the grammar.
S → aA | bB
A → aA | a
B → bB
D → ab | Ea
E → aC | d

[3] [3] [3] [8]

MODULE 4

7a. Define PDA and with a neat schematic diagram .Explain the working model of Push Down Automata.

[2] [4] [1] [6]

7b. Design a PDA for the following language by final state.
L={ $a^n b^n$ | n >=1)
Write Instantaneous description for n=3.

[3] [4] [3] [8]

7c. Write a note on Programming Techniques for Turing Machine.

[2] [4] [1] [6]

OR

8a. Design a Turing Machine to accept the following Language and show the sequence of moves made by the TM for the string "aaabbb" L= { $a^n b^n$ | n >=1 }.

[3] [4] [2] [10]

8b. Design a PDA to accept the following Language by a final state.
L= { WCW^R| WЄ (a+b)* } , write ID for W= aabbaa.

[3] [4] [3] [10]

MODULE 5

9a. Write a LEX program to count the number of positive numbers, negative numbers, positive fractions and negative fractions.

[3] [5] [3] [8]

9b. Explain any 8 meta characters to form regular expressions with example.

[2] [5] [1] [6]

9c. Write a YACC program to evaluate valid arithmetic expression involving operators +, -, * and /.

[3] [5] [3] [6]

OR

10a. What is LEX ? Write a program to count the number of words, lines and numbers characters in a given text.

[3] [5] [3] [10]

10b. Explain the syntax of LEX and YACC program and hence with a neat diagram Explain Parser communication and interaction between Lexical phase and symantic phase with a neat diagram.

[2] [5] [2] [10]

USN : _____ Course Code : 18CS54/16CS52/18IS54/16IS52

Fifth Semester B.E FASTTRACK Examination, AUGUST_SEPTEMBER_2021

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 hrs Max. Marks :100

Instructions :1. Answer any FIVE full Questions.

	L	CO	PO	M

1a. Define the following terms with example
a.Alphabet. b. Strings. c. Length of string. d. Empty String.e. Power of an Alphabet. [2] [1] [3] [6]

1b. Define Deterministic Finite Automata (DFA). Design a DFA for the following language and Compute δ*(q0, abbaaa)
L= { w | Na(w) ≥1 , Nb(w) =2} [2] [1] [2] [7]

1c. Define Non- deterministic Finite Automata (NFA). Design a NFA for the following language and Compute δ*(q0, aabba)
L= {w | wϵ Σ* and w is aab^nor aba.-} [2] [1] [2] [7]

2a. Explain subset construction method and Apply Subset construction Scheme and Convert following NFA to DFA.

δ	A	b
àq0	{ q0, q1 }	{ q0 }
q1	Φ	{q2}
*q2	Φ	Φ

[3] [1] [2] [10]

2b. Define Ɛ-closure and find Ɛ-closure of each state.Hence convert this into its equivalent DFA

δ	ϵ	a	b
àp	{ r }	{ q }	{ p, r }
q	Φ	{ p }	Φ
*r	{ p, q }	{ r }	{ p }

[3] [1] [2] [10]

3a. Define Regular expression and find the regular expression for the following languages

a.L={ | w | mod 3 = 0 such that w Ɛ (a+b)*}
L= { $a^n b^m$ | n>=4 and m<=3 }

[2] [2] [2] [10]

3b. Let R be a regular expression. Then prove that there exists a finite automaton M = (Q,â,d, q_0, A) which accepts L(R). [2] [2] [2] [10]

4a. Apply Table Filling Algorithm to find a minimum state Automata.

δ	0	1
→A	B	C
B	C	E
*C	D	C
D	C	E
*E	B	E

[3] [2] [2] [10]

4b. State and prove Pumping lemma for Regular Languages. [3] [2] [2] [10]

5a. Define Context Free Grammar and Construct CFG for the following Languages
i.Set of strings of a's and b's ending with Substring 'abb'
L= { $a^i b^j c^k$ | i = j + k and j, k >=1 }
[2] [3] [3] [10]

5b. a.Consider the Grammar : S→(L) | a L→L,S | S
Draw Leftmost and Rightmost derivation and Parse Tree for the string w = (a, a)
b.Define Ambiguous Grammar and Prove that the following grammar is ambiguous on w = a * b + c E→I | E+E | E*E | (E) I→a | b | c
[3] [3] [2] [10]

6a. Define ϵ-production and Nullable variable. Find ϵ-free productions for the following grammar.
S →ABC A→BC | a B→ bAC | ϵ C→ cAB | ϵ
[2] [3] [3] [10]

6b. Define Context free grammar(CFG). Construct CFG for the following languages:
a. L = { $a^n b^{2n}$ | n>=0 }
b. L = { w | w ϵ (a+b)*bba }
c. L = { $0^i 1^j 2^k$ | i = j+k and j, k>=0 }.
[2] [3] [3] [10]

7a. Explain the working of Pushdown Automata with a neat schematic diagram.
Design a PDA for the following language by final state.
L={ $a^n b^n$ | n>=1}
Write Instantaneous description for n=3.
[2] [4] [2] [10]

7b. a.Rephrase formal definition of Turing Machine, and Explain the working with a neatdiagram.
b.Write a note on Programming Techniques for Turing Machine.
[2] [3, 4] [2] [10]

8a. Design a PDA to accept the following Language by a final state.[L2]{CO2][PO1]L= { WCW R | W€ (a+b)*} , write ID for W= aabbaa
[3] [4] [3] [10]

8b. Design a PDA for the following Language by empty stack.L={ a n b n | n >= 1}Write ID for n=3
[3] [4] [2] [10]

9a. Write a LEX program to count the number of positive numbers, negative numbers, positive fractions and negative fractions.
[2] [5] [1] [10]

9b. Write a YACC program to evaluate valid arithmetic expression involving operators +, -, * and /.
[2] [5] [1] [10]

10a. Explain any 8 meta characters to form regular expressions with example.
[2] [5] [3] [10]

10b. Explain Lex and YACC specification with an example each.
[2] [5] [2] [10]

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16CS/IS52

Fifth Semester B.E. Makeup Examination, January 2020

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *Answer ANY FIVE full questions from Each UNIT*
2. *Assume any missing data*

UNIT - I

		L	CO	PO	M
a.	What is Automata? With Neat schematic representation explain the working of Automata?	(01)	(01)	(01)	(08)
b.	Construct DFA for the following Languages				
	i. Set of all strings over Σ={0,1} starting with substring 01				
	ii. Set of all strings over Σ={0,1} ending with substring 011				
	iii. L= { |w| mod 3 <> 0, where w Ɛ Σ* for ∑={a, b} }				
	iv. L= { |w| mod 3 ≥ |w| mod 2, where w Ɛ Σ* for ∑={a, b} }	(03)	(01)	(03)	(12)

OR

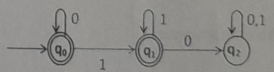
a.	Define Ɛ-NFA and Construct the Ɛ-NFA with four states for the following Language and Compute δ*(q0, aabba) L= {a^n | n>=0 } U { $b^n a$ | n>=1 }	(03)	(01)	(02)	(08)
b.	Apply Subset Construction Scheme by lazy evaluation and Convert the following Ɛ-NFA into an equivalent DFA				

δ	Ɛ	a	b	c
→p	Φ	{p}	{q}	{r}
q	{p}	{q}	{r}	Φ
*r	{q}	{r}	Φ	{p}

(03) (01) (12) (12)

UNIT – II

		L	CO	PO	M
a.	Define Regular expression and build the Regular expression for the following languages				
	i. To accept a language consisting of strings of a's and b's of odd length.				
	ii. To accept a language consisting of strings of 0's and 1's that do not end with 01.				
	iii. L= {vuv | u, v Ɛ Σ* for ∑={a, b} and | v | = 2}				
	iv. L={ |w| mod 3 = |w| mod 2, where w Ɛ Σ* for ∑={a, b} }	(03)	(02)	(03)	(10)
b.	Apply State elimination method to identify the Regular Expression for the following finite Automata				



(03) (02) (02) (10)

OR

a.	State and prove the Pumping Lemma for Regular Languages. Apply Pumping Lemma and discover that the following language is Non-Regular L = { 0^n | n is perfect Square}	(03)	(03)	(12)	(10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Apply Table Filling Algorithm and Determine the Minimum State Deterministic Automata(DFA) for the following DFA shown in the Fig 4

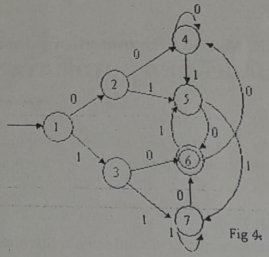


Fig 4.

(05) (03) (03)

UNIT – III

L CO PO

5 a. Obtain a context free grammar to generate a language consisting of equal number of a's and

(2) (3) (1

b. Consider the context free grammar with productions.

E→I E→E+E
E→E*E E→(E)
I→a I→b
I →Ia I→Ib
I→I0 I→I1

Write leftmost derivation and parse tree for the string (a101+b1)*(a1+b).

(4) (3) (1

c. Eliminate Useless symbols in the grammar.

S → aA | bB
A → aA | a
B → bB
D → ab | Ea
E → aC | d

(2) (3) (1

OR

6 a. Show that the following grammar is ambiguous.

S→ aB|bA
A→ aS|bAA|a
B→ bS|aBB|b

(2) (3) (

b. Eliminate Useless symbols in the grammar.

S → aA| a |Bb | cC
A → aB

(2) (3) (

c. Eliminate all ϵ-productions from the grammar.

S→ ABCa|bD
A→ BC|b
B→ b| ϵ
C→c | ϵ
D→ d

(2) (3) (

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

UNIT – IV

L CO PO M

7 a. Define Push Down Automata- PDA and Construct PDA for the following language by final state. Draw Transition Diagram and write the sequence of Instantaneous Description – ID's to trace the input string for n = 2.

$$L = \{a^n b^{2n} \mid a, b \in \Sigma, n \geq 0\}$$

(03) (04) (03) (10)

b. Define language acceptance of PDA and Construct PDA by empty stack for the following Grammar and write the sequence of Instantaneous Description – ID's to trace the input string – w = aaaaaa

$$S \rightarrow aAS \mid bAB \mid aB$$
$$A \rightarrow bBB \mid aS \mid a$$
$$B \rightarrow bA \mid a$$

(03) (04) (03) (10)

OR

a. Define Turing machine and With neat schematic diagram explain the working of Basic Turing machine.

(02) (04) (02) (10)

b. Construct Turing Machine to accept the following language and write the sequence of Instantaneous Description – ID's to trace the input string w = " aabb"

$$L = \{a^n b^n \mid a, b \in \Sigma, n \geq 0\}$$

(03) (04) (03) (10)

UNIT -V

L CO PO M

a. Explain the structure of LEX specification format with suitable example

(02) (05) (01) (10)

b. Develop a LEX program to count the number of identifiers, integer and floating point constants present in the input stream..

(03) (05) (03) (10)

OR

a. Explain the structure of YACC specification format with suitable example

(02) (05) (01) (10)

b. Develop a YACC program to recognize and evaluate the arithmetic expression involving additive operators (+, -) and multiplicative operators (*, /).

(03) (05) (03) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

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16CS/IS52/15IS52

Fifth Semester B.E. Semester End Examination, Dec./Jan. 2019-20

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours Max. Marks: 100

Instructions: 1. *Answer any one full question from each UNIT.*
2. *Each full question of a UNIT carries 20 marks*

UNIT - I

			L	CO	PO	M
1	a.	Define the following with an example for each. (i). Alphabet (ii). Strings (iii).Power of an alphabet (iv).Transition table (v). Transition diagram	(1)	(1)	(1)	(05)
	b.	Design a DFA to accept the language L={ w | w is of even length and begins with 01}.	(3)	(1)	(3)	(07)
	c.	Design a NFA which accepts strings of 0'and 1's that have the symbol 1 in the second last position. Convert NFA to equivalent DFA.	(3)	(1)	(3)	(08)

OR

	a.	Design a NFA to accept strings of 0's and 1's that have 1 in third last position. Define Epsilon closures with an example.	(3)	(1)	(3)	(07)
	b.	Design a ε-NFA to accept the decimal number consisting of an optional+ or – sign, a string of digits, a decimal point and another string of digits, either this string of digits or string after decimal point can be empty but atleast one of the two strings is nonempty.	(6)	(1)	(3)	(08)
	c.	Design a DFA to accept the language L={awa | w ∈ (a+b)*}	(3)	(1)	(3)	(05)

UNIT – II

			L	CO	PO	M
	a.	Prove that, If L=L(A) for some DFA A, then there is a regular expression R such that L=L(R).	(3)	(2)	(1)	(06)
	b.	Convert regular expression (0+1)*1(0+1) to a ε-NFA.	(3)	(2)	(1)	(06)
	c.	Design a NFA which accepts all strings containing 110. Convert it to a regular expression.	(3)	(2)	(1)	(08)

OR

	a.	Minimize the following DFA using table filling algorithm.	(6)	(2)	(1)	(10)
	b.	Show that $L=\{a^n b^n \mid n \geq 0\}$ is not regular.	(3)	(2)	(1)	(05)

δ	0	1
→A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

c. State and Prove Pumping Lemma for regular languages. (3) (2) (1) (05)
L CO PO M

UNIT - III

5 a. Define Context Free Grammar and Construct Context Free Grammar for the following Languages
i. Set of strings of a's and b's starting with substring 'ab'
ii. $L= \{ a^n b^m c^k \mid n=m+k, \text{ for } k, m>=0\}$ (03) (02) (02) (06)

b. The following grammar generates the language of RE - 0*1(0+1)*
$S \rightarrow A \mid B$
$A \rightarrow 0A \mid \varepsilon$
$B \rightarrow 0B \mid 1B \mid \varepsilon$
Determine leftmost, rightmost derivations and Parse Tree for the following strings
a) 00101 b) 1001 (03) (02) (02) (10)

c. Prove that the family of Context free Languages is under UNION. (05) (03) (12) (04)

OR

6 a. Define Ambiguous Grammar and Prove that the following grammar is ambiguous for string aab
$S \rightarrow aS \mid aSbS \mid \varepsilon$ (05) (02) (12) (06)

b. Simplify the following grammar by removing redundancies.
$S \rightarrow ASB \mid \varepsilon$
$A \rightarrow aAS \mid a$
$B \rightarrow SbS \mid A \mid bb$ (04) (03) (02) (10)

c. Organize the following grammar into an equivalent Grammar in Chomsky Normal Form – CNF
$S \rightarrow Aba \mid AB$
$A \rightarrow aab$
$B \rightarrow b$ (03) (03) (03) (04)
L CO PO M

UNIT - IV

7 a. Design a turing machine to accept the language $L=\{0^n1^n \mid n>=1\}$. (6) (4) (1) (10)

b. Show that the PDA to accept the language L(M) = {w | w ε (a+b)* having equal number of a's and b's } is nondeterministic. (2) (4) (1) (08)

c. Define deterministic PDA. (1) (4) (1) (02)

OR

8 a. Design a turing machine to accept the language consisting of all palindromes of 0's and 1's. (6) (4) (1) (10)

b. Design a PDA to accept the language $L(M)= \{wCw^R \mid w \varepsilon (a+b)^*$ where w^R is reverse of w by a final state. (6) (4) (1) (10)
L CO PO M

UNIT -V

9 a. Explain the structure of lex program with an example. (2) (5) (3) (07)

b. Write a word counting lex program. (3) (5) (3) (07)

c. Explain yacc parser with an example. (2) (5) (1) (06)

OR

Explain shift reduce parsing. (2) (5) (1) (07)

What is regular expression? Explain characters that form a regular expression. (2) (5) (1) (08)

Write lex specification for decimal numbers. (3) (5) (1) (05)

Note: L (Level),CO (Course Outcome), PO (Programme Outcome), M (Marks)

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15CS52/16CS52/16IS52

Fifth Semester B.E. Semester End Examination, Dec/Jan 2018-19

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours Max. Marks: 100

Instructions: 1. *UNIT-III and UNIT-V are compulsory*
2. *Answer any one full question from remaining units*

UNIT - I

		L	CO	PO	M
a.	Define the following with examples. i) Alphabet ii) String iii) Language	(1)	(1)	(12)	(6)
b.	Design DFA for the following: i) To accept the strings of a's and b's ending with 'abb'. ii) L={ w such that |w| mod 4=0, w ∈ {a,b}* }	(3)	(1)	(3)	(7)
c.	Convert the following ε-NFA to DFA				

δ	ε	a	b
-->p	{r}	{q}	{p, r}
q	Φ	{p}	Φ
*r	{p, q}	{r}	{p}

(3) (1) (3) (7)

OR

a.	Define finite automata. List the applications of finite automata.	(1)	(1)	(12)	(5)
b.	Design a DFA to accept the binary numbers which are divisible by 4.	(3)	(1)	(3)	(5)
c.	Design an NFA to accept the strings of 0's and 1's whose 2nd symbol from the right end is '1'. Convert the same NFA to DFA.	(3)	(1)	(3)	(10)

UNIT – II

		L	CO	PO	M
a.	State and Prove Pumping Lemma for regular languages.	(2)	(2)	(3)	(6)
b.	Convert regular expression (0+1)*1(0+1) to a ε-NFA.	(2)	(2)	(3)	(6)
c.	Design a NFA which accepts all strings containing 110. Convert it to a regular expression using state elimination method.	(4)	(2)	(3)	(8)

OR

		L	CO	PO	M
a	Show that $L=\{a^n b^n \mid n \geq 0\}$ is not regular.	(3)	(2)	(3)	(5)

Note: L (level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

b. Minimize the following DFA using table filling algorithm.

δ	0	1
→A	B	F
B	G	C
*C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

(3) (2) (2) (10)

c. Prove that If L is a regular language over an alphabet Σ then $\bar{L} = \Sigma^* - L$ is also a regular language.

(5) (2) (2) (5)

UNIT - III

L CO PO M

5 a. Define context-free-grammar(CFG). Construct CFG for the following languages:
i) $L = \{ w \mid w \in (0+1)^*110 \}$
ii) $L = \{ 0^{n+1}1^n \mid n >= 1 \}$

(3) (2) (2) (6)

b. Write the LMD, RMD and parse tree for the string '+*-xyxy' using the grammar
E --> +EE | *EE | -EE | x | y

(3) (2) (2) (6)

c. Convert the following grammar into CNF.
S --> 0A | 1B
A--> 0AA | 1S | 1
B --> 1BB | 0S | 0

(3) (3) (3) (8)

UNIT - IV

L CO PO M

6 a. Define Push Down Automata.

(1) (4) (2) (3)

b. Design a PDA to accept the language $L(M) = \{wCw^R \mid w \in (a+b)^*$ where w^R is reverse of w by final state.

(3) (4) (2) (8)

c. Show that the PDA to accept the language $L(M) = \{w \mid w \in (a,b)^*$ and $n_a(w) > n_b(w) \}$ is nondeterministic.

(3) (4) (2) (9)

OR

L CO PO M

7 a. Explain the Programming techniques for Turing machines.

(2) (4) (2) (8)

b. Define Turing machine.

(1) (4) (3) (2)

c. Design a Turing machine to accept the language consisting of all palindromes of 0's and 1's.

(3) (4) (2) (10)

UNIT -V

L CO PO M

8 a. Explain the structure of Lex with an example.

(2) (5) (12) (6)

b. Explain parser-lexer communication.

(2) (5) (12) (6)

c. Write a yacc program to recognize an arithmetic expression involving operators +, -, * and /.

(3) (5) (3) (8)