

Performance

Subject Code	CS102504
Subject Name	Internet of Things

Course & Sem: B.TECH 5TH SEM

Max Marks: 40

(C+D)

Minimum Pass Mark: 14

Branch: CSE

Time: 2hrs

Note: Attempt all questions. Part (a) is compulsory. Attempt any one out of part (b), (c) in all question.

CO1. Students will familiar with the concepts of Internet of Things.

CO2. Students will familiar with IoT Architecture

CO3. Students will ready to Analyze basic protocols in wireless sensor network

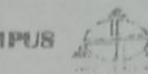
CO4. Students will be capable to design IoT applications in different domain and be able to analyze their performance

CO5. Capable to implement basic IoT applications on embedded platform

Q. No.	Questions	Marks	CO	BL	PI
Q.1	a. List out the Features of IoT. b. Discuss about IoT connectivity layers. c. Write short notes on 3G/4G/5G..	2 8 8	3,4 3,4 3,4	L2 L1 L2	1.4.1 1.4.1 1.4.1
Q.2	a. Define M2M. <u>Q-3</u> b. what is the difference between IoT and M2M? c. Explain Big data and smart grid. <u>Q-4</u>	2 8 8	3,4 3,4 3,4	L2 L2 L1	1.4.1 1.4.1 1.4.1
Q.3	a. Define sensor. <u>Q-2</u> b. Explain the Transducers and temperature sensor. <u>Q-3</u> c. What is actuator? and Explain the type of actuator. <u>Q-3</u>	2 8 8	3,4 3,4 3,4	L2 L2 L2	1.4.1 1.4.1 1.4.1
Q.4	a. Elements of Generalized Measurement System. b. Write note on : hydraulic motors ,solenoid relay. <u>Q-3</u> c. Describe the IoT network configuration.	2 8 8	3,4 3,4 3,4	L2 L2 L2	1.4.1 1.4.1 1.4.1

(RTD) sensor note
X

The sensor output
RTD
Digital
Digital
Digital



Proforma - CT

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CO4. Students will be capable to design IoT applications in different domain and be able to analyze their performance

CO5. Capable to implement basic IoT applications on embedded platform

Q. No.	Questions	Marks	CO	BL	PI
Q.1	a. List out the IoT Data protocols. b. Write short notes on IPv4, IPv6. c. Write short notes on Gateway Prefix Allotment.	2 8 8	2 2 2	L2 L1 L2	1.4.1 1.4.1 1.4.1
Q.2	a. List out the IoT Communication protocols. b. Write short notes on NFC,ZigBee. c. Explain IEEE 802.11 and IEEE 802.15 and their versions.	2 8 8	2, 2, 2,	L2 L2 L1	1.4.1 1.4.1 1.4.1
Q.3	a. Define Node MCU Board. b. Write Down the introduction to Raspberry PI. c. Explain in brief Operator,loops random no.,arrays,Math library .	2 8 8	4.5 4.5 4.5	L2 L2 L2	1.4.1 1.4.1 1.4.1
Q.4	a. Define Cloud Computing. b. Write note on Service models c. Describe the Cloud Computing Fundamental in details.	2 8 8	4 4 4	L2 L2 L2	1.4.1 1.4.1 1.4.1

Rasp

Subject Code	CS102503
Subject Name	Introduction to Data Science

Class Test II	Course: B.E./B.Tech Branch : Computer Science & Engineering	Max. Marks
Max. Time 2 Hours	Semester : 5th Section : A, B, C , D	Min. Pass Marks

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

CO1:	Student will be able to understand the basic concepts of Data Science
CO2:	Student will be able to understand how to read and manipulate data
CO3:	Student will be able to understand the data cleaning, and dimensionality reduction
CO4:	Student will be able to understand and analyze the data
CO5:	Student will be able to use visualization of data to capture data insight and

Q. No.	Question	Mark	CO	BTL	PO
1	a) Define Data Smoothing Process.	2	1, 6	1,3	1,2
	b) Explain various ways to handle missing data with help of an appropriate table.	6	1,6	1,2, 3	1,2, 3
	c) Explain various Data Reduction Technique.	6	1, 6	1,2, 5,6	1,2, 3
	d) Explain various web scrapping tools.	6	1, 6	1,2, 5,6	1,2, 3
2	a) Explain the various data visualisation tools.	2	1,2,6	4,6	1,2, 3
	b) Difference between Supervised, Unsupervised and Reinforcement Learning.	6	1,2,6	1,2, 3	1,2, 3
	c) WAP to display a bar chart of the popularity of programming Languages. Use different color for each bar.(Java, Python, PHP, JavaScript, C#, C++)	6	1,2,6	1,2, 3	1,2, 3,4

	d)	WAP to create a pie chart with a title of the popularity of programming Languages. Make multiple wedges and multiple color of the pie(Java, Python, PHP, JavaScript, C#, C++) (Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7)	6	1,2,6	1,2, 3	1,2, 3,4																																																																													
3	a)	Differentiate between linear Regression and logistic Regression.	2	1,6	2	1,2																																																																													
	b)	Draw a scatter plot. Math_marks = [88, 92, 80, 89, 100, 80, 60, 100, 80, 34] science_marks = [35, 79, 79, 48, 100, 88, 32, 45, 20, 30] marks_range = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]	5	2,6	1,2, 5	1,2, 3																																																																													
	c)	Explain different type of covariance and correlation?	5	1,2,6	1,2, 3	1,2																																																																													
	d)	Write a Pandas program to identify the column(s) of a given DataFrame which have at least one missing value and to count the number of missing values in each column of a given DataFrame. Test Data: <table border="1"> <thead> <tr> <th></th> <th>ord_no</th> <th>purch_amt</th> <th>ord_date</th> <th>customer_id</th> <th>salesman_id</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>70001.0</td> <td>150.50</td> <td>2012-10-05</td> <td>3002</td> <td>5002.0</td> </tr> <tr> <td>1</td> <td>NaN</td> <td>270.65</td> <td>2012-09-1</td> <td>3001</td> <td>5003.0</td> </tr> <tr> <td>2</td> <td>70002.0</td> <td></td> <td></td> <td>3001</td> <td></td> </tr> <tr> <td>3</td> <td>70004.0</td> <td>110.50</td> <td>2012-08-</td> <td></td> <td>NaN</td> </tr> <tr> <td>4</td> <td>NaN</td> <td>948.50</td> <td>2012-09-10</td> <td>3002</td> <td>5002.0</td> </tr> <tr> <td>5</td> <td>70005.0</td> <td>2400.60</td> <td>2012-07-27</td> <td>3001</td> <td>1.0</td> </tr> <tr> <td>6</td> <td>NaN</td> <td>5760.00</td> <td>2012-09-10</td> <td>3001</td> <td>5001.0</td> </tr> <tr> <td>7</td> <td>70010.0</td> <td>1983.43</td> <td>2012-10-10</td> <td>3004</td> <td>NaN</td> </tr> <tr> <td>8</td> <td>70003.0</td> <td>2480.40</td> <td>2012-10-10</td> <td>3003</td> <td>03.0</td> </tr> <tr> <td>9</td> <td>70012.0</td> <td>250.45</td> <td>2012-06-27</td> <td>3002</td> <td>5002.0</td> </tr> <tr> <td>10</td> <td>NaN</td> <td>75.29</td> <td></td> <td></td> <td>5003.0</td> </tr> <tr> <td>11</td> <td>70013.0</td> <td>3045.60</td> <td>2012-04-25</td> <td>3001</td> <td>N</td> </tr> </tbody> </table>		ord_no	purch_amt	ord_date	customer_id	salesman_id	0	70001.0	150.50	2012-10-05	3002	5002.0	1	NaN	270.65	2012-09-1	3001	5003.0	2	70002.0			3001		3	70004.0	110.50	2012-08-		NaN	4	NaN	948.50	2012-09-10	3002	5002.0	5	70005.0	2400.60	2012-07-27	3001	1.0	6	NaN	5760.00	2012-09-10	3001	5001.0	7	70010.0	1983.43	2012-10-10	3004	NaN	8	70003.0	2480.40	2012-10-10	3003	03.0	9	70012.0	250.45	2012-06-27	3002	5002.0	10	NaN	75.29			5003.0	11	70013.0	3045.60	2012-04-25	3001	N	5	1,2,6	1,2, 3,5
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CO: Course Outcome

BTL: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

PO: Program Outcome

SHRI SHANKARACHARYA TECHNICAL CAMPUS

Bhilai (Chhattisgarh)

An Autonomous Institute

Approved by AICTE, New Delhi
Affiliated to CSV Technical University, BHILAI



श्री शंकराचार्य टेक्निकल कॉम्प्यूटर सिलार्ड (छत्तीसगढ़)

(Shri GangaJali Education Society)
Estd. 1999

All BTech Courses Accredited by NBA, New Delhi
Accredited by NAAC with "A" Grade

HIRF-2020 Rank (Band 251-300)
An ISO 9001:2015 Certified Institution

स्वरासी संस्थान

Subject Code	CS 102503
Subject Name	Introduction to Data Science

Class Test I	Course: B.E./B.Tech Branch : Computer Science & Engineering	Max. Marks 40
Max. Time 2 Hours	Semester : 5th Section : A, B, C & D	Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

CO1:	Basic Concepts of Data Science.
CO2:	Understanding of reading data and manipulation.
CO3:	understand data cleaning , dimentionality reduction.
CO4:	understand and analyse data.
CO5:	use visualization of data to capture data insight and build model.

Q. No.	Question	Marks	CO	BTL	PO
1	a) What is Data Science?	2	1, 6	1,3	1,2
	b) What are types of Data? Diffenciat qualititve and quatitive data.	6	1,6	1,2, 3	1,2, 3
	c) What is API ? Explain with example.	6	1, 6	1,2, 5,6	1,2, 3
	d) What is web Scaping? Xplain Types of web Scrapers.	6	1, 6	1,2, 5,6	1,2, 3
2	a) What is unstructured Data ?	2	1,2,6	4,6	1,2, 3
	b) Write a NumPy program to find common values between two arrays.	6	1,2,6	1,2, 3	1,2, 3
	c) Explain Data science process.	6	1,2,6	1,2, 3	1,2, 3,4
	d) Write a NumPy Program to split a 2-D array into three 2-D array.	6	1,2,6	1,2, 3	1,2, 3,4
3	a) What is JSON format?	2	1,6	2	1,2

b)	Write a Python program to demonstrate (i) insert and append (ii) delete and clear	5	2,6	1,2, 5	1,2, 3
c)	Write the difference between: tuple, list, set and dictionary.	5	1,2,6	1,2, 3	1,2
d)	What do you mean by Broadcasting? Why we use broadcasting? Explain with Example.	5	1,2,6	1,2, 3,5	1,2, 3

CO: Course Outcome

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2. Unstructured data is data which is present in native format and it is not used until it is processed.

Eg- mediaPost, photo

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Bhilai (छत्तीसगढ़)

स्वशासी संस्थान

MHRD-2020 Rank (Band 251-300)

An ISO 9001:2015 Certified Institution

Subject Code	CS102524
Subject Name	Cryptography and Network Security

Class Test I	Course: B.Tech Branch : Computer Science & Engineering	Max. Marks 40
Max. Time 2 Hours	Semester : 5th Section : A, B,C,D,IOTCS	Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

CO1:	Student will be able understand basics of Cryptography and Network Security
CO2:	Student will be able to secure a message over insecure channel by various means.
CO3:	Student will be able to learn about how to maintain the Confidentiality, Integrity and Availability of a data.
CO4:	Student will be able to understand various protocols for network security to protect against the threats
CO5:	Student will be able to undersatand various crptographic algorithms.

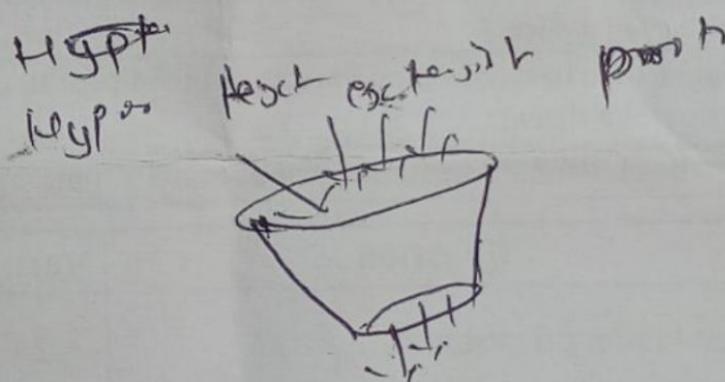
Q. No.	Question	Marks	CO	BTL	PO
1	a) What is certification Authority?	2	1, 6	1,3	1,2
	b) Explain the concept of Digital Signatures.	6	1,6	1,2, 3	1,2, 3
	c) What do you understand by Kerberos? Explain.	6	1, 6	1,2, 5,6	1,2, 3
	d) Explain the working of HMAC. Also write their advantages & disadvantages.	6	1, 6	1,2, 5,6	1,2, 3
2	a) What is web services security?	2	1,2,6	4,6	1,2, 3
	b) Explain the protocol stack of SSL.	6	1,2,6	1,2, 3	1,2, 3
	c) What is HTTP?Explain.	6	1,2,6	1,2, 3	1,2, 3,4

	d) What do you understand by IEEE802.11? Explain.	6	1,2,6	1,2, 3	1,2, 3,4
3	a) Define Intruders.	2	1,6	2	1,2
	b) Why PGP is needed? Explain.	5	2,6	1,2, 5	1,2, 3
	c) Explain Firewall and its types.	5	1,2,6	1,2, 3	1,2
	d) Explain intrusion detection system.	5	1,2,6	1,2, 3,5	1,2, 3

CO: Course Outcome

BTL: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

PO: Program Outcome



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स्वशासी संस्थान

HIRF-2020 Rank (Band 281-300)
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Subject Code	CS102524
Subject Name	Cryptography & Network Security

Class Test I	Course: B.E./B.Tech Branch : Computer Science & Engineering	Max. Marks 40
Max. Time 2 Hours	Semester : 5th Section : C & D	Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

CO1:	Student will be able to Understand basic cryptographic algorithms, messages
CO2:	Student will be able to Understand web authentication and security issues.
CO3:	Ability to identify information system requirements for both of them such as client and server.
CO4:	ability to understand the current legal issues towards information security.

Q. No.	Question	Marks	CO	BTL	PO
1	a) What is the need for security? Explain in brief?	2	1, 2	1,3	1,2
	b) Explain the types of Security Attacks with suitable example.	6	1,2	1,2, 3	1,2, 3
	c) Differentiate between Substitution Cipher and Transposition Cipher? Explain in detail with suitable examples?	6	1, 2	1,2, 5,6	1,2, 3
	d) Explain Encryption and Decryption Method in cryptography using block diagram?	6	1	1,2, 5,6	1,2, 3
2	a) Distinguish between stream and block ciphers?	2	1,2	4,6	1,2, 3

	b)	Explain DES algorithm with proper flowchart and example.	6	1,2	1,2, 3	1,2, 3
	c)	Explain encryption method using RC5 algorithm in detail.	6	1,2	1,2, 3	1,2, 3,4
	d)	Explain the steps in the various rounds of AES.	6	1,2	1,2, 3	1,2, 3,4
3	a)	Differentiate Symmetric Key Ciphers and Asymmetric Key Ciphers in cryptography?	2	1	2	1,2
	b)	Explain the Sub Key generation in the blowfish algorithm.	5	2	1,2, 5	1,2, 3
	c)	Explain the RSA algorithm using suitable example?	5	1,2	1,2, 3	1,2
	d)	Find out the Value of K1(Private Key 1) and K2(Private Key 2), if the Value of n=11, g=7, x=3, y=6 using Diffie-hellman key exchange algorithm.	5	1,2	1,2, 3,5	1,2, 3

CO: Course Outcome

BTB: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

PO: Program Outcome



Subject Code	CS102502
Subject Name	Computer Network

Class Test II	Course: B.E./B.Tech : Computer Science & Engineering	Branch	Max. Marks 40
Max. Time 2 Hours	Semester : 5th A,B,C,D,DS,IoTCS		Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

CO1:	Describe the basis and structure of an abstract layered Network protocol model
CO2:	Understand the working of network protocols.
CO3:	Students will have deep understanding of various protocols used at Data Link Layer and will be able to analyze the advantages and disadvantages of various available protocols for flow and error control
CO4:	Students will be able to analyze various Ethernet standards and will be able to choose an appropriate standard according to requirement of LAN.
CO5:	Students will be able to use various network based applications.

Q. No.	Question	Marks	CO	BTL	PO
1	a) What do you understand by Classfull addressing?	2	2	1,2	1,2
	b) Compare IPv4 and IPv6 addressing schemes.	6	2	1,2, 3	1,2,3
	c) Write short notes on any two: a) ICMP c) Mobile IP b) IPSec	6	2	1,2	1,2,3
	d) Write short notes on any two: a) OSPF b) RIP c) BGP	6	2	1,2	1,2,3
2	a) Write difference between UDP and TCP.	2	2,4	4	1,2,3
	b) Explain TCP protocol, its services and header format in details.	6	2,4	1,2, 3	1,2,3
	c) Explain briefly about congestion control and its strategies.	6	2,4	1,2, 5	1,2,3,4
	d) Discuss TCP connection management phases in detail.	6	2,4	1,2, 3	1,2,3,4
3	a) What is cryptography?	2	4,5	2	1,2
	b) Explain firewall with its advantages and services.	5	5	1,2, 5	1,2,3
	c) What do you mean by MIME? Explain its general header in brief.	5	5	1,2, 3	1,2
	d) Write short notes on any two: b) FTP c) DNS c) SMTP d) The Web and HTTP	5	5	1,2, 3,5	1,2,3

CO: Course Outcome

BTL: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

PO: Program Outcome

L3 -



Subject Code	CS102502
Subject Name	Computer Network

Class Test 1	Course: B.E./B.Tech Computer Science & Engineering	Branch :	Max. Marks 40
Max. Time 2 Hours	Semester : 5th (A, B, C, D, DS, TOTCS)		Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

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CO4:	Students will be able to analyze various Ethernet standards and will be able to choose an appropriate standard according to requirement of LAN.
CO5:	Students will be able to use various network based applications.

Q. No.	Question	Marks	CO	BTL	PO
1	a) What is Checksum	2	1	1,2	1,2
	b) Design full ISO/OSI reference model. Explain the function of each layer?	6	1,2	1,2, 3	1,2,3
	c) Write various features of HDLC. Clearly explain various response modes and station types?	6	3	1,2	1,2,3
	d) Explain the term switching. State the differences between circuit switching and packet switching.	6	1	1,2	1,2,3
2	a) Explain Ethernet standard.	2	4	4	1,2,3
	b) Explain stop & wait and Sliding window protocol for flow control	6	3	1,2, 3	1,2,3
	c) Eight-bit messages are transmitted using a Hamming code. How many check bits are needed to ensure that the receiver can detect and correct single-bit errors? Show the bit pattern transmitted for the message 11010011. Assume that even parity is used in the Hamming code	6	1	1,2, 5	1,2,3,4
3	Explain the various media used for data transmission in computer networks.	6	1,2	1,2, 3	1,2,3,4
3	a) What is Frames	2	1	2	1,2
	b) Compare LAN,MAN,WAN ?	5	1	1,2,	1,2,3

<input checked="" type="checkbox"/> c)	Explain all the topologies details.	5	4	1,2, 3	1,2
<input checked="" type="checkbox"/> d)	A bit stream 10011101 is transmitted using the standard CRC method .the generator polynomial is x^3+1 . i)What is the actual bit string Transmitted?ii)Supose the third bit from the left is inverted during transmission.How will receiver the code.	5	1	1,2, 3,5	1,2,3

CO: Course Outcome

BTL: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

L3 -

PO: Program Outcome

$$\begin{array}{r}
 10011101000 \\
 \downarrow \\
 \begin{array}{l}
 x^3 + 1 \quad | \quad 1 \cdot x^3 + 0 \cdot x^2 + 0 \cdot x + 0 \cdot 1 \\
 \hline
 1 \quad 0 \quad 0 \quad 1 \\
 \xrightarrow{\text{using XOR}}
 \end{array} \\
 \begin{array}{r}
 1001) 10011101000 \\
 1001 \downarrow \downarrow \downarrow \\
 \hline
 \begin{array}{r}
 1 \quad x \quad x \quad 1 \quad 1 \quad 0 \quad 0 \\
 \hline
 1 \quad 0 \quad 0 \\
 \hline
 0 \quad 1 \quad 0 \quad 0
 \end{array}
 \end{array}
 \end{array}$$

HDLC is ~~data~~ bit-oriented
data link protocol

it is

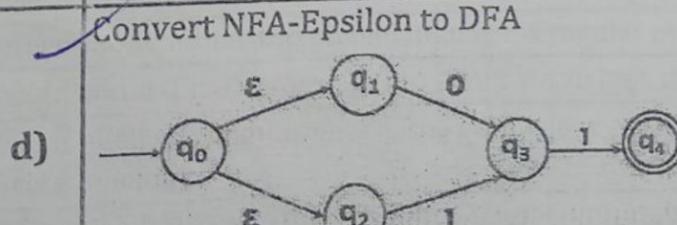
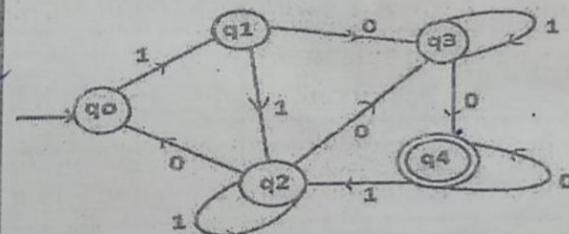
Subject Code	CS102501
Subject Name	Theory of Computation

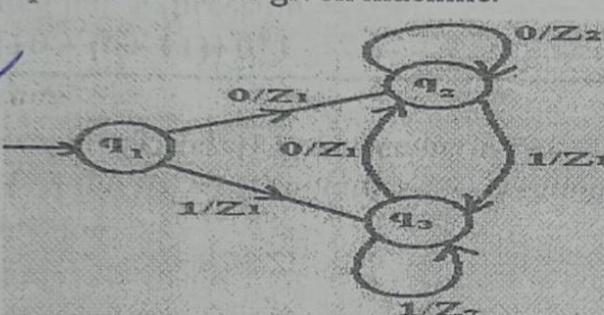
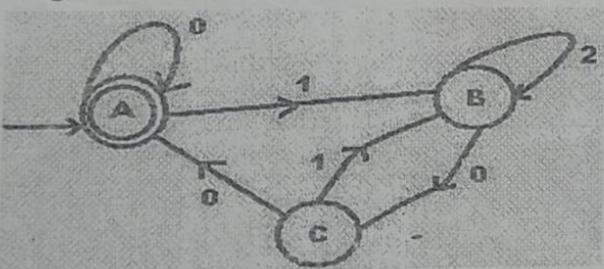
Class Test I	Course: B.Tech. Branch : Computer Science & Engineering	Max. Marks 40
Max. Time 2 Hours	Semester : 5th Section : C	Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

C01:	Design finite automata to accept a set of strings of a language.
C02:	Determine whether the given language is regular or not.
C03:	Design context free grammars to generate strings of context free language.
C04:	Design push down automata & the equivalent context free grammars & Design Turing machine.
C05:	Distinguish between computability & noncomputability, Decidability and undecidability.

Q. No.	Question	Marks	CO	BTL	PO
1	a) Construct regular expression that generates all the strings of a's, b's & c's where every strings contains at least one a and at least one b.	2	1,2	1,3	1,2
	b) State & Prove Myhill Nerode's Theorem in detail.	6	1	1,2, 3	1,2, 3
	c) Differentiate between NFA & DFA. Construct DFA for given NFA.	6	1,2	1,2, 5,6	1,2, 3
	d) Convert NFA-Epsilon to DFA	6	1	1,2, 5,6	1,2, 3



	a)	Construct the regular expression that generates all the Strings over {a,b} where every string contains atleast two a's.	2	1,2	4,6	1,2, 3
	b)	State & Prove Arden's Theorem.	6	1,2	1,2, 3	1,2, 3
	c)	Construct a DFA Machine equivalent to the given Regular Expression. $(a+b)^* ab (ab)^*$	6	1,2	1,2, 3	1,2, 3,4
2	d)	Consider the mealy machine describe by transition table given in Fig. and construct a Moore machine which is equivalent to the given machine.	6	1	1,2, 3	1,2, 3,4
						
	a)	Explain 2-Way Finite Automata with example.	2	1	2	1,2
	b)	Find the Regular Expression for Given Diagram.	5	1,2	1,2, 5	1,2, 3
3	c)		5	1,2,3	1,2, 3	1,2
	d)	Explain Closure Properties of Regular Language.	5	1,2,3	1,2, 3,5	1,2, 3
		Construct equivalent DFA for given Regular Expression $[10 + (0+11)] 0^*1$	5	1,2	1,2,	1,2,

O: Course Outcome

TL: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

O: Program Outcome

SHRI SHANKARACHARYA TECHNICAL CAMPUS

Bhilai (Chhattisgarh)

An Autonomous Institute

Approved by AICTE, New Delhi

Affiliated to CSV Technical University, Bhilai



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स्वशासी संस्थान

Subject Code	CS102501
Subject Name	Theory of Computation

Class Test II	Course: B.E./B.Tech Branch : Computer Science & Engineering	Max. Marks 40
Max. Time 2 Hours	Semester : 5th Section : A,B,C,D,DS & IOTCS	Min. Pass Marks 14

Instructions : Attempt all Questions. Part (a) of each question is compulsory and carries 2 Marks. Attempt any two parts from remaining parts i.e. (b), (c) & (d).

CO1:	Student will be able to construct finite state machines and the equivalent regular expressions.
CO2:	Student will be able to prove the equivalence of languages described by finite state machines and regular expressions.
CO3:	Student will be able to construct pushdown automata and the equivalent context free grammars.
CO4:	Student will be able to prove the equivalence of languages described by pushdown automata and context free grammars.
CO5:	Student will be able to construct Turing machines and Post machines.

Q. No.	Question	Marks	CO	BTL	PO
1	a) Explain Pumping lemma for regular sets.	2	2,3	2	1,2
	b) Reduce the following grammar G to CNF where G is: $\begin{aligned} S &\longrightarrow aAD \\ A &\longrightarrow a/aB/bAB \\ B &\longrightarrow b \\ D &\longrightarrow d \end{aligned}$	6	3,4	3,4, 5	1,2, 3,4
	c) Convert the following grammar into GNF: $\begin{aligned} S &\longrightarrow AB \\ A &\longrightarrow BS/b \\ B &\longrightarrow SA/b \end{aligned}$	6	3,4	2,3	1,2, 3
d)	Explain Chomsky Classification of grammars.	6	3,4	1,2	1,2

	a) Differentiate between PDA and Turing Machine	2	3,4	2	1,2
	b) Explain Halting problem of Turing Machine. OR Explain Church's Hypothesis.	6	5	1	1,2
2	c) Construct a PDA equivalent to the following grammar $S \rightarrow aAA$ $A \rightarrow /bS/a$	2	3,4	2	1,2
	d) Design a turing machine M to recognize the Language $L = \{1^n 0^n 1^n / n > 0\}$	6	5	2,4, 5	1,2, 3,4
	a) Explain Initial function.	2	5	1,2	1
	b) Compute: $A(1,1), A(2,1), A(1,2), A(2,2)$ By Using Recursive Functions.	5	5	1,2	1,2
3	c) Explain Space and Time Complexity Theory in detail. OR What is Turing Computation Function.	5	5	1,2	1,2, 3
	d) Define Recursive Function & Partial Recursive Function OR Show that $f(x,y) = x+y$ is primitive recursive.	5	5	1,2	1,2

CO: Course Outcome

BTL: Bloom's Taxonomy Levels (L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysis, L5 - Evaluating, L6 - Creating)

PO: Program Outcome

***** ALL THE BEST *****