

S5 CSE QUESTION BANK
COMPUTER SCIENCE & ENGINEERING



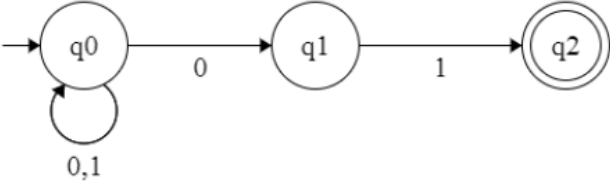
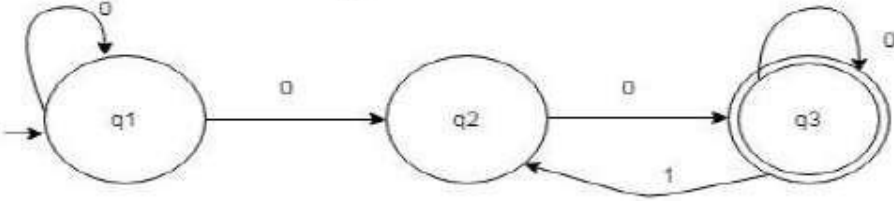
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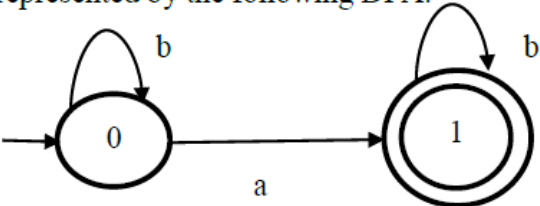
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CST301 FORMAL LANGUAGES AND AUTOMATA THEORY

MODULE 1

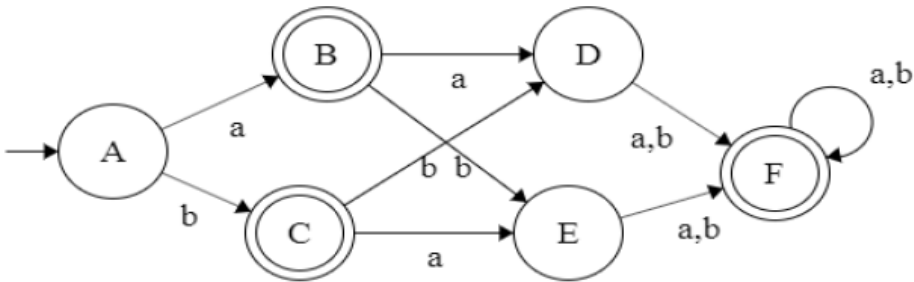
| Sl. No | Questions | Marks | KTU/KU Month/Year |
|--------|---|-------|-------------------|
| 1 | <p>Draw the state transition diagram showing a DFA for recognizing the language.</p> <p>L over the alphabet set $\Sigma = \{a, b\}$:</p> <p>$L = \{x \mid x \in \Sigma^* \text{ and the number of a in } x \text{ is divisible by 2 or 3}\}.$</p> | 3 | DEC 21 |
| 2 | <p>Write a Regular Grammar G for the language: $L = \{0^n 1^m : n, m \geq 1\}$</p> | 3 | DEC 21 |
| 3 | <p>Draw the state-transition diagram showing a DFA for recognizing the language:</p> <p>$L = \{x \in \{a,b\}^* \mid \text{every block of five consecutive symbols in } x \text{ contains two consecutive a's.}\}$</p> | 6 | DEC 21 |
| 4 | <p>Draw the state-transition diagram showing an NFA N for the following language L. Obtain the DFA D equivalent to N by applying the subset construction algorithm.</p> <p>$L = \{x \in \{a, b\}^* \mid x \text{ contains 'bab' as a substring}\}$</p> | 8 | DEC 21 |
| 5 | <p>Define Regular Grammar and write Regular Grammar G for the following language : $L = \{x \in \{a, b\}^* \mid x \text{ does not ends with 'bb' }\}$</p> | 7 | DEC 21 |
| 6 | <p>Obtain the DFA over the alphabet set $\Sigma = \{a, b\}$, equivalent to the regular grammar G with start symbol S and productions: $S \rightarrow aA \mid bS$, $A \rightarrow aB \mid bS \mid a$ and $B \rightarrow aB \mid bS \mid a$</p> | 7 | DEC 21 |

| 7 | <p>Formally define extended delta for an NFA. Show the processing of input $w = 0101$ for the following NFA.</p>  | 3 | SEP 20 | | | | | | | | | | | | | | | | | | |
|----|--|-----|--------|---|---|-------|-----|---|-------|-----|---|-------|-----|---|---|---|---|---|---|---|--------|
| 8 | Differentiate between the transition function in DFA, NFA and ϵ -NFA | 3 | SEP 20 | | | | | | | | | | | | | | | | | | |
| 9 | <p>Convert the following NFA to DFA and describe the language it accepts. $M = (\{P, Q, R, S, T\}, \{0,1\}, \delta, P, \{S, T\})$ and δ is given as:</p> <table border="1" data-bbox="560 657 885 989"> <thead> <tr> <th></th> <th>0</th> <th>1</th> </tr> </thead> <tbody> <tr> <th>P</th> <td>{P,Q}</td> <td>{P}</td> </tr> <tr> <th>Q</th> <td>{R,S}</td> <td>{T}</td> </tr> <tr> <th>R</th> <td>{P,R}</td> <td>{T}</td> </tr> <tr> <th>S</th> <td>-</td> <td>-</td> </tr> <tr> <th>T</th> <td>-</td> <td>-</td> </tr> </tbody> </table> | | 0 | 1 | P | {P,Q} | {P} | Q | {R,S} | {T} | R | {P,R} | {T} | S | - | - | T | - | - | 5 | SEP 20 |
| | 0 | 1 | | | | | | | | | | | | | | | | | | | |
| P | {P,Q} | {P} | | | | | | | | | | | | | | | | | | | |
| Q | {R,S} | {T} | | | | | | | | | | | | | | | | | | | |
| R | {P,R} | {T} | | | | | | | | | | | | | | | | | | | |
| S | - | - | | | | | | | | | | | | | | | | | | | |
| T | - | - | | | | | | | | | | | | | | | | | | | |
| 10 | Prove that “ A language L is accepted by some ϵ -NFA if and only if L is accepted by some NFA”. | 4 | SEP 20 | | | | | | | | | | | | | | | | | | |
| 11 | <p>Convert the following NFA to DFA.</p>  | 3 | DEC 19 | | | | | | | | | | | | | | | | | | |
| 12 | Write the notation for the language defined by a DFA. Write a string belong to the language L3 if $L=\{0,1\}$ | 3 | DEC 19 | | | | | | | | | | | | | | | | | | |

| MODULE 2 | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|--------------|--------------------------|---|-----|---|---|---|---|---|-----|---|---|-----|---|---|---|---|---|---|---|---|---|--------|
| Sl. No | Questions | Marks | KTU/KU Month/Year | | | | | | | | | | | | | | | | | | | | | |
| 1 | Using homomorphism on Regular Languages, Prove that the language $L = \{a^n b^n c^{2n} \mid n \geq 0\}$ is not regular. Given that the language $\{a^n b^n \mid n \geq 1\}$ is not regular. | 3 | DEC 21 | | | | | | | | | | | | | | | | | | | | | |
| 2 | Construct an ϵ -NFA for the regular expression $(a+b)^* ab(a+b)^*$ | 3 | DEC 21 | | | | | | | | | | | | | | | | | | | | | |
| 3 | State and explain any three closure properties of Regular Languages. | 6 | DEC 21 | | | | | | | | | | | | | | | | | | | | | |
| 4 | Find the equivalent Regular Expression using Kleene's construction for the language represented by the following DFA.  | 8 | DEC 21 | | | | | | | | | | | | | | | | | | | | | |
| 5 | Using pumping lemma for Regular Languages, prove that the language $L = \{0^n \mid n \text{ is a perfect square}\}$ is not Regular. | 7 | DEC 21 | | | | | | | | | | | | | | | | | | | | | |
| 6 | Obtain the minimum state DFA for the following DFA. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th style="border-right: 1px solid black;">a</th> <th>b</th> </tr> </thead> <tbody> <tr> <th style="border-right: 1px solid black;">→ 0</th> <td>1</td> <td>2</td> </tr> <tr> <th style="border-right: 1px solid black;">1</th> <td>4</td> <td>5</td> </tr> <tr> <th style="border-right: 1px solid black;">(2)</th> <td>0</td> <td>3</td> </tr> <tr> <th style="border-right: 1px solid black;">(3)</th> <td>5</td> <td>2</td> </tr> <tr> <th style="border-right: 1px solid black;">4</th> <td>1</td> <td>0</td> </tr> <tr> <th style="border-right: 1px solid black;">5</th> <td>4</td> <td>3</td> </tr> </tbody> </table> | | a | b | → 0 | 1 | 2 | 1 | 4 | 5 | (2) | 0 | 3 | (3) | 5 | 2 | 4 | 1 | 0 | 5 | 4 | 3 | 3 | DEC 21 |
| | a | b | | | | | | | | | | | | | | | | | | | | | | |
| → 0 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| (2) | 0 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| (3) | 5 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 4 | 3 | | | | | | | | | | | | | | | | | | | | | | |

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| 7 | Give a regular expression for the set of all strings not containing 101 as a substring | 3 | SEP 20 |
| 8 | Find an equivalent ϵ -NFA for the following regular expression $(0 + 1)^*011$ | 4 | SEP 20 |
| 9 | State the closure properties of regular sets. | 3 | SEP 20 |
| 10 | State pumping lemma for regular languages. Prove that the language $L = \{a^{n^2} \mid n > 0\}$ is not regular. | 5 | SEP 20 |
| 11 | Write regular expression for the language $L = \{1^n 0^m \mid n \geq 1, m \geq 0\}$ | 3 | DEC 19 |
| 12 | Construct NFA without ϵ – transitions from the following NFA. $M = (\{q_0, q_1, q_2\}, \{a, b, c\}, \delta, q_0, \{q_2\})$ and $\delta(q_0, a) = \{q_0\}$, $\delta(q_0, b) = \{q_1\}$, $\delta(q_0, c) = \{q_2\}$ $\delta(q_1, \epsilon) = \{q_0\}$, $\delta(q_1, a) = \{q_1\}$, $\delta(q_1, b) = \{q_2\}$, $\delta(q_2, \epsilon) = \{q_1\}$, $\delta(q_2, a) = \{q_2\}$, $\delta(q_2, c) = \{q_0\}$. | 6 | DEC 19 |

| MODULE 3 | | | |
|----------------------------|---|--------------|------------------------------|
| S I N o | Questions | Marks | KTU/KU Month/Year |
| 1 | State Myhill-Nerode Theorem. | 3 | DEC 21 |
| 2 | Write a Context-Free Grammar for the language $L = \{wcw^r \mid w \in \{a,b\}^*\}$, w^r represents the reverse of w . | 3 | DEC 21 |
| 3 | Show the equivalence classes of Canonical Myhill-Nerode relation for the language of binary string which starts with 1 and ends with 0. | 7 | DEC 21 |
| 4 | Consider the following productions: $S \rightarrow aB \mid bA$ $A \rightarrow aS \mid bAA \mid a$ $B \rightarrow bS \mid aBB \mid b$ For the string 'baaabba' find i) The leftmost derivation ii) The rightmost derivation iii) The parse tree | 7 | DEC 21 |
| 5 | Construct the Grammars in Chomsky Normal Form generating the set of all strings over $\{a,b\}$ consisting of equal number of a's and b's. | 7 | DEC 21 |
| 6 | Find the Greibach Normal Form for the following Context Free Grammar $S \rightarrow XA \mid BB$, $B \rightarrow b \mid SB$, $X \rightarrow b$, $A \rightarrow a$ | 7 | DEC 21 |

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| 7 | <p>State Myhill-Nerode theorem, Minimize the following DFA.</p>  | 5 | SEP 20 |
| 8 | <p>Describe clearly the equivalent classes of the Canonical Myhill-Nerode relation for the language of binary strings with second-last symbol as 0.</p> | 5 | SEP 20 |
| 9 | <p>Define context free grammar. Consider the following CFG</p> $S \rightarrow aS \mid Sb \mid a \mid b$ <p>Prove by induction on the string length that no string in $L(G)$ has ba as substring.</p> | 3 | SEP 20 |
| 10 | <p>Convert the following grammar into Chomsky normal form</p> $S \rightarrow ASB \mid \epsilon, \quad A \rightarrow aAS \mid a, \quad B \rightarrow SbS \mid A \mid bb$ | 4 | SEP 20 |
| 11 | <p>Convert the following grammar to Chomsky Normal Form. $S \rightarrow 0S0 \mid 1S1 \mid \epsilon$</p> | 3 | DEC 18 |
| 12 | <p>Whether the following grammar is ambiguous? $E \rightarrow E+E \mid E^*E \mid I \mid I > 0 \mid 1 \mid a \mid b$</p> | 3 | DEC 18 |

| MODULE 4 | | | |
|----------------------|--|--------------|------------------------------|
| S N o | Questions | Marks | KTU/KU Month/Year |
| 1 | Write the transition functions of PDA with acceptance by Final State for the language $L = \{a^n b^n : n \geq 0\}$. | 3 | DEC 21 |
| 2 | State Pumping Lemma for Context Free Languages. | 3 | DEC 21 |
| 3 | Design a PDA for the language $L = \{ww^r \mid w \in \{a,b\}^*\}$. Also illustrate the computation of the PDA on the string 'aabbaa'. | 7 | DEC 21 |
| 4 | Construct a CFG to generate $L(M)$ where $M = (\{p, q\}, \{0, 1\}, \{X, Z_0\}, \delta, q, Z_0, \emptyset)$ where δ is defined as follows: $\delta(q, 0, Z_0) = (q, XZ_0)$ $\delta(q, 0, X) = (q, XX)$ $\delta(q, 1, X) = (p, \epsilon)$ $\delta(p, 1, X) = (p, \epsilon)$ $\delta(p, \epsilon, X) = (p, \epsilon)$ $\delta(p, \epsilon, Z_0) = (p, \epsilon)$ | 7 | DEC 21 |
| 5 | Using pumping lemma for Context free languages, prove that the language $L = \{a^n b^n c^n \mid n \geq 1\}$. | 7 | DEC 21 |
| 6 | Prove that CFLs are closed under Union, Concatenation and Homomorphism. | 7 | DEC 21 |
| 7 | Prove the equivalence of acceptance of a PDA by final state and empty stack. | 6 | SEP 20 |
| 8 | Define a deterministic PDA. How a DPDA differs from a non-deterministic PDA? | 3 | SEP 20 |
| 9 | Let G be the grammar $S \rightarrow aB bA, \quad A \rightarrow a aS bAA, \quad B \rightarrow b bS aBB$ For the string <i>aabbaabbba</i> find i) leftmost derivation, ii) parse tree, and iii) Is the grammar ambiguous? | 4 | SEP 20 |
| 10 | | 5 | SEP 20 |

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| | Design a PDA to accept the language $L = \{ww^R \mid w \in \{0,1\}^*\}$. | | |
| 11 | Write the conditions for a pushdown automaton to be considered as deterministic. | 3 | DEC 19 |
| 12 | Which are the methods to accept a string in a PDA? Whether both type of PDAs can accept the same language. Justify your answer. | 3 | DEC 19 |

| MODULE 5 | | | |
|----------------------------|--|--------------|------------------------------|
| S I N O | Questions | Marks | KTU/KU Month/Year |
| 1 | Write the formal definition of Context Sensitive Grammar and write the CSG for the language $L = \{ a^n b^n c^n \mid n \geq 1 \}$. | 3 | DEC 21 |
| 2 | Explain Chomsky hierarchy of languages. | 3 | DEC 21 |
| 3 | Design Linear Bounded Automata for the language $L = \{ a^n b^n c^n \mid n \geq 1 \}$. | 7 | DEC 21 |
| 4 | Design a Turing Machine for the language $L = \{ a^n b^{2n} \mid n \geq 1 \}$. Illustrate the computation of TM on the input 'aaabbbbb'. | 7 | DEC 21 |
| 5 | Design a Turing Machine to obtain the product of two natural numbers a and b both represented in unary on the alphabet 0. For example, number 5 is represented as 00000 ie 0^5 . Assume that initially the input tape contains $0^a 10^b$ and Turing machine should halt with 0^{a*b} as the tape content. | 7 | DEC 21 |
| 6 | Prove that 'Turing Machine halting problem' is undecidable. | 7 | DEC 21 |
| 7 | Design a TM to compute the 2's complement of a binary string. | 5 | SEP 20 |
| 8 | Design a Turing machine to accept , $L = \{ w \in \{0,1\}^* \mid w \text{ has equal number of 0's and 1's} \}$. | 4 | SEP 20 |
| 9 | Design a TM to find the sum of two numbers m and n. Assume that initially the tape contains m number of 0s followed by # followed by n number of 0s | 5 | SEP 20 |
| 10 | Define formally Type 0, Type 1, Type 2 and Type 3 grammar. Show the corresponding automata for each class | 5 | SEP 20 |
| 11 | List the closure properties of Recursive Languages | 4 | SEP 20 |
| 12 | Define a Universal Turing Machine (UTM). With the help of suitable arguments show the simulation of other Turing machines by a UTM. | 6 | SEP 20 |

CST 303 COMPUTER NETWORKS

MODULE 1

| Sl. No | Questions | Marks | KTU/KU Month/Year |
|--------|--|--------|-------------------------------|
| 1 | How are computer networks classified on the basis of physical size? | 3 | KTU APRIL 2018 |
| 2 | What are the reasons for using Layered Architecture in Computer Networks? Define the terms protocol and interface. | 3 | KTU APRIL 2018 |
| 3 | What are the OSI service primitives for connection oriented service? | 4 | KTU APRIL 2018 KTU 2021 |
| 4 | Define simplex, half duplex and full duplex transmission mode. Give one example for each. | 3 | DEC 17, APR 18 MAY 19 |
| 5 | List and explain different factors which determine the performance of communication in a network? | 3 | DEC 17, APR 18 |
| 6 | List out the key design issues that occur in Computer Networks. | 4 | DEC 17 |
| 7 | Describe the ISO/OSI layered architecture with the help of a neat diagram. | 4 8 | APR 18 KTU 2021 |
| 8 | What are point to point and broadcast networks?? | 5 | APR 18 |
| 9 | What are the different types of transmission technology widely used in computer networks? Explain. | 3 | DEC 21 |
| 10 | What is the transmission time of a packet sent by a station if the length of the packet is 1 million bytes and the bandwidth of the channel is 200 Kbps? | 3 | DEC 21 |

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| 11 | Differentiate between simplex, half duplex and full duplex mode of communication with diagrams. Give one example for each.. | 3 | DEC 18,21 |
| 12 | What does "negotiation" mean when discussing network protocols in a layered architecture? Give an example.. | 3 | MAY 19 |
| 13 | Why are the layers from Transport layer and above called truly end to end layers? | 9 | MAY 19, DEC 20 |
| 14 | Compare Twisted Pair, Coaxial Cable and Optical Fibre guided transmission media. | 5 | MAY 19,DEC 20,21 |

MODULE 2

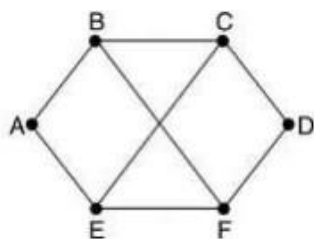
| Sl. No | Questions | Marks | /KU Month/Year |
|--------|--|-------|--------------------|
| 1 | Differentiate between normal and asynchronous balanced modes of operations in HDLC. | 3 | KTU APRIL 2018 |
| 2 | Draw and explain the frame format for Ethernet. | 3 | DEC 17 |
| 3 | How collision is avoided in CSMA/CA? Describe the different strategies used for this. | 5 | KTU APRIL 2018 |
| 4 | Write physical and transmission characteristics of Optical Fibre Cable guided transmission media. | 3 | DEC 17 |
| 5 | Describe error control and flow control in data link layer. | 3 | DEC 17 |
| 6 | Demonstrate the significance of sequence numbers in stop and wait ARQ. | 3 | DEC 2020, MAY 2019 |
| 7 | Discuss about Go-Back-N ARQ. The timer for only the first outstanding frame is set in Go-Back-N ARQ. Analyse the protocol and illustrate how all the outstanding frames are managed with just one timer. | 9 | DEC 2020 |
| 8 | How does Multiple Access with Collision Avoidance solve the hidden node problem and exposed node problem in Wireless LANs? | 9 | DEC 2020 |
| 9 | List the different guided media for communication. Explain the cable type, connectors, and applications of each of them | 8 | DEC 21 |
| 10 | Explain the concept of Sliding window protocols. Differentiate between the working of One-bit sliding window, Selective repeat and Go-back- N bidirectional protocols. | 6 | DEC 21 |

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| 11 | A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted. | 8 | DEC 21 |
| 12 | Which are the devices operating in datalink layer and physical layer? Explain the function of each of them | 8 | DEC 21 |
| 13 | Draw and explain IEEE 802.11 Wireless LAN frame structure. | 6 | DEC 21 |
| 14 | An 8-bit byte with binary value 10101111 is to be encoded using an even-parity Hamming code. What is the binary value after encoding? | 3 | MODEL |
| 15 | Data link protocols almost always put the CRC in a trailer rather than in a header. Why? | 6 | MODEL |
| 16 | Explain the working of IEEE 802.11 MAC sublayer. | 10 | MODEL |
| 17 | Distinguish between Bridges and Switches. | 4 | MODEL |

MODULE 3

| Sl. No | Questions | Marks | KTU/KU Month/Year |
|---------------|---|--------------|--------------------------|
| 1 | What is flooding? Describe any two situations where flooding is advantageous. | 3 | KTU APRIL 17 |
| 2 | Compare classful and classless addressing, giving examples for both. | 3 | DEC 17 |
| 3 | Write short note on RIP. | 5 | DEC 17 |
| 4 | Differentiate between static and dynamic routing. | 3 | DEC 17 |
| 5 | Explain distance vector routing with an example | 6 | DEC 17 |

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| 6 | Define Subnetting. What are the advantages of Subnetting? Explain with an example | 3 | DEC 20 |
| 7 | Explain the different steps in link state routing | 9 | DEC 20 |
| 8 | Draw and explain the datagram format for IPv6. | 5 | DEC 20 |
| 9 | Illustrate the Count to Infinity problem in routing. | 3 | DEC 20 |
| 10 | Describe two major differences between the warning bit method and the Random Early Detection (RED) method. | 3 | DEC 20 |
| 11 | How many octets does the smallest possible IPv6 (IP version 6) datagram have | 5 3 | DEC 17 |
| 12 | Illustrate the working of leaky bucket algorithm with the help of diagram. | 3 | DEC 20 |
| 13 | Compare datagram network with virtual circuit network. | 6 | DEC 20 |
| 14 | How is routing table different from forwarding table? | 3 | DEC 20 |
| 15 | Specify the significance along with the size of the following fields in an IP packet header: DF, MF, Fragment offset, Time-to-live. | 3 | DEC 20 |
| 16 | A network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle? | 3 | DEC 21 |
| 17 | How do you subnet the Class C IP address 195.1.1.0 so as to have 10 subnets with a maximum of 12 hosts in each subnet. | 6 | DEC 21 |
| 18 | Illustrate the packet routing process of mobile hosts | 6 | MAY 19, DEC 21 |
| 19 | Consider the following subnet.. | 8 | DEC 21 |



Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4).

The measured delays to B, D, and E, are 6, 3, and 5, respectively. What is C's new routing table? Give both the outgoing line to use and the expected delay.

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| 20 | Explain the steps involved in Multicast routing. | 6 | DEC 21 |
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MODULE 4

| Sl. No | Questions | Mar ks | KTU/KU Month/Year |
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| 1 | List and explain any three closed loop congestion control techniques. | 3 | DEC 17, APR 18 |
| 2 | Discuss the common techniques used in computer networks to improve theQoS. | 5 | DEC 17 |
| 3 | Give the significance of RARP. | 4 | DEC 17 |
| 4 | Compare the working of BOOTP and DHCP. | 6 | DEC 17 |
| 5 | What is internet multicasting? What is IGMP? Explain any three IGMP messages | 6 3 | DEC 17 DEC 19.DEC 21 |
| 6 | What is meant by exterior gateway routing protocol? Explain the working of BGP? | 5 | DEC 18,21 |
| 7 | What is the function of ARP? Explain its working | 5 | DEC 18,19,21 |
| 8 | A computer on a 6-Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 1 Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the full 6 Mbps? | 8 | DEC 20 |

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| 9 | What is the function of RARP? | 5 | DEC 17 |
| 10 | Describe stub networks, multi-connected networks and transit networks. | 5 | DEC 20,21 |
| 11 | List and explain the different types of error reporting messages used by ICMP. | 3 | DEC 18 |
| 12 | What is the use of ARP? Explain ARP operation and packet format. | 7 | DEC 21 |
| 13 | Differentiate between BOOTP and DHCP. | 5 | DEC 21 |
| 14 | Explain how routing is done using BGP | 5 | MAY 19 DEC 19 |
| MODULE 5 | | | DEC21 |
| Sl. No | Questions | Mar ks | KTU/KU Month/Year |
| 1 | Describe the name-address resolution techniques used in DNS | 5 | APR 18 |
| 2 | Write notes on MIME | 5 4 6 | DEC 17 MAY 19 SEP 20 |
| 3 | Describe the operation and packet format of UDP | 5 | DEC 17 |
| 4 | Distinguish between partially qualified and fully qualified domain names | 5 | APRIL 18 |
| 5 | Explain the three different phases in a TCP transmission with the help of diagrams. | 7 | DEC 18 |
| 6 | Explain the File Transfer Protocol (FTP) and its features. | 5 | DEC 18 |
| 7 | What is TCP? Draw and explain TCP segment header. Explain TCP connection establishment process. | 8 | DEC 17,DEC 21 |
| 8 | Explain SNMP basic components and their functions. Describe the basic commands used in SNMP. | 6 | DEC 17,DEC 21 |
| 9 | What is DNS? Explain resource record and name server. Illustrate DNS working. | 8 | DEC 21,20 |

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| 10 | What is FTP? Explain it's working in detail with the commands involved. | 6 | DEC 21 |
| 11 | What is the significance of circular sending and receiving buffers in TCP? How are they used? | 3 | DEC 21 |

CST 305 SYSTEM SOFTWARE**MODULE 1**

| Sl. No | Questions | Marks | KTU/KU |
|---------------|--|--------------|-----------------------------|
| 1 | Explain the instruction format and addressing modes of SIC. What are the various addressing modes supported by SIC/XE | 3 | DEC17 DEC18 |
| 2 | Explain program relocation with an example | 3 | DEC 17 |
| 3 | Write a sequence of instructions for SIC/XE to divide BETA by GAMMA and to store Quotient in ALPHA and remainder in DELTA | 3 | DEC 17 |
| 4 | What are assembler directives? List any five assembler directives in SIC machine | 4 | DEC17,A PR 18, MAY 19 |
| 5 | Write notes on the architecture of SIC/XE | 4 | DEC17, APR 18 |
| 6 | Let Numbers be an array of 100 words. Write a sequence of instructions for SIC to set all 100 elements of the array to 1 | 5 | DEC 17 |
| 7 | Write notes on SIC machine architecture. Compare the features of standard SIC and SIC/XE architecture | 3 9 | APR 18 MAY 19 |
| 8 | Write a subroutine for SIC/XE that will read a record into a buffer. The record may be any length from 1 to 100 bytes. The end of record is marked with "null" character (ASCII code 00). The subroutine should place the length of record into a variable named LENGTH. Use immediate addressing and register-to-register instructions to make the process efficient as possible. | 4 | APR 18 |
| 9 | Write a sequence of instructions for SIC to set $ALPHA = BETA * 9 + GAMMA$ | 3 | DEC 18 DEC 21 |
| 10 | List out the various used in SIC along with their purpose | 3 | DEC 18 |
| 11 | Distinguish between Application software and system software. | 3 | DEC 18 |

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|-----------------|--|---|------------------------------|
| | add the corresponding elements of A & B and store the result in C. A, B and C are array of 10 words each. Write a SIC/Xe program to add the corresponding elements of A & B and store the result | | |
| 14 | Explain how floating point numbers are represented in SIC/XE. | 3 | SEP 20 |
| 15 | List the basic assembler functions | 3 | SEP 20 |
| 16 | What is the difference between the instructions LDA #5 and LDA FIVE? Explain how each instruction is executed. | 3 | SEP 20 |
| 17 | Compare the following with reference to SIC and SIC/XE machines: i. Memory ii. Instruction format | 4 | SEP 20 DEC 21 |
| 18 | Suppose RECORD contains a 100-byte record. Write a subroutine for SIC that will write this record onto device 05. | 5 | DEC 20 |
| 19 | Explain the different I/O instructions in SIC. | 3 | DEC 21 |
| 20 | Illustrate the roles and functions of Operating System, Assembler, Compiler and Linker in a modern computer system. | 8 | DEC 21 |
| 21 | Describe the use of n,i,x,b,p and e bits in the SIC/XE instruction format. Write the binary combination for these bits such that the resultant target address would be as below and also state what would be the addressing modes for each. i. (PC) + disp ii. (B) + disp iii. (PC) + disp + (X) iv. (B) + disp + (X) | 8 | DEC 21 |
| MODULE 2 | | | |
| 1 | What is meant by forward reference? How is it resolved by two pass assembler. | 3 | DEC 18, MAY 19, DEC 21 |
| 2 | Describe data structures used in the two pass SIC assembler program Give algorithm for pass 1 of a two pass SIC assembler | 3 | DEC 17 DEC 21 |
| 3 | With suitable examples, how the different instruction formats and addressing modes of SIC/XE are handled during assembling | 5 | DEC 17 |
| 4 | Describe the format of object program generated by the two-pass SIC assembler algorithm | 5 | DEC 17 |
| 5 | Explain the format of the object program generated by a two pass SIC assembler, highlighting the content of each record type | 5 | DEC 17 |
| 6 | Explain the data structures used and their purposes in a | 3 | DEC 17 |

| | two- pass assembler | | | | | | | | | | | | | | | | | |
|----------|---|----------|----------|---------|---------|---------|-------|------|---------|------|--------|----|-------|-----|------|---|---|--------|
| 7 | With the aid of an explain the second pass of a two pass algorithm | 6 | MAY 19 | | | | | | | | | | | | | | | |
| 8 | Explain the working of any one type of one pass Assembler | 6 | DEC 18 | | | | | | | | | | | | | | | |
| 9 | Explain the syntax of records in the Object Program file | 3 | APR 18 | | | | | | | | | | | | | | | |
| 10 | <p>Consider the statements in SIC program. Consider the program being assembled using a 2 pass assembler.</p> <table border="1"> <thead> <tr> <th>Line no</th> <th>Location</th> <th>Label</th> <th>Opcode</th> <th>Operand</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>1000</td> <td>LENGTH</td> <td>RESW</td> <td>4</td> </tr> <tr> <td>20</td> <td>-----</td> <td>NEW</td> <td>WORD</td> <td>3</td> </tr> </tbody> </table> <p>What will be the address value assigned to the symbol NEW during pass 1?</p> | Line no | Location | Label | Opcode | Operand | 10 | 1000 | LENGTH | RESW | 4 | 20 | ----- | NEW | WORD | 3 | 3 | SEP 20 |
| Line no | Location | Label | Opcode | Operand | | | | | | | | | | | | | | |
| 10 | 1000 | LENGTH | RESW | 4 | | | | | | | | | | | | | | |
| 20 | ----- | NEW | WORD | 3 | | | | | | | | | | | | | | |
| 11 | <p>Suppose the address associated with the symbol RETADR is 0030 and the machine equivalent code for STL is 14. Assemble the given SIC/XE instruction, by clearly indicating the instruction format, addressing mode and the setting of different flag bits, given the address value assigned to RETADR is 0030.</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Label</th> <th>Opcode</th> <th>Operand</th> </tr> </thead> <tbody> <tr> <td>0000</td> <td>FIRST</td> <td>STL</td> <td>RETA DR</td> </tr> </tbody> </table> | Location | Label | Opcode | Operand | 0000 | FIRST | STL | RETA DR | 5 | SEP 20 | | | | | | | |
| Location | Label | Opcode | Operand | | | | | | | | | | | | | | | |
| 0000 | FIRST | STL | RETA DR | | | | | | | | | | | | | | | |
| 12 | What is a relocatable program? Do all instructions of SIC/XE machine program need modification because of relocation? Justify your answer | 4 | DEC 20 | | | | | | | | | | | | | | | |
| 13 | Give the structure and purpose of Modification record and Define record. | 3 | DEC 21 | | | | | | | | | | | | | | | |
| 14 | Write a SIC program to perform linear search in an array of 100 elements. | 6 | DEC 21 | | | | | | | | | | | | | | | |
| 15 | Generate the assembled object program for the below SIC program. The machine code for the instructions used are: LDX – 04, LDA – 00, ADD – 18, TIX – 2C, STA – 0C, JLT – 38 and RSUB – 4C. Show the location counter value for each instruction | 6 | DEC 21 | | | | | | | | | | | | | | | |

| | | |
|-------|-------|----------|
| SUM | START | 4000 |
| FIRST | LDX | ZERO |
| | LDA | ZERO |
| LOOP | ADD | TABLE, X |
| | TIX | COUNT |
| | JLT | LOOP |
| | STA | TOTAL |
| | RSUB | |
| TABLE | RESW | 2000 |
| COUNT | RESW | 1 |
| ZERO | WORD | 0 |
| TOTAL | RESW | 1 |
| | END | FIRST |

MODULE 3

| | | | |
|----|---|---|---------------------------|
| 1 | Write notes on multi pass assembler with example | 5 | APR18, DEC17 |
| 2 | Distinguish between program blocks and control section How the assembler handles multiple program blocks | 9 | DEC 18 DEC 21 |
| 3 | Write notes on MASM assemblers | 3 | DEC 17 |
| 4 | Explain the concept of single pass assembler with a suitable example | 5 | DEC 17 |
| 5 | What are control section of a program block? What are the advantages of using them? Explain with proper example the purpose of EXTREF and EXTDEF assembler directives | 4 | DEC17,D EC18 |
| 6 | Distinguish between Program blocks and control section. How does the assembler handle multiple program blocks? | 8 | DEC18 SEP 20 DEC 21 |
| 7 | List out the basic functions of assemblers with proper examples | 4 | APR 18 |
| 8 | Explain two passes of assembler algorithm with proper example | 9 | APR 18 |
| 9 | What is literal? How is it handled by assembler? | 3 | APR 18 |
| 10 | Explain how external references are handled by assembler | 5 | APR 18 |
| 11 | With the help of an example explain how to find target address during assembling in each case | 6 | DEC 18 |

| 12 | Give the format and purpose of the different record types present in an object program that uses multiple control sections. | 4 | SEP 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|--|----------|-------------------------|--|--|------|------|-------|---|--|--|--------|-------------------------|--|--|--------|--------------|------|-------|-----|--------|------|-------|-------|-------|------|--|-----|--------|------|--|------|----|------|--|-----|--------|------|--|-------|-------|------|--|---|-------|------|--------|-----|----------|------|--|-----|--------|------|--|-----|----|------|--|-----|--------|------|--|-------|-------|------|--|---|---------|------|--------|------|---|------|--------|------|---|--|--|-------|--|------|---|----------|--|------|--------|------|------|------|--------|-----|---|------|--------|-----|---------------|--|--|
| 13 | Develop the records (excluding header, text and end records) for the following control section named COPY | 5 | SEP 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Loc</th> <th colspan="3">Source Statement</th> </tr> </thead> <tbody> <tr> <td>0000</td> <td>COPY</td> <td>START</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td>EXTDEF</td> <td>BUFFER, BUFFEND, LENGTH</td> </tr> <tr> <td></td> <td></td> <td>EXTREF</td> <td>RDREC, WRREC</td> </tr> <tr> <td>0000</td> <td>FIRST</td> <td>STL</td> <td>RETADR</td> </tr> <tr> <td>0003</td> <td>CLOOP</td> <td>+JSUB</td> <td>RDREC</td> </tr> <tr> <td>0007</td> <td></td> <td>LDA</td> <td>LENGTH</td> </tr> <tr> <td>000A</td> <td></td> <td>COMP</td> <td>#0</td> </tr> <tr> <td>000D</td> <td></td> <td>JEQ</td> <td>ENDFIL</td> </tr> <tr> <td>0010</td> <td></td> <td>+JSUB</td> <td>WRREC</td> </tr> <tr> <td>0014</td> <td></td> <td>J</td> <td>CLOOP</td> </tr> <tr> <td>0017</td> <td>ENDFIL</td> <td>LDA</td> <td>=C 'EOF'</td> </tr> <tr> <td>001A</td> <td></td> <td>STA</td> <td>BUFFER</td> </tr> <tr> <td>001D</td> <td></td> <td>LDA</td> <td>#3</td> </tr> <tr> <td>0020</td> <td></td> <td>STA</td> <td>LENGTH</td> </tr> <tr> <td>0023</td> <td></td> <td>+JSUB</td> <td>WRREC</td> </tr> <tr> <td>0027</td> <td></td> <td>J</td> <td>@RETADR</td> </tr> <tr> <td>002A</td> <td>RETADR</td> <td>RESW</td> <td>1</td> </tr> <tr> <td>002D</td> <td>LENGTH</td> <td>RESW</td> <td>1</td> </tr> <tr> <td></td> <td></td> <td>LTORG</td> <td></td> </tr> <tr> <td>0030</td> <td>*</td> <td>=C 'EOF'</td> <td></td> </tr> <tr> <td>0033</td> <td>BUFFER</td> <td>RESB</td> <td>4096</td> </tr> <tr> <td>1033</td> <td>BUFEND</td> <td>EQU</td> <td>*</td> </tr> <tr> <td>1000</td> <td>MAXLEN</td> <td>EQU</td> <td>BUFEND-BUFFER</td> </tr> </tbody> </table> | Loc | Source Statement | | | 0000 | COPY | START | 0 | | | EXTDEF | BUFFER, BUFFEND, LENGTH | | | EXTREF | RDREC, WRREC | 0000 | FIRST | STL | RETADR | 0003 | CLOOP | +JSUB | RDREC | 0007 | | LDA | LENGTH | 000A | | COMP | #0 | 000D | | JEQ | ENDFIL | 0010 | | +JSUB | WRREC | 0014 | | J | CLOOP | 0017 | ENDFIL | LDA | =C 'EOF' | 001A | | STA | BUFFER | 001D | | LDA | #3 | 0020 | | STA | LENGTH | 0023 | | +JSUB | WRREC | 0027 | | J | @RETADR | 002A | RETADR | RESW | 1 | 002D | LENGTH | RESW | 1 | | | LTORG | | 0030 | * | =C 'EOF' | | 0033 | BUFFER | RESB | 4096 | 1033 | BUFEND | EQU | * | 1000 | MAXLEN | EQU | BUFEND-BUFFER | | |
| Loc | Source Statement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | COPY | START | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EXTDEF | BUFFER, BUFFEND, LENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EXTREF | RDREC, WRREC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | FIRST | STL | RETADR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0003 | CLOOP | +JSUB | RDREC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0007 | | LDA | LENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000A | | COMP | #0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 000D | | JEQ | ENDFIL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0010 | | +JSUB | WRREC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0014 | | J | CLOOP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0017 | ENDFIL | LDA | =C 'EOF' | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 001A | | STA | BUFFER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 001D | | LDA | #3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0020 | | STA | LENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0023 | | +JSUB | WRREC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0027 | | J | @RETADR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 002A | RETADR | RESW | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 002D | LENGTH | RESW | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | LTORG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0030 | * | =C 'EOF' | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0033 | BUFFER | RESB | 4096 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1033 | BUFEND | EQU | * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | MAXLEN | EQU | BUFEND-BUFFER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | How is a feature of an assembler categorized as machine dependent or machine independent? Support your answer with an example for each category. | 3 | DEC 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODULE 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Give algorithm for an absolute loader | 6 | DEC 17, APR18, | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|----|--|---|-----------------------------|
| | | | MAY 19, DEC 21 |
| 2 | Write notes on Dynamic linking. Explain with example | 4 | APR18, MAY19 |
| 3 | Differentiate between linkage loaders and linkage editors | 3 | DEC 18 |
| 4 | Describe the data structures used for linking loading algorithm. Give algorithm for pass1 of the linking loader | 5 | DEC 17 DEC 21 |
| 5 | Write notes on machine independent loader features | 4 | DEC 17 |
| 6 | Explain the concept of program relocation with an example OR What is the need of relocation in assembly programs? With a small example illustrate how relocation is handled in assemblers. | 4 | MAY 19 DEC 21 |
| 7 | Write the algorithm for Pass 2 of a Linking loader | 6 | MAY19 DEC 21 |
| 8 | List and explain different machine independent features of loader. Explain the working of one type of one pass Assembler | 9 | DEC 18 SEP 20, DEC 21 |
| 9 | Explain the algorithm of pass1 of a linking loader | 6 | APR 18 |
| 10 | What is the use of bitmask in program relocation | 3 | DEC 18 |
| 11 | Given an idle computer with no programs in memory, how do we get things started? | 3 | DEC 18 |
| 12 | Explain the concept of Automatic library search | 3 | MAY 19 |
| 13 | What is a load and go assembler? | 3 | DEC 20 |
| 14 | What is the use of bitmask in program relocation? Illustrate with example. | 3 | DEC 20 |
| 15 | Give the algorithm for pass 2 of a linking loader. | 5 | DEC 20 |
| 16 | With a help of neat diagram explain what is a linkage editor? | 4 | DEC 20 |
| 17 | Outline the need and functions of a bootstrap loader. | 3 | DEC 21 |
| 18 | Describe how the concepts of segments are handled in MASM assembler for 8086. Also compare near and far jump concept and its handling in MASM. | 6 | DEC 21 |

MODULE 5

| | | | |
|----|--|----|--------------------------|
| 1 | Explain the concept of macro definition and expansion with the help of an example | 5 | DEC 17 |
| 2 | Give algorithm for one pass macro processor and explain the process. Describe the data structures used in one pass macro processor | 10 | DEC17 DEC18 DEC 21 |
| 3 | How are unique labels generated in macro expansion? Explain conditional macro expansion with an example | 10 | DEC 17, APR 18 |
| 4 | Explain recursive macro expansion with an example | 5 | DEC 17, APR 18 |
| 5 | Explain macro processor algorithm | 10 | APR 18 |
| 6 | What are the different data structures used in the implementation of the macro processor algorithm? Give examples. | 5 | APR 18 DEC 20 |
| 7 | Differentiate between keyword and positional macro parameters | 3 | DEC 18 |
| 8 | Is it possible to include labels in the body of macro definition? Justify your answer. Write short note on concatenation of macro parameters within a character string | 10 | DEC 18 SEP 20 |
| 9 | A code segment need to be repeatedly used in various parts of assembly language program and fast execution is also needed. Would you use a macro or a subroutine? Justify your answer with the help of examples. List and explain the different design options available for macro-processors | 10 | MAY 19 |
| 10 | Certain macro processor feature are independent of the machine architecture. Give the details of such machine independent macro-processor features | 10 | MAY 19 |
| 11 | What is meant by line-by-line macro processor? What are its advantages? | 5 | SEP 20 |
| 12 | What are the important factors considered while designing general purpose macroprocessors? | 5 | SEP 20 |
| 13 | What is conditional macro expansion? | 5 | SEP 20 |
| 14 | What are the important factors considered while designing general purpose macro processors? | 5 | SEP 20 |

| | | | |
|----|--|----|---|
| 15 | Describe any two commonly used debugging methods Give general design of a device driver | 5 | DEC17 |
| 16 | Write notes on debugging functions and capabilities of an interactive debugging system. | 5 | DEC17 |
| 17 | Differentiate between character and block device drivers | 10 | DEC17, APR18, DEC18, SEP 20, DEC 21 |
| 18 | Explain the structure of text editors with the help of example and diagram | 5 | DEC17, MAY19 SEP 20,DEC 21 |
| 19 | Explain various text editors .Write notes on the user interface of a text editor | 5 | DEC17, APR18 |
| 20 | What is a debugger ?Explain the different debugging methods in details | 10 | APR 18 |
| 21 | What is a device driver? What are the major design issues of a device driver? | 5 | DEC18 |
| 22 | Draw the structure of a typical text editor and describe the functions of each block. List out the main four tasks associated with the documented editing process. | 10 | DEC18 |
| 23 | List out the criteria that should be met by the user interface of an efficient debugging system | 4 | DEC18 |
| 24 | A new device is plugged into the system. Which is the appropriate system software needed for the proper working of the new hardware? Give its functionalities and general architecture | 10 | MAY 19 |
| 25 | Write down the situations where debugging by induction ,deduction and backtracking are used, explaining each process | 10 | SEP 20, DEC 21 |

| | | | |
|----|--|---|--------|
| 26 | With a neat diagram show the relationship between viewing and editingbuffer. | 5 | SEP 20 |
| 27 | Discuss the debugging functions and capabilities. | 4 | SEP 20 |
| 28 | With a simple diagram illustrate the communication pathway of anapplication program to a device through a device driver. | 3 | DEC 21 |

CS 307 - MICROPROCESSORS AND MICROCONTROLLERS

MODULE 1

| Sl.No. | Questions | Marks | KU/KTU, Year |
|--------|---|-------|--|
| 1 | List the registers used in 8086 microprocessor. | 3 | KTU-Dec.2017 |
| 2 | Describe the functions of INTR, READY and HOLD signals. | 3 | KTU-Dec.2017 |
| 3 | List features of 8085 microprocessor. | 3 | KTU- Dec-2021 |
| 4 | Find the physical address of the memory locations referred by the following instructions, when DS=BC00H, SI=0023H, BX=0012H a)MOV AL,[SI] b) MOV [BX][SI],DL | 3 | KTU-Dec.2019 |
| 5 | The value of Code Segment (CS) Register is 3054H and the value of different registers is as follows: BX: 4025H , IP: 1580H , DI: 5467H. Calculate the physical address of the next instruction to be fetched. | 3 | KTU- Dec-2021 |
| 6 | Give architectural and signal difference between 8086 | 4 | KTU-Dec.2017 |
| 7 | What are the flag bits available in flag register of 8086? | 3 | KTU-Apr. 2018 KTU- Dec-2021 |
| 8 | With the help of timing diagram shows the transition of control signals involved in the I/O read operation of 8086 in minimum mode. | 3 | KTU-Apr. 2018 |
| 9 | How does the 8086 processor access a word from an odd memory location? How many memory cycles does it take? | 3 | KTU-Dec.2018 |
| 10 | Find the physical address of the destination operands referred in the following instructions, if DS=0223H, DI=0CCCH and SI=1234H a) MOV [DI], AL b) MOV [SI][56H], BL | 3 | KTU-Dec.2018 |
| 11 | Explain the physical and logical memory organization of 8086? | 9 | KTU-Apr. 2018,KTU-Dec 2020 |
| 12 | Draw the Memory Read timing diagram of 8086 in Minimum mode. Describe the status of the relevant signals during each clock period. | 9 | KTU-Dec.2018, KTU-Dec 2020 KTU- Dec-2021 |
| 13 | Give the architectural and signal differences between 8086 and 8088. | 4 | KTU- Dec-2021 |
| 14 | Draw and explain the internal block diagram of 8086. | 9 | KTU-Dec.2017 KTU- Dec-2021 |

| MODULE 2 | | | |
|-----------------|---|---|---|
| 1 | State the significance of assembler directives in an assembly language program with suitable examples. | 3 | KTU-Dec.2017 |
| 2 | Explain the working of the following instructions with suitable example. a) IN b)SAR | 3 | KTU-Dec 2020 |
| 3 | Write a program to find the largest number from an unordered array of 8-bit numbers. | 5 | KTU-Dec.2017 |
| 4 | With the help of an example state the differences in the functioning aspects of the instructions SHR and SAR of 8086. | 3 | KTU-Apr. 2018 |
| 5 | List the 8086 instructions used for transferring data between registers, memory, stack, and I/O devices. | 3 | KTU-Dec 2021 |
| 6 | Write an 8086assembly language program to check whether a string is palindrome or not. Assume that the string and its length are stored at known memory locations. | 9 | KTU-Apr. 2018 |
| 7 | Write 8086 assembly language program to find the count of even and odd numbers from a set of 10 sixteen bit numbers stored in location starting from a known address. Store the results in two different locations. | 9 | KTU-Dec. 2018 |
| 8 | What is the difference in the execution of an 8086 intersegment and intra segment CALL instruction? | 3 | KTU-Dec.2018 |
| 9 | Define the functions of the following 8086 assembler directives: a) ASSUME b) EQU c) OFFSET ,SEGMENT | 3 | KTU-Dec.2018, KTU-Dec 2020 KTU-Dec 2021 |
| 10 | What are the different addressing modes supported by 8086.Explain with examples. | 9 | KTU-Dec.2017 KTU-Dec.2018 KTU-Apr. 2018 |
| 11 | Discuss about the data transfer instructions with examples. | 4 | KTU-Dec 2021 |
| 12 | Write an 8086-program to find the largest among 'n' numbers (each numbers and count are of one byte only). Kindly assume that the size of array(count) stored in 2000h, and the numbers(array) stored from 2001h onwards up to 'n' continues locations. | 7 | KTU-Dec 2021 |
| MODULE 3 | | | |
| 1 | Describe interrupt cycle of 8086/8088 with neat diagram. | 3 | KTU-Dec.2017, KTU-Dec2020 |
| 2 | Give description about maskable and non maskable interrupt. | 3 | KTU-Dec.2017, KTU Dec 2020 |
| 3 | Give a brief description about Interrupt Service Routine. | 3 | KTU-Dec.2017 |
| 4 | What are the disadvantages of polling scheme over | 3 | KTU-Apr.2018 |

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| | interrupt scheme? | | |
| 5 | What is an Interrupt Vector Table (IVT)? Provide a diagrammatic representation of the IVT of 8086. | 3 | KTU-Apr.2018 |
| 6 | With the help of a diagram explain the different blocks of 8259 Programmable Interrupt Controller. | 9 | KTU-Apr.2018 |
| 7 | What are the five dedicated interrupts of 8086? | 5 | KTU-Dec 2020 KTU-Dec 2021 |
| 8 | Write the condition(s) which cause 8086 to perform a Type 1, Type 2 and Type 3 interrupts. | 3 | KTU-Dec.2018 |
| 9 | Discuss 8086 interrupt acknowledgement cycle | 3 | KTU-Dec.2018 |
| 10 | Draw the architectural block diagram of 8259 Programmable Interrupt Controller and explain the role of each functional part. | 9 | KTU-Dec.2018 KTU-Dec 2021 |
| 11 | What do you mean by Interrupt Vector Table (IVT)? The starting address for a type 7 interrupt-service procedure is 1112:1314. Show where and in what order this address should be placed in the 8086 IVT. | 5 | KTU-Dec.2018 KTU-Dec 2021 |
| 12 | Explain how the priority resolver block of 8259 select the request to be served next. | 3 | KTU-Dec 2020 |
| 13 | Explain the stack structure of 8086. | 4 | KTU-Dec 2021 |
| 14 | Interface two 32K X 8 EPROMS and two 32K X 8 RAM chips with 8086, microprocessor and draw the suitable circuit showing their interfacing. | 10 | KTU-Dec 2021 |
| MODULE 4 | | | |
| 1 | Mention the salient features of basic I/O mode operation of 8255. | 5 | KTU- Dec.2017 KTU-Dec 2020 KTU-Dec 2021 |
| 2 | Compare I/O mapped and memory mapped interfacing. | 3 | KTU- Dec.2017 |
| 3 | Draw the internal architecture of 8279 and explain. | 9 | KTU- Dec.2017 KTU-Dec 2020 |
| 4 | Describe different modes of operation of peripheral ICs:8255 and 8259. | 6 | KTU- Dec.2017, KTU Dec2020 KTU-Dec 2021 |
| 5 | What is DMA? State the sequence of operations performed by DMA controller in DMA transfer operation. | 3 | KTU-Apr.2018 |
| 6 | What are the different operational modes of 8279. | 9 | KTU-Apr.2018 |
| 7 | Explain the features of 8257 DMA controller. | 4 | KTU-Apr.2018 KTU-Dec 2021 |
| 8 | Write notes on scanned keyboard with 2-key lock out of 8279 keyboard/display controller. | 3 | KTU-Dec.2018 |
| 9 | Describe the control word format of 8255 PPI. | 4 | KTU-Dec.2018 |
| 10 | Design an interface with an 8086 CPU and two chips of 16*8 EPROM and two chips of 32*8 ROM. Select the starting address of EPROM suitably. The RAM address must start at 00000H | 9 | KTU-Dec.2018 |

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| 11 | Explain output modes of 8279, programmable keyboard/display interface. | 3 | KTU-Dec 2020 |
| 12 | Interface two numbers of 16Kx8 EPROM and 2 numbers of 4Kx8 RAM to 8086. Select suitable address map. | 9 | KTU-Dec.2020 |
| 13 | Interface two 4K*8 EPROMS and two 4K*8 RAM chip with 8086.Select suitable address maps. | 6 | KTU-Dec.2017 |
| 14 | Explain the interfacing of an IO device to 8086 using peripheral I/O method | 3 | KTU-Dec 2020 |
| 15 | With a neat diagram describe the architecture of 8255 PPI | 8 | KTU-Dec 2021 |
| 16 | Explain the 8254 programmable timer and its operation modes with a neat block diagram | 9 | KTU-Dec 2021 |
| 17 | Give the registers available in 8257 DMA Controller. Explain their functions. | 6 | KTU-Dec 2021 |
| MODULE 5 | | | |
| 1 | What are the different types of micro controllers? | 5 | KTU-Dec.2017 |
| 2 | What factors are needed to be considered for selecting a microcontroller? | 5 | KTU-Dec.2017 |
| 3 | Give brief description of memory and I/O addressing of 8051. | 10 | KTU-Dec.2017 |
| 4 | With the help of a block diagram describe the different components of 8051. | 10 | KTU-Apr.2018 KTU-Dec 2021 |
| 5 | Consider four LEDs connected to the lower 4 bits of Port P0 of 8051 microcontroller. Assume that the LEDs will glow if the corresponding bit is 1. Write an 8051 program which makes the group of LEDs to function as 4-bit Ring Counter. The program should iterate to display the Ring Counter sequence five times continuously and then exit. (Hint: 4bit Ring Counter sequence is 1000, 0100,0010 and0001. | 10 | KTU-Apr.2018 |
| 6 | What are the different addressing modes supported by 8051? | 5 | KTU-Dec.2017, KTU-Dec 2020 KTU-Dec 2021 |
| 7 | What is a microcontroller? Distinguish between a microcontroller and a microprocessor | 5 | KTU-Apr.2018 KTU-Dec 2021 |
| 8 | How the 8051 differentiate between internal and external program memory? | 1 | KTU-Dec.2018 |
| 9 | Discuss the selection criteria of a typical microcontroller | 4 | KTU-Dec.2018 |
| 10 | Discuss the structure of internal data memory (RAM) of 8051. | 5 | KTU-Dec.2018 KTU-Dec 2021 |
| 11 | What is the size of 8051 Stack Pointer (SP)? Discuss the operation of 8051stack. | 4 | KTU-Dec.2018 |
| 12 | Describe Internal data memory organization of 8051 microcontroller. | 9 | KTU-Dec.2020 |
| 13 | Explain PSW of 8051 microcontroller | 5 | KTU-Dec.2020 |

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| 14 | Explain the organization of stack in 8051 microcontrollers. | 5 | KTU-Dec.2020 |
| 15 | Describe the program status word (PSW) of 8051. | 3 | KTU-Dec.2018 |
| 16 | Describe the following instructions of 8051 microcontroller. a) AJMP b) SJMP c) XCHD d) MOVX e) SWAP | 5 | KTU-Dec.2020 |
| 17 | Write an 8051 assembly language program to count the occurrence of a given byte in a sequence of n bytes. | 7 | KTU-Dec.2020 |
| 18 | State the name and purpose of any 6 special function registers (SFRs) of 8051 microcontroller. | 5 | KTU-Dec 2021 |
| 19 | List the IO ports available in 8051 | 10 | KTU-Dec 2021 |

Course Code: CST309

Course Name: Management of Software Systems

| Module I | | | |
|-----------------|--|--------------|----------------|
| SL. No | Questions | Marks | Year |
| 1. | Why professional software that is developed for a customer is not simply the programs that have been developed and delivered. | 3 | Model Question |
| 2. | Incremental software development could be very effectively used for customers who do not have a clear idea about the systems needed for their operations. Justify. | 3 | Model Question |
| 3. | Identify any four types of requirements that may be defined for a software system | 3 | Model Question |
| 4. | Compare waterfall model and spiral model | 8 | Model Question |
| 5. | Explain Agile ceremonies and Agile manifesto | 6 | Model Question |
| 6. | Illustrate software process activities with an example | 8 | Model Question |
| 7. | Explain Agile Development techniques and Agile Project Management | 6 | Dec 2021 |
| 8. | Outline the advantages of incremental development model over Waterfall model. | 3 | Dec 2021 |
| 9. | Differentiate plan-driven and agile software development approach | 3 | Dec 2021 |
| 10 | Explain the major phases in waterfall model of software development. Which phase consumes the maximum effort for developing a typical software product? | 7 | Dec 2021 |
| 11 | Explain different process activities | 8 | Dec 2021 |
| 12 | Briefly explain design concepts in Software Engineering. | 8 | Dec 2021 |

| Module II | | | |
|------------------|--|--------------|----------------|
| SL. No | Questions | Marks | Year |
| 1. | Identify any four types of requirements that may be defined for a software system | 3 | Model Question |
| 2. | Describe software architecture. 56 | 3 | Model Question |
| 3. | What are functional and non-functional requirements? Imagine that you are developing a library management software for your college, | 10 | Model Question |

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| | listing eight functional requirements and four nonfunctional requirements | | |
| 4. | List the components of a software requirement specification | 4 | Model Question |
| 5. | Compare Software Architecture design and Component level design | 6 | Model Question |
| 6. | Summarize the structure of a SRS document. | 3 | Dec 2021 |
| 7. | Illustrate Requirement elicitation and analysis process with the help of a diagram. | 8 | Dec 2021 |
| 8. | Why is requirements elicitation considered as a critical task in requirements engineering? Explain any two methods for requirements elicitation. | 6 | Dec 2021 |
| 9. | Explain different architectural styles used in Software design | 6 | Dec 2021 |

| Module III | | | |
|-------------------|---|--------------|----------------|
| SL. No | Questions | Marks | Year |
| 1. | Differentiate between GPL and LGPL? | 3 | Model Question |
| 2. | Compare white box testing and black box testing. | 3 | Model Question |
| 3. | Explain software testing strategies. | 8 | Model Question |
| 4. | Describe the formal and informal review techniques | 6 | Model Question |
| 5. | Explain Continuous Integration, Delivery, and Deployment (CI/CD/CD) | 8 | Model Question |
| 6. | Explain test driven development | 6 | Model Question |
| 7. | Define any four types of system testing | 3 | Dec 2021 |
| 8. | Compare any two types of Black box testing strategies citing examples. | 7 | Dec 2021 |
| 9. | Explain basis path White box testing strategy with an example | 7 | Dec 2021 |
| 10 | Discuss the Formal Technical Review (FTR) process performed by Software Engineers. | 3 | Dec 2021 |
| 11 | Describe Continuous Integration, Delivery and Deployment (CI/CD/CD) in DevOps Automation. | 8 | Dec 2021 |

| Module IV | | | |
|------------------|--|--------------|----------------|
| SL. No | Questions | Marks | Year |
| 1. | Specify the importance of risk management in software project management? | 3 | Model Question |
| 2. | Describe the COCOMO cost, estimation model. | 3 | Model Question |
| 3. | Explain Personas, Scenarios, User stories and Feature identification? | 3 | Dec 2021 |
| 4. | Identify the types of maintenance that a software product might need. Explain | 4 | Dec 2021 |
| 5. | What is risk? Explain different types of software risk | 3 | Dec 2021 |
| 6 | List out the factors that affect software pricing. | 3 | Dec 2021 |
| 7 | You are given a project which involves many risks, that are difficult to anticipate at the start of the project. Which life cycle model is best suited for the project? Justify your answer. Explain that model in detail. | 7 | Dec 2021 |
| 8. | List out and explain fundamental project management activities. | 4 | Dec 2021 |
| 9. | Discuss Risk management process in detail with a diagram | 10 | Dec 2021 |
| 10. | Define software configuration management. Explain different activities involved in configuration management. | 10 | Dec 2021 |
| 11. | Summarize Software Project planning process. | 4 | Dec 2021 |
| 12 | Explain why micro services should have low coupling and high cohesion. | 9 | Dec 2021 |

| Module V | | | |
|-----------------|--|--------------|----------------|
| SL. No | Questions | Marks | Year |
| 1. | Discuss the software quality dilemma | 3 | Model Question |
| 2. | List the levels of the CMMI model? | 3 | Model Question |
| 3. | Outline the elements of Software Quality Assurance. | 3 | Dec 2021 |
| 4. | Describe different levels of the CMMI model. | 3 | Dec 2021 |
| 5. | List out the metrics that are used to measure software quality. Justify how these metrics interpret the quality of the Software. | 5 | Dec 2021 |
| 6. | Describe Software Process Improvement process. | 10 | Dec 2021 |
| 7. | Outline the elements of a SPI framework | 4 | Dec 2021 |

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| MCN301 | DISASTER MANAGEMENT |
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| MODULE 1 | | | |
|-----------------|--|-----------|------------------|
| Sl. No | Questions | Marks | Year |
| 1. | What is the mechanism by which stratospheric ozone protects earth from harmful UV rays? | 3 | KTU MODEL |
| 2. | What are disasters? What are their causes? | 3 | KTU MODEL |
| 3. | List the strategies for disaster risk management 'before', 'during' and 'after' a disaster | 3 | KTU MODEL |
| 4. | Explain the different types of cyclones and the mechanism of their formation | 10 | KTU MODEL |
| 5. | Explain with examples, the difference between hazard and risk in the context of disaster management | 10 | KTU MODEL |
| 6. | Explain the following terms in the context of disaster management (a) exposure (b) resilience (c) disaster risk management (d) early warning systems, (e) damage assessment (f) crisis counselling (g) needs assessment | 3 | KTU MODEL |
| 7. | Categorize the various layers of atmosphere based on their distance from earth and explain the features of each layer with a neat diagram. | 10 | DEC 2021 |
| 8. | Define the following terms: a) Disaster b) Hazard c) Risk | 6 | DEC 2021 |
| 9. | State and explain crisis counselling. Identify the necessity of crisis counselling. | 8 | DEC 2021 |
| 10. | Identify the reasons for the depletion of Ozone layer . Suggest two initiatives which can be implemented at home to prevent this. | 6 | DEC 2021 |
| Module 2 | | | |
| 1. | Define hazard mapping. Explain the two approaches of hazard mapping. | 8 | DEC 2021 |
| 2. | In Kerala for the past 5 years. the average number of road accidents is 44076 per year and 1 death occurs in every 10 accidents. Considering the population as 3.33 crores, assess the risk of being killed in driving an automobile in terms of societal and individual risk. | 6 | DEC 2021 |

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| 3. | Explain the four different types of vulnerability. List any four socio-economic indicators of human capital as livelihood asset. | 4 | KTU Model |
| 4. | Outline the two major physical vulnerability assessment approaches. | 6 | KTU Model |
| 5. | What is participatory hazard mapping? How is it conducted? What are its advantages? | 8 | KTU Model |
| 6. | Explain the applications of hazard maps | 6 | KTU Model |
| 7. | Explain the types of vulnerabilities and the approaches to assess them | 6 | Model Question |
| 8. | Explain the core elements of disaster risk management | 8 | KTU Model |
| 9. | Explain the factors that decide the nature of disaster response | 6 | KTU Model |

| MODULE 3 | | | |
|-----------------|---|-----------|------------------|
| 1. | Explain the core elements of disaster risk management. | 10 | DEC 2021 |
| 2. | State the requirements for effective disaster response. | 4 | DEC 2021 |
| 3. | Define the term 'disaster risk reduction'. Explain the measures for disaster risk reduction. | 8 | Dec 2021 |
| 4. | Define 'relief' in the context of disaster management. Identify the principles guiding relief. | 6 | Dec 2021 |
| 5. | State the principle of qualitative risk assessment and the method of expressing risk qualitatively. | 3 | Dec 2021 |
| 6. | State the different types of disaster response | 6 | DEC 2021 |
| 7. | Briefly explain the levels of stakeholder participation in the context of disaster risk reduction | 3 | KTU Model |

| MODULE 4 | | | |
|-----------------|---|----------|-----------------------|
| 1 | What is disaster preparedness? Explain the components of a comprehensive disaster preparedness strategy | 6 | KTU Model |
| 2 | Explain the different disaster response actions | 8 | KTU Model |
| 3 | Explain the benefits and costs of stakeholder participation in disaster management | 4 | KTU Model |
| 4 | How are stakeholders in disaster management identified? | 4 | Model Question |
| 5. | What are the steps to effective disaster communication? | 4 | KTU Model |
| 6. | What are the barriers to communication? | 4 | Dec 2021 |
| 7. | Explain capacity building in the context of disaster management | 7 | Dec 2021 |
| 8. | Distinguish between risk communication and crisis communication. | 3 | Model Question |
| 9. | Describe the effective ways of promoting stakeholder participation in disaster risk reduction. State its benefits. | 4 | Model Question |
| 10. | Explain capacity building , relevance of capacity assessment and the different methods of assessing capacity in disaster risk management. | 8 | Dec 2021 |

| MODULE 5 | | | |
|-----------------|---|-----------|-----------------------|
| 1. | Explain the common disaster types in India. | 10 | DEC 21 |
| 2. | State the objectives and main elements of national disaster management policy. | 4 | DEC 21 |
| 3. | State the targets, priorities and guiding principles of Sendai Framework for disaster risk reduction. | 8 | DEC 21 |
| 4. | Explain the institutional arrangement for disaster management in India | 6 | DEC 21 |
| 5. | Explain the institutional arrangement for disaster management in India | 10 | KTU MODEL |
| 6. | Explain the guiding principles and priorities of action according to the Sendai Framework for Disaster Risk Reduction | 8 | Model Question |