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| **20CS/CB/DS/IT205**  **Hall Ticket Number:**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |      |  |  |  | | --- | --- | --- | | **I/IV B.Tech( Regular/Supplementary) DEGREE EXAMINATION** | | | | **September,2022** | **Common to CB,CSE,DS & IT Branches** | | | **Second Semester** | **Digital Logic Design** | | | **Time: Three Hours** | | **Maximum:70 Marks** | | | | | | | |  |
| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | | | | | | | |  |
| 1. | a) | |  | | --- | | (1101.101)2 = ( ? ) 10 | | CO1 |  |
|  | b) | What are weighted codes? | CO1 |  |
|  | c) | In how many ways we can represent negative number and what they are? | CO1 |  |
|  | d) | Define Hamming code. | CO2 |  |
|  | e) | Define combinational circuit. | CO2 |  |
|  | f) | Define prime implicants. | CO2 |  |
|  | g) | Define Encoders. | CO3 |  |
|  | h) | Define Decoder. | CO3 |  |
|  | i) | Illustrate the purpose of Enable input. | CO3 |  |
|  | j) | Write the characteristic equation of T Flip Flop. | CO3 |  |
|  | k) | Write the excitation table for SR Flip Flop. | CO4 |  |
|  | l) | List any two Applications of Shift Register. | CO4 |  |
|  | m) | Define programmable array logic. | CO4 |  |
|  | n) | Write the drawback of ripple counter. | CO4 |  |
| **Unit –I** | | | | |
| 2. | a) | Convert each pair of decimal number to BCD and add   1. (65)10+(56)10 ii)(113)10+(101)10 | CO1 | 7M |
|  | b) | Explain r’s complement and r-1’s complement with an example. | CO1 | 7M |
| **(OR)** | | | | |
| 3. | a) | Show that the following   1. X+X=X ii) (X+Y)’=X’Y’ | CO1 | 7M |
|  | b) | Simplify the following Boolean function F, together with don’t care conditions d, and then express the simplified function in sum-of-minterms form  F(A,B,C,D)=∑(4,5,6,7,12,13,14)+ d(1,9,11,15) | CO1 | 7M |
| **Unit –II** | | | | |
| 4. |  | Using the tabular method of simplification, find all equally minimal solutions for the function below.  F(A,B,C,D)= ∑(1,4,5,10,12,14) | CO2 | 14M |
| **(OR)** | | | | |
| 5. | a) | Construct a Full Adder with two half adders with a neat diagram. | CO2 | 7M |
|  | b) | Explain about the Analysis and Design Procedure of Combinational logic. | CO2 | 7M |
| **Unit –III** | | | | |
| 6. | a) | Identify the differences between Latch and Flip Flop. Explain the construction of SR Latch. | CO3 | 7M |
|  | b) | Explain edge triggered and master slave flip-flop with example. | CO3 | 7M |
| **(OR)** | | | | |
| 7. | a) | Convert SR–Flip Flop to D–Flip Flop. | CO3 | 7M |
|  | b) | Discover the characteristic equation of a JK flip-flop. | CO3 | 7M |
| **Unit –IV** | | | | |
| 8. | a) | Draw the circuit diagram and explain the operation of 4-bit shift register. | CO4 | 7M |
|  | b) | Draw the state diagram of BCD Ripple Counter and design the circuit. | CO4 | 7M |
| **(OR)** | | | | |
| 9. |  | Implement the following three Boolean functions with PLA  F1(A,B,C)=∑(0,1,2,4)  F2(A,B,C)= ∑(0,5,6,7)  F3(A,B,C)=∑(0,3,5,7) | CO4 | 14M |

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| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | |  |

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| 1. | a) | |  | | --- | | (1101.101)2 = ( ? ) 10  Conversion -------1 M | |  | |  |  |
|  | b) | What are weighted codes?  Any Two weighted codes------1M |  |  |
|  | c) | In how many ways we can represent negative number and what they are?  Any Two ways-----1M |  |  |
|  | d) | Define Hamming code  Definition-----1M |  |  |
|  | e) | Define combinational circuit  Definition-------1M |  |  |
|  | f) | Define prime implicants  Definition------1M |  |  |
|  | g) | Define Encoders  Definition-------1M |  |  |
|  | h) | Define Decoder  Definition-------1M |  |  |
|  | i) | Illustrate the purpose of Enable input  Purpose of Enable input-------1M |  |  |
|  | j) | Write the characteristic equation of T Flip Flop  Equation Derivation------1M |  |  |
|  | k) | Write the excitation table for SR Flip Flop  Excitation table--------1M |  |  |
|  | l) | List any two Applications of Shift Register  Any Two Applications--------1M |  |  |
|  | m) | Define programmable array logic.  Definition of PAL--------1M |  |  |
|  | n) | Write the drawback of ripple counter  Any two drawbacks-----1M |  |  |
| **Unit –I** | | | | |
| 2. | a) | **Convert each pair of decimal number to BCD and add**   1. **(65)10+(56)10 ii)(113)10+(101)10**   Conversion to Decimal-------6M  Addition------1M | CO1 | 7M |
|  | b) | **Explain r’s complement and r-1’s complement with an example**  Procedure for r’s complement------3.5M  Procedure for r-1’s complement-------3.5M | CO1 | 7M |
| **(OR)** | | | | |
| 3. | a) | **Show that the following**   1. **X+X=X ii) (X+Y)’=X’Y’**   Proof for each one 3.5M-------2\*3.5=7M | CO1 | 7M |
|  | b) | **Simplify the following Boolean function F, together with don’t care conditions d, and then express the simplified function in sum-of-minterms form**  **F(A,B,C,D)=∑(4,5,6,7,12,13,14)+ d(1,9,11,15)**  Simplification--------5M  Conversion to Sum of Minterms-----2M | CO1 | 7M |
| **Unit –II** | | | | |
| 4. |  | **Using the tabular method of simplification, find all equally minimal solutions for the function below.**  **F(A,B,C,D)= ∑(1,4,5,10,12,14)**  Simplification-----14M | CO2 | 14M |
| **(OR)** | | | | |
| 5. | a) | **Construct a Full Adder with two half adders with a neat diagram.**  Full adder derivation------5M  Diagram-----2M | CO2 | 7M |
|  | b) | **Explain about the Analysis and Design Procedure of Combinational logic**.  Analysis procedure-------3.5M  Design procedure-------3.5M | CO2 | 7M |
| **Unit –III** | | | | |
| 6. | a) | **Identify the differences between Latch and Flip Flop. Explain the construction of SR Latch**  Differences between Latch and Flip Flop------3.5M  Construction of SR Latch----3.5M | CO3 | 7M |
|  | b) | **Explain edge triggered and master slave flip-flop with example**.  Edge triggered flip flop----3.5M  Master Slave flip flop--------3.5M | CO3 | 7M |
| **(OR)** | | | | |
| 7. | a) | **Convert SR–Flip Flop to D–Flip Flop**  SR flip flop Excitation table----3M  Characteristic table of D flip flop---3M  Conversion------1M | CO3 | 7M |
|  | b) | **Discover the characteristic equation of a JK flip-flop**  Truth Table of JK----3M  Characteristic table------3M  Derivation of Characteristic equation---------1M | CO3 | 7M |
| **Unit –IV** | | | | |
| 8. | a) | **Draw the circuit diagram and explain the operation of 4-bit universal shift register**  Diagram-----3M  Explanation----4M | CO4 | 7M |
|  | b) | **Draw the state diagram of MOD – 8 Down Counter and design synchronous circuit using T-Flip flops.**  Procedure-----5M  Diagram-------2M | CO4 | 7M |
| **(OR)** | | | | |
| 9. |  | **Implement the following three Boolean functions with PLA**  **F1(A,B,C)=∑(0,1,2,4)**  **F2(A,B,C)= ∑(0,5,6,7)**  **F3(A,B,C)=∑(0,3,5,7)**  Procedure-----10M  Diagram------4M | CO4 | 14M |

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