

**III.B.TECH- I-SEM (R20)-II MID Examinations-December-2023 Date: 29.12.2023**

**Subject: Formal Languages and Automata Theory Time: 10:00 TO 11:30 AM**

**Branch: CSE, IT, CSC & CSM Marks: 25 M**

***Answer All Questions In Part-A& Part-B***

**PART-A 5X2=10 M**

**1.** Give the closure properties of deterministic context free languages.(CO1)

**2.** Construct the PDA to the following grammar: (CO3)

**S→AB**

**A→BS/b**

**B→SA/a**

**3.** Write properties of recursively enumerable languages.(CO2)

**4.** What do you mean by Halting Problem.(CO1)

**5.** What are undecidable problems?(CO2)

**PART-B 3X5=15 M**

6. a. Construct a PDA for the following grammar **S→AA/a, A→SA/b.** [CO1] **[2+3]**

b. Convert the grammar **S→0AA, A→0S/1S/0** to a PDA that Accepts the same Language by

Empty Stack. [CO1]

(**OR**)

7. a. Obtain GNF for **S→AB, A→BS/b , B→SA/a**. [CO1] **[2+3]**

b. Enlist various Decision closure Properties of CFL’s. [CO3]

8. a. Construct a Turing Machine that will accept the Language consists of all **palindromes of 0’s**

**and 1’s?.** [CO1] **[2+3]**

b. Give instantaneous description ID of Turing machine. [CO2]

(**OR**)

9. a. Explain about the Decidability and Undecidability Problems. [CO3] **[2+3]**

b. Obtain the solution for the following correspondence system **A={100,0,1},B={1,100,00}** [CO2].

10. a) Obtain GNF for **S->AB, A->BS/b , B->SA/a. [CO1]**

b) Design a Turing Machine for **L={0n1m0n1m/m,n>=1}.** [CO2]

(**OR**)

11. a) Construct a Turing Machine that accepts those strings beginning with a ‘1’. [CO3]

b) Briefly write about Universal Turning Machine (UTM). [CO1]

**SCHEME OF EVALUATION**

**Part –A**

| **SNO** | **THEORY** | **MARKS** | **TOTAL** |
| --- | --- | --- | --- |
| **1** | Give the closure properties of deterministic context free languages. | **2** | **2** |
| **2** | Construct the PDA to the following grammar:  S→AB  A→BS/b  B→SA/a | **2** | **2** |
| **3** | Write properties of recursively enumerable languages. | **2** | **2** |
| **4** | What do you mean by Halting Problem. | **2** | **2** |
| **5** | What are undecidable problems? | **2** | **2** |

| **SNO** | **THEORY** | **MARKS** | **TOTAL** |
| --- | --- | --- | --- |
| **6** | a. Construct a PDA for the following grammar S→AA/a, A→SA/b.  b. Convert the grammar S→0AA, A→0S/1S/0 to a PDA that Accepts the same Language by Empty Stack. (or) | **2.5**  **2.5** | **5** |
| **7** | a. Obtain GNF for S→AB, A→BS/b , B→SA/a.  b. Enlist various Decision closure Properties of CFL’s. | **2.5**  **2.5** |  |
| **8** | a. Construct a Turing Machine that will accept the Language consists of all palindromes of 0’s and 1’s?.  b. Give instantaneous description ID of Turing machine  (or) | **2.5**  **2.5** | **5** |
| **9** | a. Explain about the Decidability and Undecidability Problems.  b. Obtain the solution for the following correspondence system A={100,0,1},B={1,100,00} [CO2]. | **2.5**  **2.5** |  |
| **10** | a) Obtain GNF for S->AB, A->BS/b , B->SA/a.  b) Design a Turing Machine for L={0n1m0n1m/m,n>=1}.  (or) | **2.5**  **2.5** | **5** |
| **11** | a) Construct a Turing Machine that accepts those strings beginning with a ‘1’.  b) Briefly write about Universal Turning Machine (UTM). | **2.5**  **2.5** |  |

**Part –B**