**United College of Engineering & Research, Prayagraj**

**Department of Computer Science & Engineering**

**Automata Theory(KCS-402)**

**Assignment-5**

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| **Q. No.** | **Question** | **CO** | **Bloom’s level** |
|  | **Section-A** |  |  |
| 1 | What do you understand by the Halting Problem? | CO6 | L2 |
| 2 | What are the features of Universal Turing Machine? | CO6 | L2 |
| 3 | Define the Turing Machine. | CO6 | L1 |
| 4 | What do you mean by Turing decidable language? | CO6 | L2 |
| 5 | Define PCP problem. | CO6 | L1 |
|  | **Section-B** |  |  |
| 6 | Design the Turing Machine for the following language L={anbncn ! n≥1}. | CO6 | L4 |
| 7 | Design a TM for the following language: L = { an+2bn | n > 0 } | CO6 | L3 |
| 8 | Design a TM to recognize all strings consisting of an odd number of α’s. | CO6 | L2 |
| 9 | Find any three solutions of the lists X= (b, bab3, ba) and Y = (b3, ba, a). | CO6 | L3 |
| 10 | Prove that single tape machines can simulate multi tape machines. | CO6 | L2 |
| 11 | Write short notes on the following:  (a) Halting Problem  (b) Turing Church’s Thesis  (c) Recursively Enumerable languages. | CO6 | L2 |
| 12 | Construct Turing Machine for the language,  L = ={wcw | w{a,b}\* } | CO6 | L3 |
| 13 | Design a TM that can compute proper subtraction function, it is defined as  f(m,n) = m-n , if m > n  = 0 , otherwise | CO6 | L4 |
| 14 | State True or False with reason:-  (a) Every language described by Regular Expression can be recognized by DFA.  (b) Every Recursive Enumerable Language can be generated by CFL.  (c) The Halting Problem of TM is decidable.  (d) Complement of recursive enumerable language is also recursive enumerable language.  (e) Every CFL can be recognized by TM. | CO6 | L2 |
| 15 | Design a Turing machine to calculate function f(m,n)=m\*n , where m and n are integers. | CO6 | L4 |

**CO** - Course Outcome

**Bloom’s Levels**

1- Remembering 2-Understanding 3-Applying

4-Analyzing 5-Evaluating 6-Creating