7. Write briefly about the applications of Automata.

8. Construct a TM with one Tape, that accepts the language L = $\{a^n b^n | n > 0\}$. Also derive the computation sequence for input sequence w = aaabbb.

9. Convert the following context free grammar to pushdown automata :

   S $\rightarrow$ *a*ABB | *a*AA

   A $\rightarrow$ *a*BB | *a*

   B $\rightarrow$ *b*BB | AC*a*

   C $\rightarrow$ *b*



# MCA–302

**June – Examination 2022**

## MCA (IInd Year/IIIrd Year) Examination

### FORMAL LANGUAGE AND AUTOMATA

**Paper : MCA–302**

*Time : 1½ Hours* ] [ *Maximum Marks : **80***

***Note*** :– The question paper is divided into two Sections A and B. Write answers as per the given instructions.

**Section–A** **4×4=16**

**(Very Short Answer Type Questions)**

***Note*** :– Answer any *four* questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries 4 marks.

1. (i) State the halting problem of the Turing machine and also explain whether it is solvable or not ?

   (ii) State Chomsky hierarchy for formal languages.

   (iii) State the properties of Regular sets.

   (iv) Give an example of a Power set.

   (v) What do you mean by Automata ?

   (vi) What do you mean by P-problem and NP-problem ?

   (vii) What is ε-closure ? Give an example.

   (viii) Differentiate between tractable and intractable problems. Give one example.

**Section–B** **4×16=64**

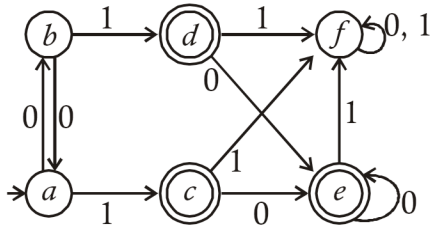
**(Short Answer Type Questions)**

***Note*** :– Answer any *four* questions. Answer should not exceed **200** words. Each question carries 16 marks.

2. Distinguish between Non-deterministic and Deterministic finite automata. Also, explain with suitable examples.



3. Minimize the given DFA :




4. Explain the Model of Pushdown Automata with suitable examples.

5. State pumping lemma theorem. Show that $L = \{A^n \mid n \text{ is prime}\}$ is not context free language.

6. Convert the following transition table (→ *indicate start state and* * *indicate final state*) into DFA :

| | 0 | 1 |
|---|---|---|
| →A | C | B |
| B | C | B |
| C | C | D |
| *D | D | D |