Branch : CSE/IT Batch : Hinglish

Theory of Computation
Finite Automata

DPP-03

[MCQ]

1. For $L = \{a^n b^m \mid n,m \geq 0\}$
What will be the regular expression ?
(a) $(a^* b^*)^*$ (b) $a^* b^*$
(c) $(ab)^*$ (d) $b^* a^*$

[MCQ]

2. Consider the following regular expressions:
(I) $(aa + aaa)^* = aa^+$
(II) $(a^*b\ (a + b)^* + (a^*b^*)^*) = (a + b)^*$
(III) $(\varepsilon + aaa\ (aaa)^*)\ (\varepsilon + a + aa) = (a + aa + aaa)^*$
Which the following is correct?
(a) (I) and (III) only.
(b) (II) and (III) only.
(c) All are correct.
(d) None of them are correct.

[MSQ]

3. Which of the following is/are regular expression for the language:
L = { containing ab as a substring}
(a) $b^* aa^*b\ (a^*b^*)^*$
(b) $(a + b)^*\ (ab)^*\ (a + b)^*$
(c) $(a^*\ b^*)^*\ ab\ (a^* + b^*)^*$
(d) $(a + b)^*\ ab\ (a + b)^*$

[MCQ]

4. What will be the regular expression for $L = \{a^{2n} \mid n \geq 15\}$ over $\sum = \{a\}$
(a) $a^{15}(aa)^*$
(b) $(aa)^* a^{15}$
(c) $a^{30}\ (aa)^*$
(d) None of these

MCQ]

5. Which of the following string does not belong to $(ab^*)^*$?
(a) aaabbaa (b) baaaabb
(c) aaabbb (d) ababa

Answer Key

1. **(b)**
2. **(b)**
3. **(a, c, d)**
4. **(c)**
5. **(b)**

Hints and solutions

1. (b)

Regular expression for L = $\{a^n b^m | n,m \geq 0\}$ = a*b*

2. (b)

False: $(aa + aaa)^*$ = (aa)*

True: (a*b (a + b)* + (a*b*)*) = (a + b)*

True: (ε + aaa (aaa)*) (ε + a + aa) = (a + aa + aaa)*

3. (a, c, d)

- b* aa*b (a*b*)* will generate all the strings which content ab as substring.
- (a* b*)* ab (a* + b*)* will generate all the strings which content ab as substring.
- (a + b)* ab (a + b)* will generate all the strings which content ab as substring.

4. (c)

Regular expression for L = $\{a^{2n} | n \geq 15\}$ = (aa)* a^{30} = a^{30} (aa)*

5. (b)

baaaabb is not present in (ab*)*.