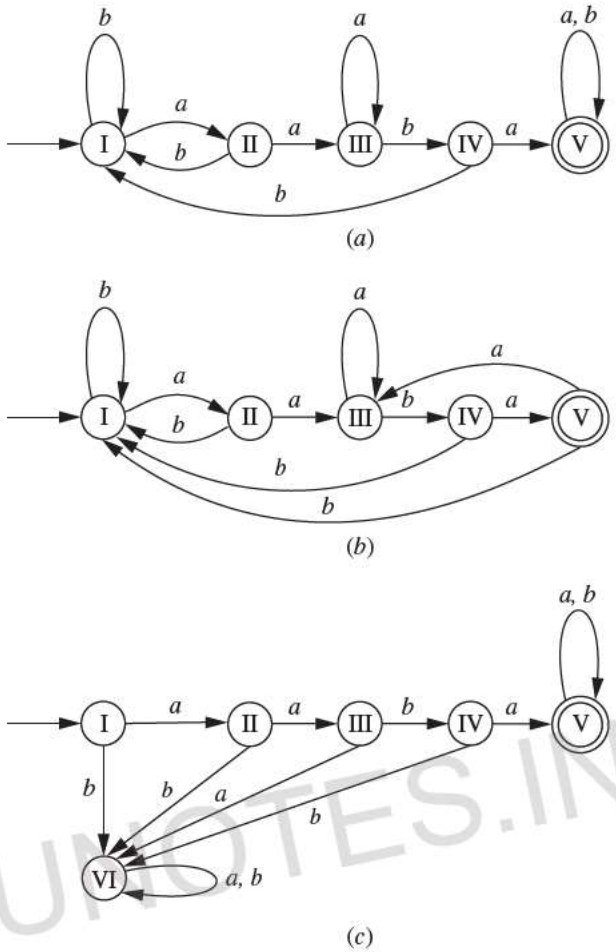
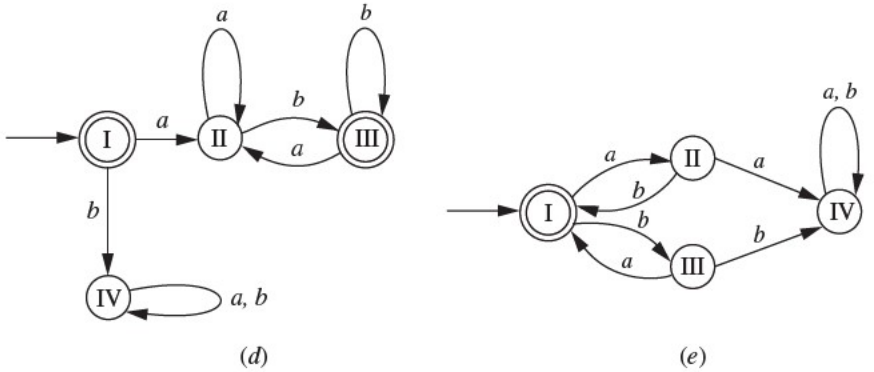
Department of CSE, RV College of Engineering – Bengaluru
FAFL – 18CS52
Video based seminar topics

Sl No	USN	Name	Topic
1	1RV20CS065	KARTHIK S HALLAD	Show that the CFG with given productions is ambiguous and find an equivalent unambiguous grammar. a. $S \rightarrow a \mid Sa \mid bSS \mid SSb \mid SbS$ b. $S \rightarrow SS \mid a \mid b$ c. $S \rightarrow ABA$ $A \rightarrow aA \mid \varepsilon$ $B \rightarrow bB \mid \varepsilon$ d. $S \rightarrow aSb \mid aaSb \mid \varepsilon$ e. $S \rightarrow aSb \mid abS \mid \varepsilon$
2	1RV20CS066	KASHISH NAYAN	For $\Sigma = \{a, b\}$, construct DFA for the language of all strings containing both aba and bab as substrings.
3	1RV20CS067	KAUSHIK B A	For each of the languages given, use the pumping lemma to show that it cannot be accepted by an FA. a. $L = \{a^n b a^{2n} \mid n \geq 0\}$ b. $L = \{a^i b^j a^k \mid k > i + j\}$ c. $L = \{a^i b^j \mid j = i \text{ or } j = 2i\}$ d. $L = \{ a^i b^j \mid j \text{ is a multiple of } i\}$
4	1RV20CS068	KEERTHI P	Consider the two regular expressions $r = a^* + b^*$ $s = ab^* + ba^* + b^*a + (a^*b)^*$ a. Find a string corresponding to r but not to s. b. Find a string corresponding to s but not to r.

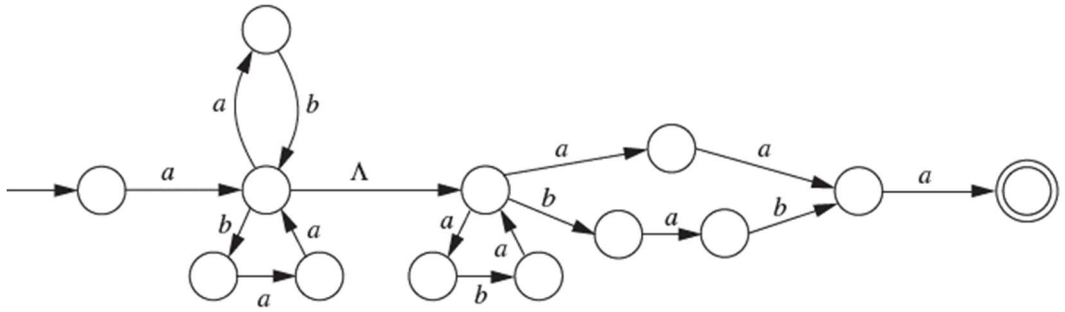
5	1RV20CS069	KESANAPALLI LAKSHMI PRIYANKA	For each of the FAs pictured in the below figure, give a simple verbal description of the language it accepts. 

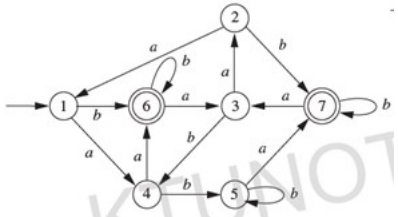
6	1RV20CS070	KOKKALLA VAMSHI KRISHNA	For each of the FAs pictured in the below figure, give a simple verbal description of the language it accepts. 
7	1RV20CS072	KRITADNYA KALING	For each of the languages given, use the pumping lemma to show that it cannot be accepted by an FA. a. $L = \{x \in \{a, b\}* \mid n_a(x) < 2n_b(x)\}$ b. $L = \{x \in \{a, b\}* \mid$ no prefix of x has more b's than a's$\}$ c. $L = \{a^{n\wedge 3} \mid n \geq 1\}$ d. $L = \{ww \mid w \in \{a, b\}*\}$
8	1RV20CS073	KRUTHIKA P	For each of the case below, write what language (a subset of $\{a, b\}^*$) is generated by the context-free grammar with the indicated productions. a. $S \rightarrow aS \mid bS \mid \varepsilon$ b. $S \rightarrow SS \mid bS \mid a$ c. $S \rightarrow SaS \mid b$ d. $S \rightarrow SaS \mid b \mid \varepsilon$
9	1RV20CS074	KUNAL SATISH MAHAJAN	Find context-free grammars generating each of the languages below. a. $L = \{w \in \{a, b\}* : n_a(w) \neq n_b(w)\}$ b. $L = \{w \in \{a, b\}* : n_a(v) \geq n_b(v)$, where v is any prefix of w$\}$ c. $L = \{w \in \{a, b\}* : n_a(w) = 2n_b(w) + 1\}$ d. $L = \{w \in \{a, b\}* : n_a(w) = n_b(w) + 2\}$

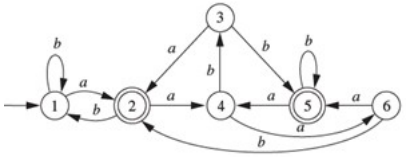
<table>
<tr>
<td>10</td>
<td>1RV20CS075</td>
<td>KUSHAJ KUMAR</td>
<td>
What language (a subset of $\{a, b\}^*$) is accepted by the PDA whose transition table is shown below, if the only accepting state is q_3?
<table>
<tr><th>Move Number</th><th>State</th><th>Input</th><th>Stack Symbol</th><th>Move(s)</th></tr>
<tr><td>1</td><td>q_0</td><td>a</td><td>Z_0</td><td>$(q_0, xZ_0), (q_1, aZ_0)$</td></tr>
<tr><td>2</td><td>q_0</td><td>b</td><td>Z_0</td><td>$(q_0, xZ_0), (q_1, bZ_0)$</td></tr>
<tr><td>3</td><td>q_0</td><td>a</td><td>x</td><td>$(q_0, xx), (q_1, ax)$</td></tr>
<tr><td>4</td><td>q_0</td><td>b</td><td>x</td><td>$(q_0, xx)(q_1, bx)$</td></tr>
<tr><td>5</td><td>q_1</td><td>a</td><td>a</td><td>(q_1, a)</td></tr>
<tr><td>6</td><td>q_1</td><td>b</td><td>b</td><td>(q_1, b)</td></tr>
<tr><td>7</td><td>q_1</td><td>a</td><td>b</td><td>$(q_1, b), (q_2, \Lambda)$</td></tr>
<tr><td>8</td><td>q_1</td><td>b</td><td>a</td><td>$(q_1, a), (q_2, \Lambda)$</td></tr>
<tr><td>9</td><td>q_2</td><td>a</td><td>x</td><td>(q_2, Λ)</td></tr>
<tr><td>10</td><td>q_2</td><td>b</td><td>x</td><td>(q_2, Λ)</td></tr>
<tr><td>11</td><td>q_2</td><td>Λ</td><td>Z_0</td><td>(q_3, Z_0)</td></tr>
<tr><td colspan="4">(all other combinations)</td><td>none</td></tr>
</table>
The PDA can stay in state q_0 by pushing x onto the stack for each input symbol read. From q_0 it also has the choice of entering q_1, by pushing onto the stack the symbol it has just read. In state q_1 there is always the option of ignoring the input symbol that is read and leaving the stack alone, but in order to reach the accepting state it must eventually be able to move from q_1 to q_2.
</td>
</tr>
<tr>
<td>11</td>
<td>1RV20CS076</td>
<td>KUSHI P</td>
<td>For Σ = {a, b}, construct DFA for the language of all strings in which every a (if there are any) is followed immediately by bb.</td>
</tr>
</table>

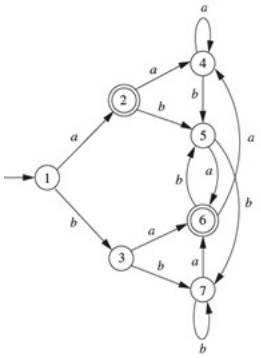
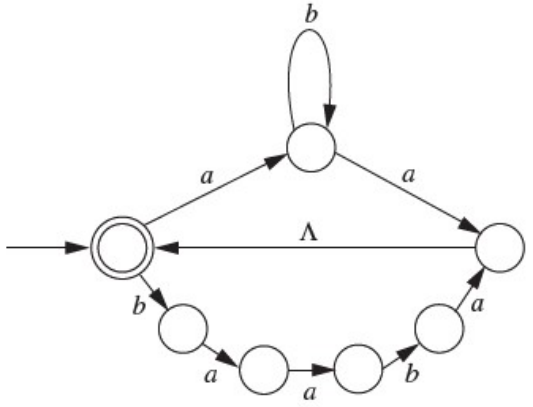
12	1RV20CS077	M M ARJUN	In both cases below, a transition table is given for a PDA with initial state q_0 and accepting state q_2. Describe in each case the language that is accepted. **Move Number / State / Input / Stack Symbol / Move(s)** 1: q_0, a, Z_0, (q_1, aZ_0) 2: q_0, b, Z_0, (q_1, bZ_0) 3: q_1, a, a, $(q_1, a), (q_2, a)$ 4: q_1, b, a, (q_1, a) 5: q_1, a, b, (q_1, b) 6: q_1, b, b, $(q_1, b), (q_2, b)$ (all other combinations): none **Move Number / State / Input / Stack Symbol / Move(s)** 1: q_0, a, Z_0, (q_0, XZ_0) 2: q_0, b, Z_0, (q_0, XZ_0) 3: q_0, a, X, (q_0, XX) 4: q_0, b, X, (q_0, XX) 5: q_0, c, X, (q_1, X) 6: q_0, c, Z_0, (q_1, Z_0) 7: q_1, a, X, (q_1, Λ) 8: q_1, b, X, (q_1, Λ) 9: q_1, Λ, Z_0, (q_2, Z_0) (all other combinations): none
13	1RV20CS078	M S RAGHAVENDRA	For the grammar G = ({S} , {a, b} , S, P), with productions a. S → aSa, S → bSb, S → λ, show a derivation tree for w = aaabbaaa b. S → abB, A → aaBb, B → bbAa, A → λ, draw derivation tree for w = abbbaabbaba c. S → AB|λ, A → aB, B → Sb, draw derivation tree for the w = aabbbb d. S → aaB, A → bBb|λ, B → Aa, draw derivation tree for the w = aabbabba and show that w is not in the language generated by this grammar.

14	1RV20CS079	MADHVESH ACHARYA M	For each of the case below, write what language (a subset of {a, b}*) is generated by the context-free grammar with the indicated productions. a. S →T T T → aT | T a | b b. S →aSa | bSb | aAb | bAa A → aAa | bAb | a | b | ε c. S →aT | bT | ε T→aS | bS d. S →aT | bT T → aS | bS | ε
15	1RV20CS080	MALAVIKA HARIPRASAD	Give a context-free grammar for generating all properly nested parentheses. A properly nested parenthesis structures are the ones involving two kinds of parentheses, say () and [ ]: example ([ ]), ([[ ]]) [()], but not ([)] or ([]].
16	1RV20CS081	MANOJ M	Find context-free grammars for the following languages: a. $L = a^n b^n$, n is even. b. $L = a^n b^n$, n is odd.
17	1RV20CS082	MANOJKUMAR BELLATTI	In each case below, find a context-free grammar with no ε -productions that generates the same language, except possibly for ε, as the given CFG. f. S →AB | ε A→ aASb |a B→ bS g. S →AB | ABC A → BA | BC | ε | a B → AC | CB | ε | b C → BC | AB | A | c
18	1RV20CS083	MAYA S RAO	Find a regular expression corresponding to each of the following subsets of {a, b}*. 1. The language of all strings in which the number of a's is even and the number of b's is odd. 2. The language of all strings in which both the number of a's and the number of b's are odd.

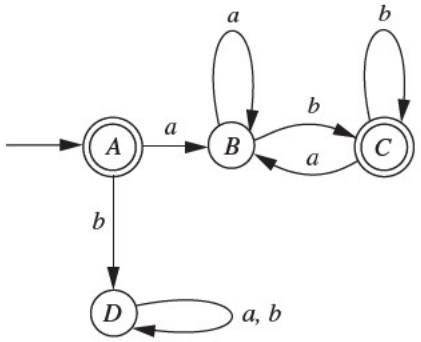
19	1RV20CS084	MAYUR ANKLEKAR	For the NFAs below, find a regular expression corresponding to the language it accepts.  (a)
20	1RV20CS085	MAYUR S CHITTARAGI	Find context-free grammars generating each of the languages below. a. $L = \{a^n b^m c^k, k = n + m\}$ b. $L = \{a^n b^m c^k, k = \lvert n - m \rvert\}$
21	1RV20CS086	MD ZEAUL HAQUE	In each case below, find a context-free grammar with no ε -productions that generates the same language, except possibly for ε, as the given CFG. a. S →AB | ε A→ aASb |a B→ bS b. S →AB | ABC A → BA | BC | ε | a B → AC | CB | ε | b C → BC | AB | A | c
22	1RV20CS087	MEETH J DAVDA	Suppose M = (Q, Σ, q_0,A, δ) is an FA, q is an element of Q, and x and y are strings in Σ^*. Using structural induction on y, prove the formula $\delta^*(q, xy) = \delta^*(\delta^*(q, x), y)\lvert$

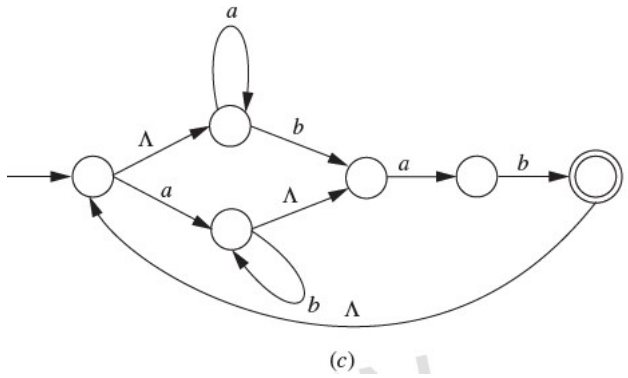
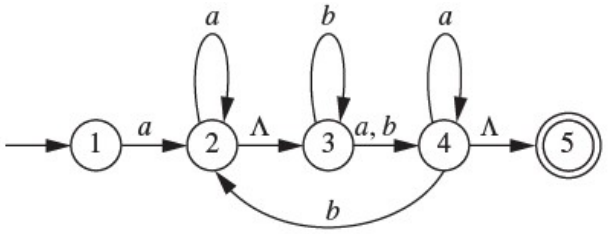
23	1RV20CS088	MEGHANSH MUNDRA	For the FAs pictured below, use the minimization algorithm (Equivalence) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 
24	1RV20CS089	MINAL R D	Draw a FA accepting the language generated by the CFG having the given productions. a. S → aA | bC A → aS | bB B →aC | bA C →aB | bS | ε b. S → bS | aA | ε A→aA | bB |b B→ bS c. S → abA | bB | aba A → b | aB | bA B → aB | aA
25	1RV20CS090	MOHAMMED KHALID MOHAMMED MINHAJUDDIN ANSARI	Let r and s be arbitrary regular expressions over the alphabet Σ. In each case below, find a simpler equivalent regular expression. a. $r(r^* r + r^*) + r^*$ b. $(r + \varepsilon)^*$ c. $(r + s)^* rs(r + s)^* + s^* r^*$
26	1RV20CS091	NAMAN N KARANTH	Each of the following grammars, though not regular, generates a regular language. In each case, find a regular grammar generating the language: a. S →AAS | ab | aab A →ab | ba | ε b. S →AB A →aAa | bAb | a |b B→ aB | bB | ε c. S →AA |B A→ AAA | Ab | bA |a B→ bB | ε

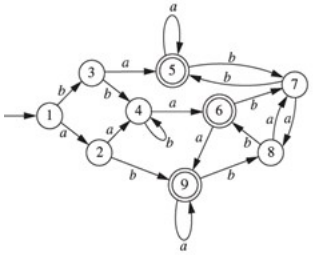
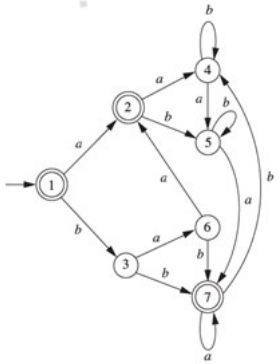
27	1RV20CS092	NAVANIKA J REDDY	For the FAs pictured below, use the minimization algorithm (Equivalence) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 
28	1RV20CS093	NAVEEN B TELI	In each case, given the context-free grammar G, find a CFG G with no ε -productions and no unit productions that generates the language L(G) − { ε }. h. S → ABA A → aA | ε B→ bB | ε i. S → aSa | bSb | ε A→ aBb | bBa B → aB | bB | ε j. S → A | B |C A→ aAa |B B→ bB | bb C → aCaa |D D→ baD | abD | aa
29	1RV20CS094	NEHA N	For the following regular expressions, draw an NFA accepting the corresponding language, so that there is a recognizable correspondence between the regular expression and the transition diagram. e. $(a + b)(ab)^*(abb)^*$ f. $(a + b)^*(abba^* + (ab)^*ba)$ g. $(a^*bb)^* + bb^*a^*$
30	1RV20CS095	NEHASHRI POOJAR S V	Construct NPDAs that accept the following languages: a. $L = \{w : n_a(w) = n_b(w) + 1\}$ b. $L = \{w : n_a(w) = 2n_b(w)\}$

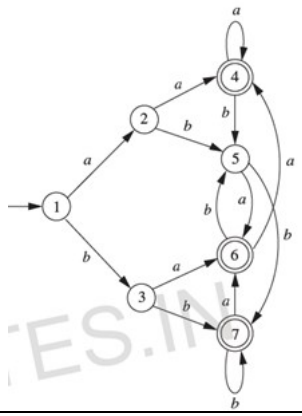
31	1RV20CS096	NIKHIL BENNUR	For the FAs pictured below, use the minimization algorithm (Table filling) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 
32	1RV20CS097	NIKHIL TAVANAPPA BELAVI	For the following regular expressions, draw an NFA accepting the corresponding language, so that there is a recognizable correspondence between the regular expression and the transition diagram. h. $(b + bba)^*a$ i. $(a + b)^*(abb + ababa)(a + b)^*$
33	1RV20CS098	NIMISHA DEY	For the NFAs below, find a regular expression corresponding to the language it accepts.  (b)

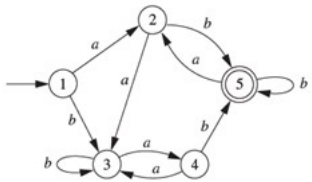
34	1RV20CS099	NISHAL H N	Find a CFG generating the given language. a. The set of odd-length strings in $\{a, b\}^*$ with middle symbol a. b. The set of even-length strings in $\{a, b\}^*$ with the two middle symbols equal. c. The set of odd-length strings in $\{a, b\}^*$ whose first, middle, and last symbols are all the same.
35	1RV20CS100	NISHITH S SHETTY	Find a regular expression corresponding to each of the following subsets of $\{a, b\}^*$. a. The language of all strings containing exactly two a's. b. The language of all strings containing at least two a's.
36	1RV20CS101	NITHISH S	Construct NPDAs that accept the following languages: a. $L = \{w : n_a(w) + n_b(w) = n_c(w)\}$ b. $L = \{w : 2n_a(w) \leq n_b(w) \leq 3n_a(w)\}$ c. $L = \{w : n_a(w) < n_b(w)\}$
37	1RV20CS102	NITIN SINGH	Find context-free grammars for the following language: $L = a^n b^n$, n is a multiple of three.
38	1RV20CS103	P BHUVANESHWAR	Find a regular expression corresponding to each of the following subsets of $\{a, b\}^*$. a. The language of all strings that do not end with ab. b. The language of all strings that begin or end with aa or bb.
39	1RV20CS104	PARI RAHEJA	For $\Sigma = \{a, b\}$, construct DFA for the language of all strings containing no more than one occurrence of the string aa. (The string aaa contains two occurrences of aa.)
40	1RV20CS105	PAVAN R	Draw a transition diagram for an FA that accepts the string **abaa** and no other strings.
41	1RV20CS106	PEDDISETTY VARAD NITHIN	Find a regular expression corresponding to each of the following subsets of $\{a, b\}^*$. a. The language of all strings not containing the substring aa. b. The language of all strings in which the number of a's is even.

42	1RV20CS107	PETA SIVA DEEKSHITH REDDY	In each case, given the context-free grammar G, find a CFG G with no ε -productions and no unit productions that generates the language L(G) − { ε }. a. S → ABA A → aA | ε B→ bB | ε b. S → aSa | bSb | ε A→ aBb | bBa B → aB | bB | ε c. S → A | B |C A→ aAa |B B→ bB | bb C → aCaa |D D→ baD | abD | aa
43	1RV20CS108	PRADHAAN R KEDLAYA	Find a regular grammar generating the language L(M), where M is the FA shown below: 

44	1RV20CS109	PRADHAN A N	For the NFAs below, find a regular expression corresponding to the language it accepts.  (c)
45	1RV20CS110	PRAGAM JAIN	Consider the two regular expressions $r = a^* + b^*$ $s = ab^* + ba^* + b^*a + (a^*b)^*$ a. Find a string corresponding to both r and s. b. Find a string in $\{a, b\}^*$ corresponding to neither r nor s.
46	1RV20CS111	PRAGATHI B C	Find a regular expression corresponding to each of the following subsets of $\{a, b\}^*$. 1. The language of all strings containing no more than one occurrence of the string aa. (The string aaa should be viewed as containing two occurrences of aa.) 2. The language of all strings in which every a is followed immediately by bb.
47	1RV20CS112	PRAJWAL C R	For the NFAs below, find a regular expression corresponding to the language it accepts. 
48	1RV20CS113	PRAJWAL P	Find a regular expression corresponding to each of the following subsets of $\{a, b\}^*$. a. The language of all strings containing both bb and aba as substrings. b. The language of all strings not containing the substring aaa.

49	1RV20CS114	PRAJWAL T S	Find context-free grammars generating each of the languages below. c. $L = \{a^n b^m c^k : n = m \text{ or } m \leq k, n \geq 0, m \geq 0, k \geq 0\}$ d. $L = \{a^n b^m c^k : n = m \text{ or } m \neq k, n \geq 0, m \geq 0, k \geq 0\}$
50	1RV20CS115	PRANAMYA MADY	For the FAs pictured below, use the minimization algorithm (Table filling) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 
51	1RV20CS116	PRANSHU PRAKHAR SINGH	For $\Sigma = \{a, b\}$, construct DFA for the language of all strings containing both bb and aba as substrings.
52	1RV20CS117	PRASAD PATIL	Find context-free grammars generating each of the languages below. a. $L = \{a^n b^m c^k, k = n + 2m\}$ b. $L = \{a^n b^m c^k, k \neq n + m\}$
53	1RV20CS118	PRASANNA SURESH NAIK	For the FAs pictured below, use the minimization algorithm (Table filling) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 
54	1RV20CS119	PRASHANTH REDDY GUNDALA	Find a regular expression corresponding to each of the following subsets of $\{a, b\}^*$. a. The language of all strings not containing the substring bba. b. The language of all strings containing both bab and aba as substrings.

55	1RV20CS120	PRATEEK PANDA	Show that the CFG with given productions is ambiguous and find an equivalent unambiguous grammar. a. S →a | Sa | bSS | SSb | SbS b. S → SS | a | b c. S → ABA A → aA |ε B→bB | ε
56	1RV20CS121	PRATHEEK M	Describe the language generated in each case by the CFG with productions a. S →ST | ε T→ aS | bT | b b. S → aaS | bbS | Saa | Sbb | abSab | abSba | baSba | baSab | ε c. S → aSB|bSA | ε A → a B → b d. S → aaSbb | SS | ε
57	1RV20CS122	PRATHIKSHA K R	For Σ = {a, b}, construct DFA for language of all strings in which both the number of a's and the number of b's are even.
58	1RV20CS123	PRATIKSHA NARASIMHA NAYAK G	Show that the CFG with given productions is ambiguous and find an equivalent unambiguous grammar. a. S → aSb | aaSb | ε b. S → aSb | abS | ε
59	1RV20CS124	PRATYUSH KISHORE	For the FAs pictured below, use the minimization algorithm (Equivalence) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 

60	1RV20CS125	PRIKSHIT	Each of the following grammars, though not regular, generates a regular language. In each case, find a regular grammar generating the language: d. $S \rightarrow SSS \mid a \mid ab$ e. $S \rightarrow AabB$ $A \rightarrow aA \mid bA \mid \varepsilon$ $B \rightarrow Bab \mid Bb \mid ab \mid b$
61	1RV20CS126	PRITVISH R	For a string $x \in \{a, b\}*$ with $\lvert x\rvert = n$, how many states are required for an FA accepting x and no other strings? For each of these states, describe the strings that cause the FA to be in that state.
62	1RV20CS128	PYDI VENKAT	For the FAs pictured below, use the minimization algorithm (Equivalence) to find a minimum-state FA recognizing the same language. (It's possible that the given FA may already be minimal.) 
63	1RV20CS192	AKANSHA A PAI	Construct NPDAs that accept the following languages: d. $L = \{a^n b^m c^{n+m} : n \geq 0, m \geq 0\}$ e. $L = \{a^n b^{n+m} c^m : n \geq 0, m \geq 1\}$ f. $L = \{a^3 b^n c^n : n \geq 0\}$
64	1RV20CS193	NANDINI MOONKA	Find context-free grammars generating each of the languages below. c. $\{a^n b^m : n \leq m + 3\}$ d. $\{a^n b^m : n = m - 1\}$ e. $\{a^n b^m : n \neq 2m\}$ f. $\{a^n b^m : 2n \leq m \leq 3n\}$
65	1RV20CS194	RAHUL ANBALAGAN	Find context-free grammars generating each of the languages below. a. $\{a^i b^j \mid i \leq j\}$ b. $\{a^i b^j \mid i < j\}$ c. $\{a^i b^j \mid j = 2i\}$ d. $\{a^i b^j \mid i \leq j \leq 2i\}$
66	1RV20CS195	SHRIKAR SWAROOP R	Construct NPDAs that accept the following languages: g. $L = \{a^n b^{3n} : n \geq 0\}$ h. $L = \{wcw^R : w \in \{a, b\}*\}$ i. $L = \{a^n b^m : n \leq m \leq 3n\}$

67	1RV20CS196	DEEPTHA GIRIDHAR	Find context-free grammars generating each of the languages below. a. $\{a^ib^j \mid j \leq 2i\}$ b. $\{a^ib^j \mid j < 2i\}$ c. $\{ a^ib^jc^k \mid i \neq j+k \}$ d. $\{a^nb^n \mid n$ is not a multiple of 3$\}$
68	1RV20CS197	SHARAN THOMAS	Describe the language generated in each case by the CFG with productions o $S \rightarrow ST \mid \varepsilon \quad T \rightarrow aS \mid bT \mid b$ o $S \rightarrow aaS \mid bbS \mid Saa \mid Sbb \mid abSab \mid abSba \mid baSba \mid baSab \mid \varepsilon$ o $S \rightarrow aSB \mid bSA \mid \varepsilon \quad A \rightarrow a \quad B \rightarrow b$ o $S \rightarrow aaSbb \mid SS \mid \varepsilon$
69	1RV20CS198	SHREYASA JOSHI	For a string $x \in \{a, b\}*$ with $\|x\| = n$, how many states are required for an FA accepting the language of all strings in $\{a, b\}*$ that begin with x? For each of these states, describe the strings that cause the FA to be in that state.
70	1RV20CS199	HARINI K S	Construct NPDAs that accept the following regular languages: j. $L_1 = L(aaa^*bab)$ k. $L_2 = L(aab^*aba^*)$ l. $L_1 \cup L_2$ m. $L_1 - L_2$ n. $L_1 \cap L_2$
71	1RV18CS198	NAMAN SOOD	Find a PDA that accepts the language $L = \{a^nb^{2n} : n \geq 0 \}$ Show the sequence of instantaneous descriptions for the acceptance of aabbbb