

PUNJAB PUBLIC SERVICE COMMISSION

**COMBINED COMPETITIVE EXAMINATION FOR
RECRUITMENT TO THE POSTS OF
PROVINCIAL MANAGEMENT SERVICE, ETC - 2016**

SUBJECT: COMPUTER SCIENCE (PAPER-II)

TIME ALLOWED: THREE HOURS

MAXIMUM MARKS: 100

NOTE: Attempt Any FIVE Questions in All. Calculator is Allowed.

- Q No. 1:**
- Give Context-free Grammars generating the following languages:
 - The set of strings over the alphabet $\{a,b\}$ with more a's than b's.
 - $\{w\#x\mid w^R \text{ is a substring of } x \text{ for } w, x \in \{0,1\}^*\}$
 - Give state diagrams of NFAs with the specific number of states recognizing each of the following languages considering alphabet is $\{0,1\}$.
 - The language $\{w \mid w \text{ ends with } 00\}$ with three states.
 - The language $1^*(001)^*$ with three states.

(10+10 Marks)

- Q No. 2:**
- Tokenize the following assignment statement by lexical analysis of scanning while describing each token.
 $C: = - A * B$
 - How is Top-down parsing different from bottom-up parsing?
 - Name the intermediate representation which is closest to the input programme, also give reasons.

(5+10+5 Marks)

- ✓ **Q No. 3:** ✓ a) Suppose, following are the requirements that are collected from an insurance company:
- The insurance company has different policies. Each policy has policy number, term, price and coverage.
 - Policies are categorized based on their types. There are two types: Automobile (Auto) policy and Home policy.
 - Policies for vehicles come under Auto policy. Auto policy has policy number, vehicle type and issue date.
 - Policies for houses come under home policy. Home policy has policy number, issue date, term and price. Customers take policy through policy agent. A customer can take only one policy.

Draw an ER diagram for the above information. Identify the key attributes in the given problem and show their relationship. How many tables are required in the given scenario?