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**BSSE\_5\_A\_Evening**

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**Assignment # 03**

**Consider scenario Tele Voting System with Gadgets. It is System for Voting in Election with following Features:**

1. Add Candidates with their symbols **(P).**
2. Polling with Mobile/Android or another gadget **(Q).**
3. Result Compilation at local as well as centralized location (Election Commission of Pakistan) **(R).**

Apply following proposition logic on above scenario for formal specification and proofs. (**Note: You have to write English statements using above scenario and then also identify that its tautology, contradiction and contingency using truth table**).

1. ⌐ ⌐ P

**Statement:** No, we can’t add Candidates with their no symbols.

**Truth table**:

|  |  |  |
| --- | --- | --- |
| P | ⌐ P | ⌐ ⌐ P |
| T | F | T |
| F | T | F |

**Conclusion:** **This statement is contingency.**

2. (P → Q) v (Q → P)

**Statement:** If you add candidate with their symbols(P) then Polling with android/mobile or gadget (Q) **or** if you polling with android/mobile or gadget (Q) then you should add candidate with symbol (P).

**Truth table**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | P → Q | Q → P | (P → Q) v (Q → P) |
| T | T | T | T | T |
| T | F | F | T | T |
| F | T | T | F | T |
| F | F | T | T | T |

**Conclusion: This statement is Tautology.**

3. P ^ (P → ⌐Q) ^ Q

**Statement:** If you add candidate with their symbols(P) and if you add candidate with their symbols(P) then Polling not with android/mobile or gadget (Q) **and** if you polling with android/mobile or gadget.

**Truth table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | ⌐Q | P → ⌐Q | P ^ (P → ⌐Q) | P ^ (P → ⌐Q) ^ Q |
| T | T | F | F | F | F |
| T | F | T | T | T | F |
| F | T | F | T | F | F |
| F | F | T | T | F | F |

**Conclusion: This statement is contradiction.**

1. (P → Q) ^ (P → ⌐Q)

**Statement:** If you add candidate with their symbols(P) then Polling with android/mobile or gadget (Q) **and** if you add candidate with their symbols(P) then Polling not with android/mobile or gadget (Q).

**Truth table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | ⌐Q | P → Q | P → ⌐Q | **(P → Q) ^ (P → ⌐Q)** |
| T | T | F | T | F | **F** |
| T | F | T | F | T | **F** |
| F | T | F | T | T | **T** |
| F | F | T | T | T | **T** |

**Conclusion: This Statement is Contingency.**

1. (P v Q) v R

**Statement:** Add candidates with their symbols or Polling with mobile/android or another gadget or Result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (P v Q) | (P v Q) v R |
| T | T | T | T | T |
| T | T | F | T | T |
| T | F | T | T | T |
| T | F | F | T | T |
| F | T | T | T | T |
| F | T | F | T | T |
| F | F | T | T | T |
| F | F | F | F | F |

**Conclusion: This Statement is contingency.**

1. P v (Q v R)

**Statement:** Add candidates with their symbols or Polling with mobile/android or another gadget or Result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (Q v R) | P v (Q v R) |
| T | T | T | T | T |
| T | T | F | T | T |
| T | F | T | T | T |
| T | F | F | F | T |
| F | T | T | T | T |
| F | T | F | T | T |
| F | F | T | T | T |
| F | F | F | F | F |

**Conclusion: This Statement is Contingency.**

1. (P v Q)

**Statement:** Add candidates with their symbols or Polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |
| --- | --- | --- |
| P | Q | P v Q |
| T | T | T |
| T | F | T |
| F | T | T |
| F | F | F |

**Conclusion: This Statement is Contingency.**

1. (Q v P)

**Statement:** Polling with mobile/android or another gadget or Add candidates with their symbols.

**Truth table:**

|  |  |  |
| --- | --- | --- |
| P | Q | Q v P |
| T | T | T |
| T | F | T |
| F | T | T |
| F | F | F |

**Conclusion: This Statement is Contingency.**

1. P v (Q ^ R)

**Statement:** Add candidates with their symbols or Polling with mobile/android or another gadget and Result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (Q ^ R) | **P v (Q ^ R)** |
| T | T | T | T | **T** |
| T | T | F | F | **T** |
| T | F | T | F | **T** |
| T | F | F | F | **T** |
| F | T | T | T | **T** |
| F | T | F | F | **F** |
| F | F | T | F | **F** |
| F | F | F | F | **F** |

**Conclusion: This statement is Contingency.**

1. (P v Q) ^ (P v R)

**Statement:** Add candidates with their symbols or Polling with mobile/android or another gadget and Add candidates with their symbols or Result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | R | (P v Q) | (P v R) | **(P v Q) ^ (P v R)** |
| T | T | T | T | T | **T** |
| T | T | F | T | T | **T** |
| T | F | T | T | T | **T** |
| T | F | F | T | T | **T** |
| F | T | T | T | T | **T** |
| F | T | F | T | F | **F** |
| F | F | T | F | T | **F** |
| F | F | F | F | F | **F** |

**Conclusion: This statement is Contingency.**

1. P ^ (Q v R)

**Statement:** Add candidates with their symbols and Polling with mobile/android or another gadget or Result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (Q v R) | **P ^ (Q v R)** |
| T | T | T | T | **T** |
| T | T | F | T | **T** |
| T | F | T | T | **T** |
| T | F | F | F | **F** |
| F | T | T | T | **F** |
| F | T | F | T | **F** |
| F | F | T | T | **F** |
| F | F | F | F | **F** |

**Conclusion: This Statement is Contingency.**

12. (P ^ Q) v (P ^ R)

**Statement:** Add candidates with their symbols and Polling with mobile/android or another gadget or Add candidates with their symbols and Result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | R | (P ^ Q) | (P ^ R) | **(P ^ Q) v (P ^ R)** |
| T | T | T | T | T | **T** |
| T | T | F | T | F | **T** |
| T | F | T | F | T | **T** |
| T | F | F | F | F | **F** |
| F | T | T | F | F | **F** |
| F | T | F | F | F | **F** |
| F | F | T | F | F | **F** |
| F | F | F | F | F | **F** |

**Conclusion: This statement is Contingency.**

13. (P → Q)

**Statement:** Add candidates with their symbols if Polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |
| --- | --- | --- |
| P | Q | P → Q |
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

**Conclusion: This Statement is Contingency.**

14. (⌐Q → ⌐P)

**Statement:** It is not true to Polling with mobile/android or another gadget if it is not true to Add candidates with their symbols.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **⌐Q** | **⌐P** | **⌐Q → ⌐P** |
| T | T | F | F | **T** |
| T | F | T | F | **F** |
| F | T | F | T | **T** |
| F | F | T | T | **T** |

**Conclusion: This Statement is Contingency.**

15. ⌐ (P v Q)

**Statement:** It is not true to Add candidates with their symbols or Polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |  |
| --- | --- | --- | --- |
| P | Q | P v Q | **⌐ (P v Q)** |
| T | T | T | **F** |
| T | F | T | **F** |
| F | T | T | **F** |
| F | F | F | **T** |

**Conclusion: This Statement is Contingency.**

16. ⌐ P ^ ⌐Q

**Statement:** It is not true to Add candidates with their symbols and it is not true to Polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **⌐P** | **⌐Q** | **⌐ P ^ ⌐Q** |
| T | T | F | F | F |
| T | F | F | T | F |
| F | T | T | F | F |
| F | F | T | T | T |

**Conclusion: This Statement is Contingency.**

17. (P → Q)

**Statement:** Add candidates with their symbols if Polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |
| --- | --- | --- |
| P | Q | P → Q |
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

**Conclusion: This Statement is Contingency.**

18. (⌐P v Q)

**Statement:** It is not true to Add candidates with their symbols or Polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **P** | **Q** | **⌐P** | **(⌐P v Q)** |
| T | T | F | **T** |
| T | F | F | **F** |
| F | T | T | **T** |
| F | F | T | **T** |

**Conclusion: This Statement is Contingency.**

19. ⌐ (P ^ ⌐Q)

**Statement:** It is not true to Add candidates with their symbols and Polling without mobile/android or another gadget.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **⌐Q** | **P ^ ⌐Q** | **⌐ (P ^ ⌐Q)** |
| T | T | F | F | **T** |
| T | F | T | T | **F** |
| F | T | F | F | **T** |
| F | F | T | F | **T** |

**Conclusion: This Statement is Contingency.**

20. (P ↔ Q)

**Statement:** Add candidates with their symbols if and only if polling with mobile/android or another gadget.

**Truth table:**

|  |  |  |
| --- | --- | --- |
| P | Q | **P ↔ Q** |
| T | T | **T** |
| T | F | **F** |
| F | T | **F** |
| F | F | **T** |

**Conclusion: This Statement is Contingency.**

21. (P → Q) ^ (Q → P)

**Statement:** Add candidates with their symbols if Polling with mobile/android or another gadget and Polling with mobile/android or another gadget if Add candidates with their symbols.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | P → Q | Q → P | (P → Q) ^ (Q → P) |
| T | T | T | T | T |
| T | F | F | T | F |
| F | T | T | F | F |
| F | F | T | T | T |

**Conclusion: This Statement is Contingency.**

22. (P ^ Q) → R

**Statement:** Add candidates with their symbols and Polling with mobile/android or another gadget if result compilation at local as well as centralized location.

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (P ^ Q) | **(P ^ Q) → R** |
| T | T | T | T | **T** |
| T | T | F | T | **F** |
| T | F | T | F | **T** |
| T | F | F | F | **T** |
| F | T | T | F | **T** |
| F | T | F | F | **T** |
| F | F | T | F | **T** |
| F | F | F | F | **T** |

**Conclusion: This Statement is Contingency.**

23. P → (Q → R)

**Statement:** Add candidates with their symbols if polling with mobile/android or another gadget if Result compilation at local as well as centralized location

**Truth table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (Q → R) | P → (Q → R) |
| T | T | T | T | **T** |
| T | T | F | F | **F** |
| T | F | T | T | **T** |
| T | F | F | T | **T** |
| F | T | T | T | **T** |
| F | T | F | F | **T** |
| F | F | T | T | **T** |
| F | F | F | T | **T** |

**Conclusion: This Statement is Contingency.**