**Practice Question of Propositional**

**Q.N.1**

a.

i. Find the truth value of ¬ (X ∧ Y) ⇒ Z if X and Z are false, and Y is true.

ii. What is the truth value if the brackets are removed?

b.

Let *p* and *q* be the proposition

*p*: Swimming is allowed.

*q*: Sharks have been spotted near the shores

Express each of the following compound propositions as an English sentence.

1. :
2. :
3. :
4. :

c.

Find Converse, Inverse and Contra-positive of an implication

**[If today is my birthday then I will get cake]**

**Q.N.2**

We consider the problem of controlling a nuclear reactor. Given the atomic sentences “The operator presses the alarm”, “the reactor is in danger of melting down”, “The control process closes down the reactor”, and “The core temperature is rising rapidly”, represent the first by A, the second by B, the third by C and the last by D.

1. Convert into English
2. B⇒ (A∨C)
3. (ii) A∨¬D
4. (iii) (A∧B) ⇒C
5. (iv) (A∨D) ⇒ (C ⇔ B)
6. Convert into symbolic form
7. If the operator presses the alarm and the core temperature is not rising rapidly then the control process does not close down the reactor.
8. If the core temperature is rising rapidly then the reactor is in danger of melting down and the operator presses the alarm.
9. If the core temperature is rising rapidly then the reactor is in danger of melting down or the operator presses the alarm.
10. Find the truth value for each of the expressions of (i) to (iv) of a. given that A and C are true, and B and D are false.

**Q.N.3**

**Using laws of logic, prove that:**

a. [(p ʌ ¬ q) ᴠ ¬ p] ᴠ q ≡ T

b. [p ᴠ (¬ p ʌ q)] ᴠ (¬ p ʌ ¬ q) ≡ T

c. (p ∧ q) → (p ∨ q) ≡ T.

d. (p → q) ∧ (p → r) ≡ p → (q ∧ r)

e. [¬ p ∧ (p ∨ q)] → q is a tautology

**Q.N.4**

**Construct a truth table to establish the following compound propositions tautology, contradiction or contingency**

i. (p ∧ q) ∨ [¬ p ∨ (p ∧ ¬ q)]

ii. [∨ r)]∧ ¬ q) ∧ ¬ r]

**Q.N.5**

**Translate the following argument into propositional calculus and test for validity using truth table.**

If Fred has access to file file.dat then it is encrypted. If file.dat is not encrypted, then it cannot be in a publically accessible directory. Therefore, Fred has access to file.dat and it is not in a publically accessible directory

**Q.N.6**

Test the validity of the argument:

If it snows, Paul will miss class.

Paul did not miss class.

Therefore, it did not snow.

**Q.N.7**

**Test whether the following Argument is valid or not.**

1. If the data is improperly formatted, the data input module will produce an error message. If the data input module produces no error message, the processing module will provide the required statistics. Therefore if the processing module does not provide the required statistics, the data is improperly formatted.
2. If you send me an email message, then I will finish writing the program.

If you do not send me an email message, then I will go to sleep early.

If I go to sleep early, then I will wake up feeling refreshed.

Therefore, if I do not finish writing the program, I will wake up feeling refreshed.



**Q.N.8**

**Construct the formal Proof to show that the following argument is valid:**

i. A, A⇒ B, C ⇒¬B ¬C

ii. P∨Q, Q⇒¬R, R P

iii. A ⇒ B, ¬C ⇒ ¬B, ¬A ⇒ C C

iv. R ⇒ ¬(P ∧ Q), Q R ⇒ ¬P

v. P ⇒ (Q ⇒ R), R ⇒ ¬S, ¬W ⇒ S Q ⇒ (P ⇒ W)

vi. (A ⇒ B) ∨ (A ∧ ¬C), A, C ⇒ ¬B ¬C

**Q.N.9**

Rewrite each of the following propositions as unambiguous English sentences.

The relevant predicates are defined as follows:

Let P be a set of all people.

• A(x) means “x is teaching CS 173.”

• T(x) means “x is taking CS 473.”

• F(x) means “x has a Facebook page.”

• C(x) means “x likes to cook.”

1. ∃x ∈ P [A(x)∧ C(x)]
2. ∀x ∈ P [T(x) → F(x)]
3. ∃z ∈ P [T(z) ∧ A(z)]
4. ¬∀x ∈ P [T(x) → (F(x) ∨ C(x))]