**UNIT-1**

**Worksheet-1**

**Mathematical Concepts**

**MCQ**

1. According to principle of mathematical induction, if P(k+1) = m(k+1) + 5 is true then \_\_\_\_\_ must be true.

a) P(k) = 3m(k)

b) P(k) = m(k) + 5

c) P(k) = m(k+2) + 5

d) P(k) = m(k)

2. A proof that p → q is true based on the fact

that q is true, such proofs are known as

\_\_\_\_\_\_\_\_\_\_\_

a) Direct proof

b) Contrapositive proofs

c) Trivial proof

d) Proof by cases

3. For any positive integer m \_\_\_\_\_\_ is

divisible by 4.

a) 5m2 + 2

b) 3m + 1

c) m2 + 3

d) m3 + 3m

4. onlyhe “-if-part” of the statement of “H if and only if S” is \_\_\_\_\_\_\_\_\_\_.

a) if S then H

b) if not S then H.

c) if H then S

d) if not S then not H.

DESCRIPTIVE QUESTIONS

1. Show that 22n-1 is divisible by 3 using the principles of mathematical induction.
2. Prove that if for an integer a, a2 is divisible by 3, then a is divisible by 3 using the proof by contradiction.
3. For any two integers a and b, (a+b) is odd if and only if exactly one of the integers a or b is odd. Prove the above statement.
4. notShow by counter example the given statement P is always true.

P = 2n2-16n+31 is always positive for all of n.

1. Prove using mathematical induction for n>=5, 2n>n2.
2. Prove that the sum of n squares can be found as follows

12+22+32+...+n2=n(n+1)(2n+1)/6