

Assignment - 5

1. (a) Assuming that repetition is not permitted, how many 4 digit numbers can be formed from 1, 2, 3, 5, 7 and 8.

(b) How many are less than 4000.

(c) How many of them are even

(d) How many of them are odd.

(e) How many are multiple of 5.

(f) How many are containing 3 and 5 both

2. (a) In how many ways can 6 boys and 4 girls sit in a row.

(b) If the boys are to sit together and girls sit together

(c) If girls are to sit together ~~only~~?

(d) If just girls are to sit together?

3. How many bit strings of length 10 contain

(a) exactly 4 1's.

(b) almost 4 1's

(c) at least 4 1's

(d) an equal number of 0's and 1's.

4) How many permutations of letters A, B, C, D, E, F, G contain

- (a) string BCD
- (b) string CFGA
- (c) strings BA and GF
- (d) strings ABC and DE
- (e) strings CBA and BED

5) In how many ways can 20-students out of 30 be selected for an activity if

- (a) Ram refuses to be selected
- (b) Raja insist on being selected
- (c) Gopal and Govind ~~is~~ insist on being selected?
- (d) Either Gopal or Govind or both get selected
- (e) just one of Gopal and Govind gets selected
- (f) Rama and Raja refuse to be selected together.

6) A man hiked for 10 hours and covered a total distance of 45 km. He hiked 6 km in first hour and 3 km in the last hour. Show that he must have hiked at least 9 km within a certain period of $\frac{1}{2}$ hour.

7 Use Mathematical Induction to show that

(a) $n^3 + 2n$ is divisible by 3, $n \geq 1$

(b) $(3^n + 7^n - 2)$ is divisible by 8; $n \geq 1$

(c) $\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \dots + \frac{1}{\sqrt{n}} \geq \sqrt{n}$,

(d) $1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{2^n} \geq 1 + \frac{k}{2}$, $n \geq 1$
for $n \geq 2$