MANIPAL UNIVERSITY
JAIPUR
(University under Section 2(f) of the UGC Act)

B.TECH FIRST YEAR

ACADEMIC YEAR: 2020-2021

COURSE NAME: BASIC MECHANICAL ENGINEERING

COURSE CODE : MA 2101

LECTURE SERIES NO : 21 (TWENTY ONE)

CREDITS : 03

MODE OF DELIVERY : ONLINE (POWER POINT PRESENTATION)

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PROPOSED DATE OF DELIVERY: 14 OCTOBER 2020

MANIPAL UNIVERSITY
JAIPUR

VISION

Global Leadership in Higher Education and Human Development

MISSION

- Be the most preferred University for innovative and interdisciplinary learning
- Foster academic, research and professional excellence in all domains
- Transform young minds into competent professionals with good human values

VALUES

Integrity, Transparency, Quality,
Team Work, Execution with Passion, Humane Touch

SESSION OUTCOME

"UNDERSTAND THE CONCEPT OF COUNTING-PRODUCT AND SUM RULE"

ASSESSMENT CRITERIA'S

ASSIGNMENT

QUIZ

MID TERM EXAMINATION –I, II

END TERM EXAMINATION

PROGRAM OUTCOMES MAPPING WITH CO4

ENGINEERING KNOWLEDGE: APPLY THE KNOWLEDGE OF MATHEMATICS, SCIENCE, ENGINEERING FUNDAMENTALS, AND AN ENGINEERING SPECIALIZATION TO THE SOLUTION OF COMPLEX ENGINEERING PROBLEMS.

Basic Principle of Counting

Product rule
Sum rule

Counting mainly encompasses fundamental counting rule, the permutation rule, and the combination rule.

The **Rule of Sum** and **Rule of Product** are used to decompose difficult counting problems into simple problems.

- **The Rule of Sum** – If a sequence of tasks $T1, T2, \ldots, Tm$ can be done in $w1, w2, \ldots wm$ ways respectively (the condition is that no tasks can be performed simultaneously), then the number of ways to do one of these tasks is $w1+w2+\cdots+wm$. If we consider two tasks A and B which are disjoint (i.e. $A \cap B = \emptyset$), then mathematically $|A \cup B| = |A| + |B|$

Example : Suppose an institute offers seven different courses in the morning shift and six different courses in the evening shift.

(a) How many ways are there for students who want admission in one course only?

(b) How many ways are there for students who want admission in more course in the morning shift and one in the evening shift?

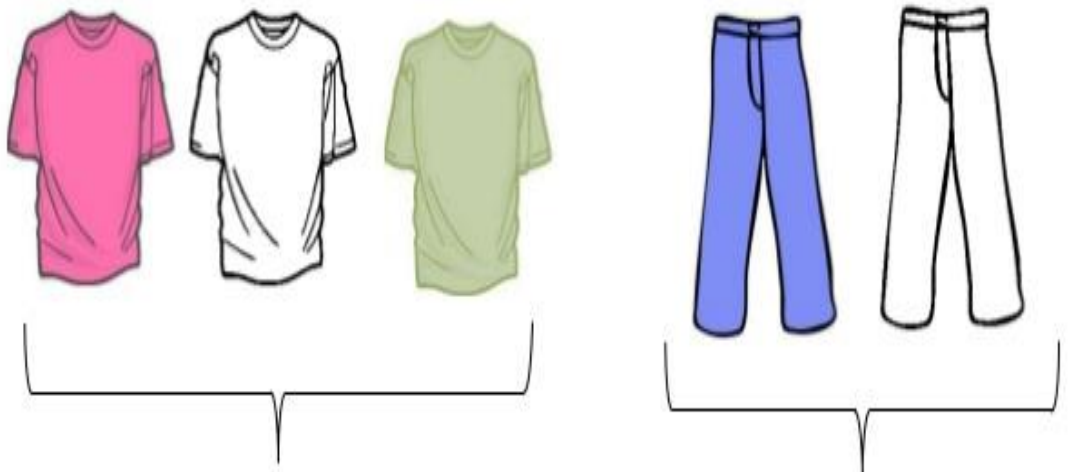
Solution: (a) By sum rule, students will have 7+6=13 choices if they want admission in only one course.

(b) By product rule there will be 7x6=42 choices for students who want to take admission in one course in the morning shift and one in the evening shift.

Example

Rohan has 3 shirts and 2 pants, in how many are the combinations possible.

He can select any shirt from 3 shirts and any pant from 3 pants.



3 ways

2 ways

Total = 3 X 2 = 6 ways

- **The Rule of Product** – If a sequence of tasks $T1, T2, \ldots, Tm$ can be done in $w1, w2, \ldots wm$ ways respectively and every task arrives after the occurrence of the previous task, then there are $w1 \times w2 \times \cdots \times wm$ ways to perform the tasks. Mathematically, if a task B arrives after a task A, then $|A \times B| = |A| \times |B|$

Let's consider this question...

If there are 4 ways from Johor to Penang and 2 ways from Penang to Langkawi, how many ways can we go for a journey from Johor to Langkawi through Penang?

JOHOR → TAXI / BUS / VAN / TRAIN → PENANG → FLIGHT / FERRY → LANGKAWI

4 ways

2 ways

So, the no of ways ; $4 \times 2 = 8$ ways


thank you!