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

INSPIRED BY LIFE

FIRST STATE PRIVATE UNIVERSITY IN RAJASTHAN
A+ NAAC
3.28 SCORE

B.TECH SECOND YEAR

ACADEMIC YEAR: 2020-2021

COURSE NAME: ENGINEERING MATHEMATICS-III

COURSE CODE : MA 2101

LECTURE SERIES NO : 29 (TWENTY-NINE)

CREDITS : 3

MODE OF DELIVERY : ONLINE (POWER POINT PRESENTATION)

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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

"IDENTIFICATION OF NATURE OF PROPOSITION"

ASSESSMENT CRITERIA'S

ASSIGNMENT

QUIZ

MID TERM EXAMINATION –I & II
END TERM EXAMINATION

VALIDATION OF ARGUMENT

Arguement

An *argument* in propositional logic is a sequence of propositions.

Terms such as Theorem, Premises and conclusion used in argument are defined as

Theorem: It is a true statement (or proposition) derived from the axioms of a mathematical structure or system.

Conclusion: It is the statement that is asserted on the basis of other proposition(s).

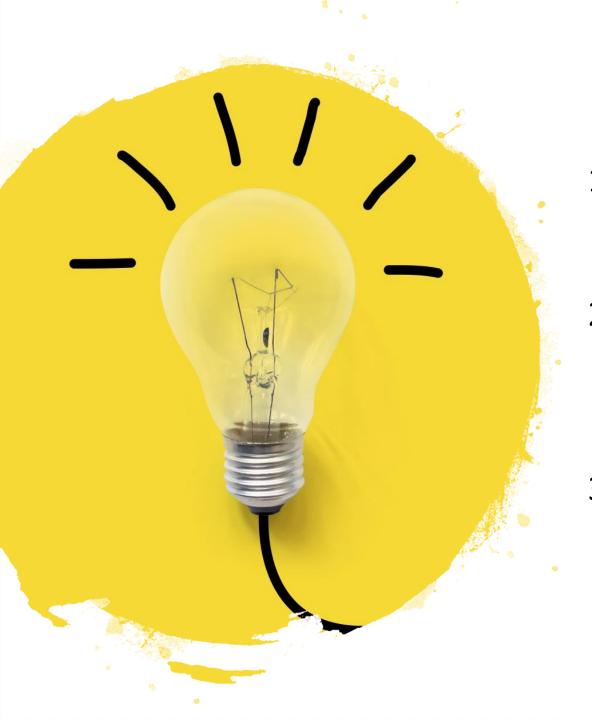Premise (or Hypothesis): It is a proposition which is assumed to be true for accepting a conclusion.

Validity of an Argument

The argument is valid if the premises imply the conclusion. An *argument form* is an argument that is valid no matter what propositions are substituted into its propositional variables.

If the premises are $p_1, p_2, ..., p_n$ and the conclusion is q then

$$(p_1 \wedge p_2 \wedge ... \wedge p_n) \rightarrow q$$

is a tautology.

Method to test the validity of an argument

1. Construct a truth table showing the truth values of all premises $(p_i's)$ and conclusion (q).

2. Find rows (called critical rows) in which all the premises are true. In case no such row is found, the argument is invalid.

3. In each critical row, determine whether the conclusion is also true. If yes, then the argument is valid, otherwise invalid. However, if atleast one critical row contains false conclusion, then the argument is invalid.

Ex. Examine the validity of the following argument

$$p \lor q$$
$$\underline{\sim q}$$
$$\therefore p$$

Sol. Let us construct the truth table as

		Premises		Conclusion
p	q	$p \lor q$	$\sim q$	p
T	T	T	F	T
T	F	T	T	T
F	T	T	F	F
F	F	F	T	F

Critical Row

As all the truth values of the premises and conclusion are true in critical row, so the argument is valid.

Ex. Examine the validity of the argument

$$(p \lor q), (p \to \neg q), (p \to r) \to r$$

Sol. Let us check the validity using truth table

p	q	r	$\neg q$	Premises			Conclusion
				$p \lor q$	p→ $\neg q$	$p \to r$	r
T	T	T	F	T	F	T	T
T	T	F	F	T	F	F	F
T	F	F	T	T	T	F	F
T	F	T	T	T	T	T	T
F	T	T	F	T	T	T	T
F	F	T	T	F	T	T	T
F	T	F	F	T	T	T	F
F	F	F	T	F	T	T	F

In the seventh row (which is critical row) the conclusion is not true, so the argument is invalid.

Ex. Check the validity of the following argument

If a man is bachelor, he is unhappy.

If a man is unhappy, he dies young.

Therefore, bachelors die young.

Sol. Let us assume the propositional variables as

p: Man is bachelor

q: Man is unhappy

r: Man dies young

Then the argument can be written as
$$(p \rightarrow q), (q \rightarrow r) \rightarrow (p \rightarrow r)$$
Now let us check its validity by truth table.

			Premises		Conclusion
p	q	r	$p \rightarrow q$	$q \rightarrow r$	$p \rightarrow r$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	F	F	T	F
T	F	T	F	T	T
F	T	T	T	T	T
F	F	T	T	T	T
F	T	F	T	F	T
F	F	F	T	T	T

As all the critical rows has true values, so the argument is valid.

Thanks for your attention!!