



A T M E  
College of Engineering



# RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS

---

Course Code: **BRMK557**

Teaching Hours/Week (L:T:P: S) :2:2:0:0

Total Hours of Pedagogy :25

Credits :03

CIE Marks :50

SEE Marks :50

Total Marks :100

Exam Hours :03

# Course Objectives:

CO1. To Understand the knowledge on basics of research and its types.

CO2. To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.

CO3. To learn Ethics in Engineering Research.

CO4. To Discuss the concepts of Intellectual Property Rights in engineering.

# Module-1 (5 Hours)

**Introduction:** Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem.

**Ethics in Engineering Research,** Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.



# Module-2(5 Hours)

**Literature Review and Technical Reading,** New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.

**Attributions and Citations:** Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.



# Module-3(5 Hours)

**Introduction To Intellectual Property:** Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India.

**Patents:** Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements. Avoid Public Disclosure of an Invention before Patenting.

**Process of Patenting.** Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Commercialization of a Patent. Need for a Patent Attorney/Agent. Can a Worldwide Patent be Obtained. Do I Need First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications. Commonly Used Terms in Patenting. National Bodies Dealing with Patent Affairs. Utility Models.



# Module-4(5 Hours)

**Copyrights and Related Rights:** Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Fair Use Doctrine. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC). International Copyright Agreements, Conventions and Treaties. Interesting Copyrights Cases.

**Trademarks:** Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration. Prior Art Search. Famous Case Law: Coca-Cola Company vs. Bisleri International Pvt. Ltd.



# Module-5(5 Hours)

**Industrial Designs:** Eligibility Criteria. Acts and Laws to Govern Industrial Designs. Design Rights. Enforcement of Design Rights. Non-Protectable Industrial Designs India. Protection Term. Procedure for Registration of Industrial Designs. Prior Art Search. Application for Registration. Duration of the Registration of a Design. Importance of Design Registration. Cancellation of the Registered Design. Application Forms. Classification of Industrial Designs. Designs Registration Trend in India. International Treaties. Famous Case Law: Apple Inc. vs. Samsung Electronics Co.

**Geographical Indications:** Acts, Laws and Rules Pertaining to GI. Ownership of GI. Rights Granted to the Holders. Registered GI in India. Identification of Registered GI. Classes of GI. Non-Registerable GI. Protection of GI. Collective or Certification Marks. Enforcement of GI Rights. Procedure for GI Registration Documents Required for GI Registration. GI Ecosystem in India.

**Case Studies on Patents.** Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, Case study of Basmati patent. IP Organizations In India. Schemes and Programmes

# Continuous Internal Evaluation:

## **Three Unit Tests each of 20 Marks (duration 01 hour)**

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10 th week of the semester
3. Third test at the end of the 15 th week of the semester

## **Two assignments each of 10 Marks**

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the Outcome defined for the course.



# Semester End Examination

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will be set for 100 marks. Marks scored shall be proportionally reduced to 50 marks
2. The question paper will have ten questions. Each question is set for 20 marks.
3. There will be 2 questions from each module. Each of the two questions is under a module (with a maximum of 2 sub-questions).
4. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored by the students will be proportionally scaled down to 50 marks



# Suggested Learning Resources:

## Textbook

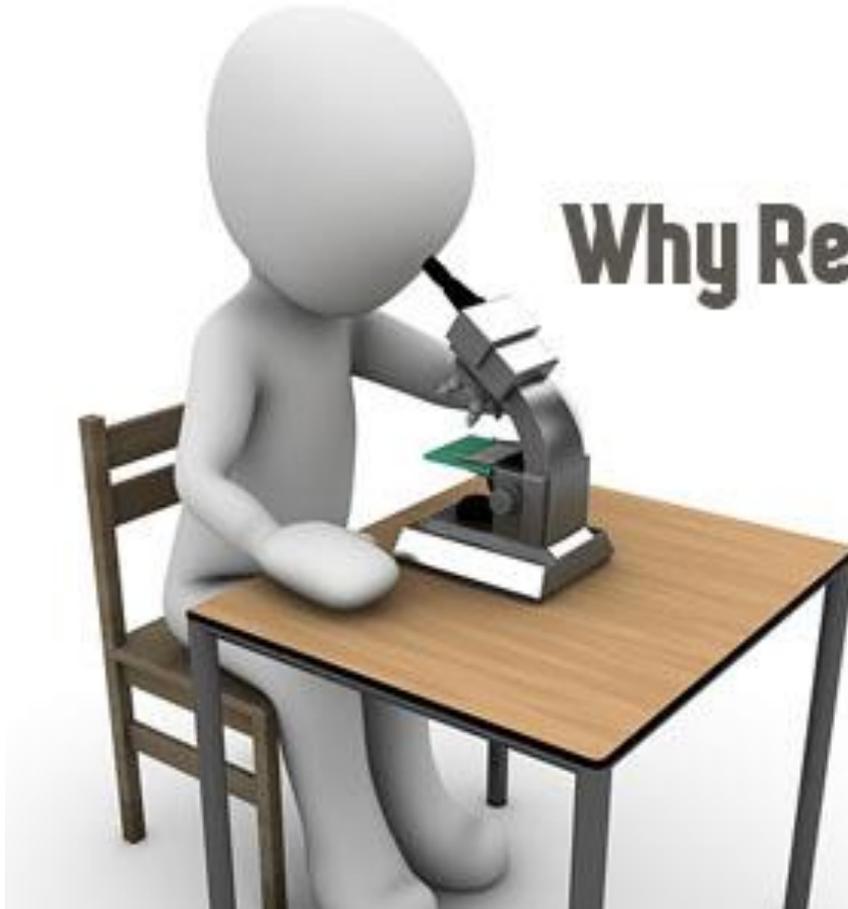
1. Dipankar Deb • Rajeeb Dey, Valentina E. Balas “Engineering Research Methodology”, ISSN 1868- 4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13- 2946-3 ISBN 978-981-13-2947-0 (eBook), <https://doi.org/10.1007/978-981-13-2947-0>
2. Intellectual Property A Primer for Academia by Prof. Rupinder Tewari Ms. Mamta Bhardwa

## Reference Book:

1. David V. Thiel “Research Methods for Engineers” Cambridge University Press, 978-1-107-03488- 4
2. Intellectual Property Rights by N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9

- Research refers to a careful, well-defined (or redefined), objective, and systematic method of search for knowledge.
- Formulation of a theory that is driven by inquisitiveness for that which is unknown and useful on a particular aspect so as to make an original contribution to expand the existing knowledge base.
- **Research involves:**
  1. Formulation of hypothesis (Assumption) or proposition of solutions, data analysis, and deductions and ascertaining whether the conclusions fit the hypothesis.
  2. Research is a process of creating, or formulating knowledge that does not yet exist.

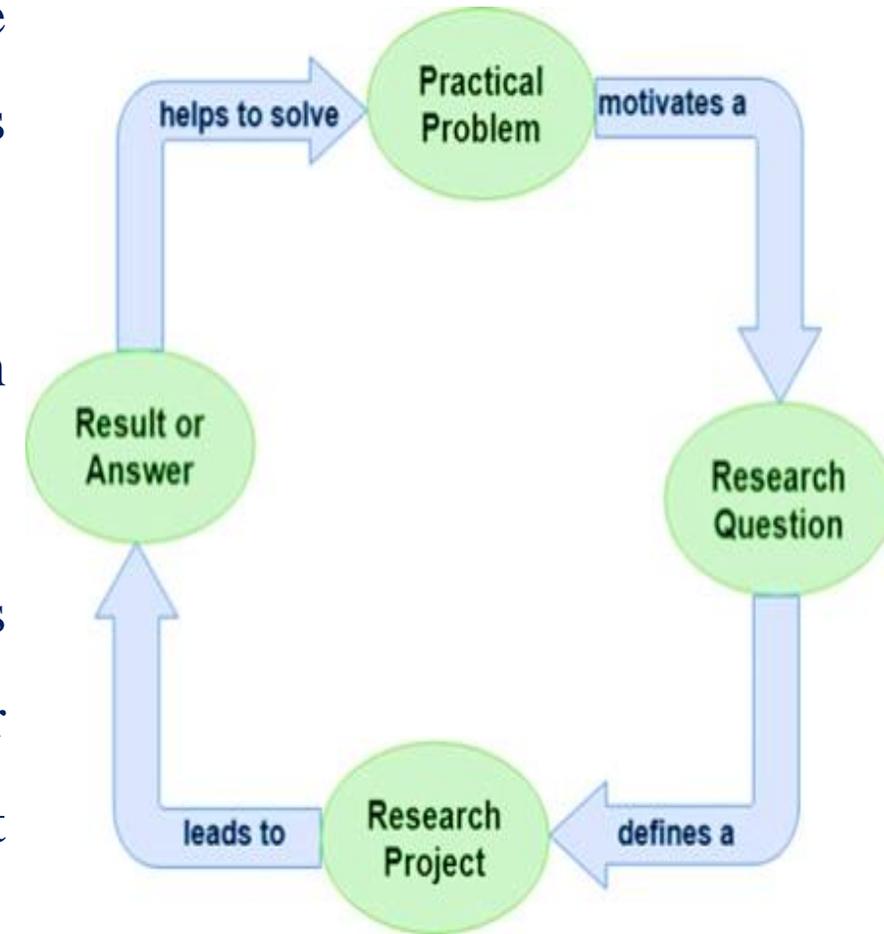




# Why Research Is Important For Students

# The Research Cycle

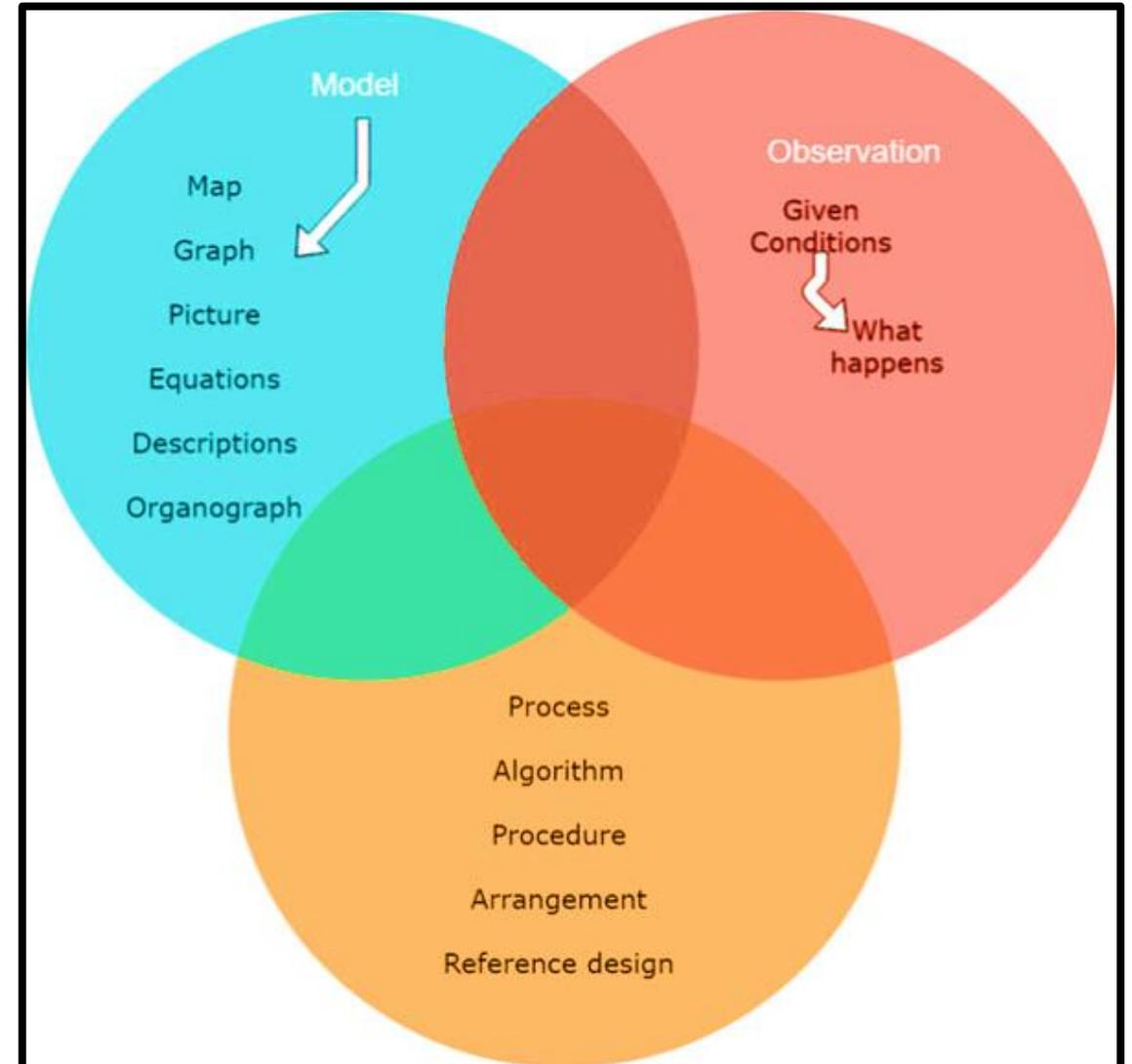
- Research cycle starts with basically a **practical problem**: one must be clear what the problem being attempted to solve is and why it is important.
- This problem motivates a **research question** without which one can tend to get lost in a giant swamp of information.
- In turn research question defines a **research project** which is an activity or set of activities that ultimately leads to **result** or **answer**, which in turn helps to solve the practical problem that one started with in the first place as shown in Fig.



*\* Research is not just about reading a lot of books and gathering a lot of existing information instead adding, maybe small and specific, yet original, contribution to existing knowledge*

# Three Categories of knowledge in Research

1. **Observation** is the most fundamental way of obtaining information from a source and significant in itself.
2. **Models** are simplified ways of describing very complex interactions in the form of a statistical relationship.
3. The final category is a way of arranging or doing things through **processes, algorithms, procedures, arrangements, or reference designs**, to get a certain desired result.



# What is the importance of research and how is it done well?

Research aimed at contributing to knowledge.

Research is not just about following steps. It's about being able to ask new questions, look at things in a new light, and come up with new solutions.

Research questions should be relevant to the world we live in and should be answered with appropriate time and resources.

Research should be used to create new knowledge that can be written or recorded in some way.

The investigation must be systematic and precise.

Qualitative research questions change throughout the project and can be modified as needed.

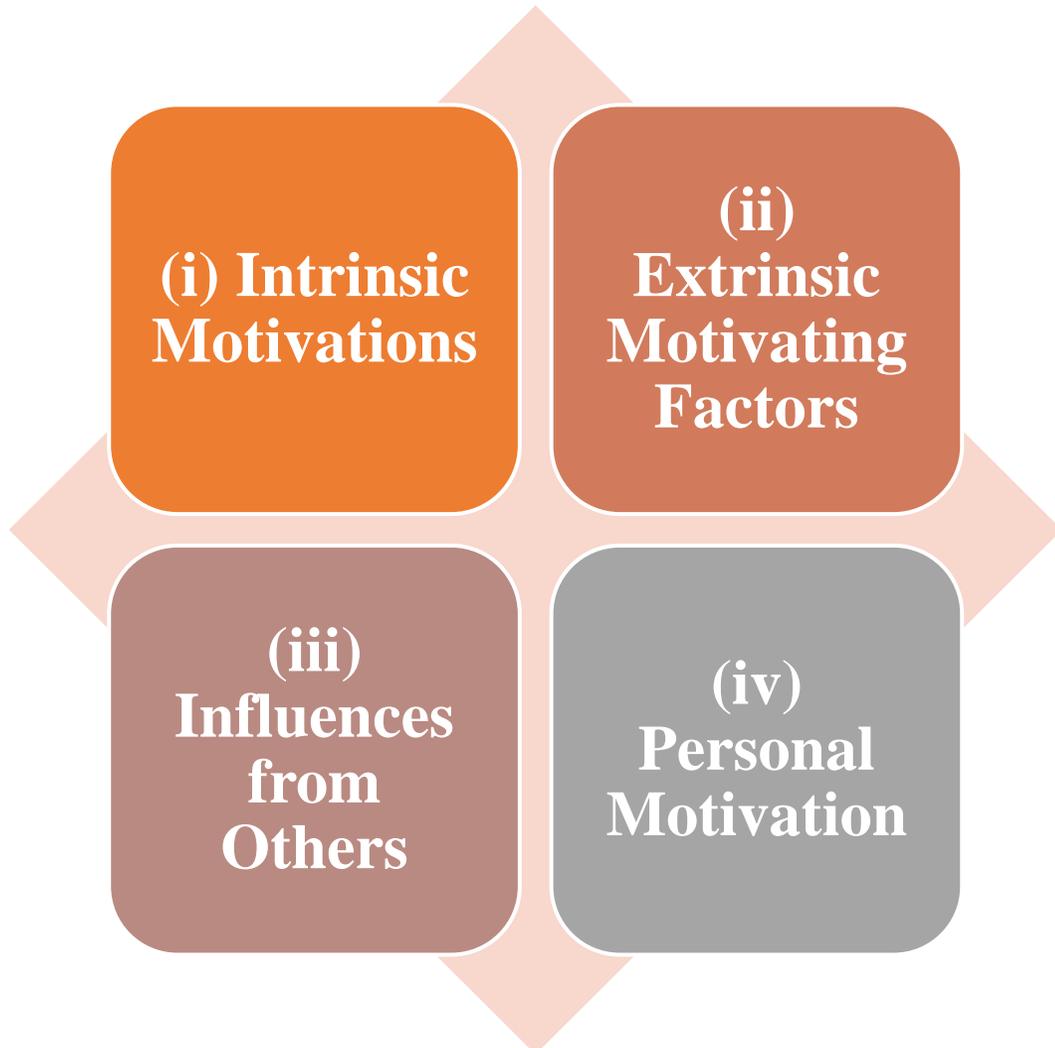
The purpose of research is to understand something or solve a problem.

# Objectives of Engineering Research

- 1. Problem Solving:** The primary objective of engineering research is to address novel and significant problems. Researchers embark on projects with the intention of finding solutions to challenges that are not well-understood or have not been adequately addressed before.
- 2. Innovation and Discovery:** Through circumstantial evidence, intuition, and imagination, researchers make informed guesses about potential conclusions. The aim is to innovate and discover new theoretical or applied knowledge, pushing the boundaries of understanding within the engineering field.
- 3. Thorough Investigation and Information Utilization:** A crucial aspect of engineering research is the ability to conduct thorough investigations and effectively use various types of information. This includes exploring engineering guidelines, standards, and best practices to avoid failures and ensure successful outcomes in both academic and professional settings.



- 4. Types of Research Studies:** Engineering research should encompass different types of research studies, such as exploratory or formulative, descriptive, diagnostic, and hypothesis-testing. Each study type is suited to specific approaches, contributing to a comprehensive understanding of the researched area.
- 5. Adaptive Objectives and Continuous Contribution:** The objectives of engineering research should be framed flexibly. If the initially desired results are not achievable, the researcher should aim to understand why and contribute valuable insights to ongoing research. This adaptive approach ensures that even failures or negative results contribute to the broader understanding of the problem, fostering continuous progress in the field.



The following factors would be a mix of extrinsic and intrinsic aspects:

- (i) Wanting to do better than what has been achieved in the world,
- (ii) improve the state of the art in technology,
- (iii) Contribute to the improvement of society,
- (iv) Fulfillment of the historical legacy in the immediate sociocultural context.

Several other factors like government directives, funding opportunities in certain areas, and terms of employment, can motivate people to get involved in engineering research.

1. **Intrinsic motivations** like interest, challenge, learning, meaning, purpose, are linked to strong creative performance
2. **Extrinsic motivations** like rewards for good work include money, fame, awards, praise, and status are very strong motivators, but may block creativity. For example: Research outcome may enable obtaining a patent which is a good way to become rich and famous.
3. **Influences from others** like competition, collaboration, commitment, and encouragement are also motivating factors in research. For example: my friends are all doing research and so should I, or, a person that I dislike is doing well and I want to do better.
4. **Personal motivations** in solving unsolved problems, intellectual joy, service to community, and respectability are all driving factors.



- (i) Descriptive **versus** Analytical
- (ii) Applied **versus** Fundamental
- (iii) Quantitative **versus** Qualitative

## (i) Descriptive versus Analytical

### **Descriptive Research:**

Descriptive research focuses on describing a situation or phenomenon without manipulating variables. It aims to provide a snapshot of the current state.

### **Analytical Research:**

Analytical research goes a step further, analyzing existing data to uncover patterns, relationships, or reasons behind observed phenomena.

## (ii) Applied versus Fundamental

### Applied Research:

Applied research seeks to solve practical problems or address real-world issues. Its goal is to provide solutions and is often more focused on immediate, practical applications.

### Fundamental Research:

Fundamental research, on the other hand, is driven by a curiosity to expand knowledge. It doesn't necessarily have an immediate practical application and often explores theoretical concepts.

## (iii) Quantitative versus Qualitative

### **Quantitative Research:**

Quantitative research involves the collection and analysis of numerical data. It is focused on measurable variables to establish patterns or relationships.

### **Qualitative Research:**

Qualitative research deals with non-numerical data, often using methods like interviews or observations to explore underlying meanings, attitudes, or perspectives.

# Finding and Solving a Worthwhile Problem

## Finding a Problem

### 1. Identifying a Research Problem:

Research students often need to find research problems, either suggested by supervisors or through literature review and theory exploration.

### 2. Literature Survey:

Conducting a thorough literature survey is crucial to ensure the chosen problem is significant and hasn't been extensively addressed. This step helps acquire essential skills.

### 3. Ideas Related to Research:

Sometimes, inspiration strikes before extensive reading, perhaps triggered by a conversation on a different subject. These initial ideas can be valuable.

### 4. Qualities of a Good Problem:

A good research problem is surprising, awaited by the field, simplifies a theory, introduces a new result, or improves existing practices. It must be worth the researcher's time and effort.

### 5. Not All Problems Are Equal:

Acknowledging that not every problem will be groundbreaking, but solving smaller problems contributes to broader discoveries. Even tackling famously difficult problems can lead to valuable insights.

## Finding and Solving a Worthwhile Problem

George Pólya (1887–1985) suggested a 4-step procedure for mathematical problem-solving, which is relevant to engineering researchers as well.

The recommended steps to solve a research problem are

- (i) Understand the problem, restate it as if its your own, visualize the problem by drawing figures, and determine if something more is needed.
- (ii) One must start somewhere and systematically explore possible strategies to solve the problem or a simpler version of it while looking for patterns.

## Finding and Solving a Worthwhile Problem

- iii) Execute the plan to see if it works, and if it does not then start over with another approach. Having delved into the problem and returned to it multiple times, one might have a flash of insight or a new idea to solve the problem.
- iv) Looking back and reflecting helps in understanding and assimilating the strategy, and is a sort of investment into the future.