INTERNAL ASSESSMENT TEST – I

Sub:	**Research Methodology & Intellectual Property Rights**							Code:	BRMK557
Date:	09/11/24	Duration:	90mins	Max Marks:	50	Sem:	V	Branch:	AIML A & C Section

Answer any 5 full questions

		Marks	CO	RBT
1	What is research? Briefly explain the categories of knowledge in research. Explain the objectives of research.	10	CO1	L1
2	Discuss in detail about the different types of Engineering research.	10	CO1	L2
3	Briefly discuss the attributes to be considered for finding a worthwhile problem and explain the steps to solve it.	10	CO2	L2
4	What ethics generally refers to? What are the ethical concerns in Engineering research. What is Plagiarism? State possible reasons for Plagiarism	10	CO2	L1
5	Discuss the effective way of searching the literature.	10	CO1	L2
6	Discuss strategies for effective technical reading, covering aspects like critical and creative reading, taking notes, and reading mathematical content.	10	CO3	L2
7	Explain in detail the steps to be taken to analyze and synthesize the port art search of research work.	10	CO3	L2

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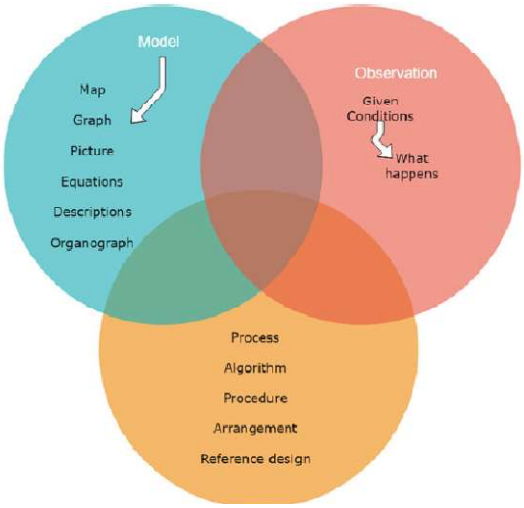
1. Research refers to careful, well defined (or redefined), objective and systematic method of search for knowledge, or formulation of theory, that is driven by inquisitiveness for that which is unknown and useful on a particular aspect so as to make an original contribution to expand the existing knowledge base.
    - Observation
        - Fundamental way for obtaining information.
        - Eg. laboratory experiments, firmwares etc.
        - Processed observation leads to model.
    - ❖ Model
        - Approximate representations.
        - ❖ Statistical models, Mathematical models etc.
        - ❖ modeling equation captures the relationship between different attributes or the behavior of the device in an abstract form.
    - ❖ Processes
        - ❖ Systematic arrangement of doing things.
        - ❖ Algorithms, procedures, reference designs etc.
        - ❖ Objective is to get the result



Objectives of research
To solve new and important problems.
❖ Concluding research outcome should be new*.
❖ Circumstantial evidence, intuition and imagination may lead to possible conclusion.
❖ Rarely, the initial targets might change.
❖ Some targets might be unrealisable.
❖ Negative results
❖ May lead to non target discoveries which might be new

2. Types of engineering research: **Descriptive vs Analytical research**

❖ **Descriptive research**

❖comparative and co relational methods, fact-finding investigation, No control over the variables rather focus on reports.

❖E.g. Online learning impact on student attendance, grades and engagement levels

❖ **Analytical research**

❖ Facts available for analysis, critical evaluation, Better control over variables, focus on the outcomes.

❖E.g.How and why online learning impacts student learning?

Applied vs fundamental research

Applied research

Focuses on immediate problems facing the organisation, Research related to socio-economical trends.

e.g. focus given on more practical and experimentations to provide the solution to treat the disease

Fundamental research

Pure or basic research, formulation of theory and generalizations.

Eg. Mathematical researches or study of basis of specific disease without immediate treatment.

Quantitative vs Qualitative research

Quantitative research

Uses statistical observations, large data involved.

E.g. focused on answering what and how behind a phenomenon or behavior

Qualitative research

Less volume of data, focus on few non representative cases.

E.g. focused on answering why behind a phenomenon or behavior

3. Problem can be stated by research supervisor
    - Problem can be posed by other researchers
    - Problem can be formulated by going through various literatures.
    - Oral presentation of literatures followed by introspection by asking questions.
    - Researcher has to be convinced about the acceptance of the problem taken for study or research.
    - Some problems are hard and open to solve, universally considered as hard.
    - Consists of deep implications and connections to different concepts.

    Recommended steps to solve research problem (George Polya):
        - Understand the problem Restate or redefine the problem or
        - visualize the problem by drawing figures and so on.
        - Systematic approach
        - Execute the plan to see whether it works?
        - Reflect back to Understand and assimilate the path from beginning.
4. Ethics generally refers to a set of rules distinguishing acceptable and unacceptable conduct, distinguishing right from wrong, or wise aphorisms like sayings of Chanakya.

    Whitbeck raised two simple but significant questions to address the tricky issue of authorship in research:

    ❖ (1) who should be included as an author and

    ❖ (2) the appropriate order of listing of authors.

    Technological developments raise a whole range of ethical concerns.

    ❖ Privacy issues related to data and surveillance systems.

    ❖ Research outcomes based repercussions.

    ❖ Adopted practices for obtaining data valid?

    ❖ Is the outcome of data analysis have any negative impact?

    ❖ Engineering Ethics deals with things “what to do” and “What not to do”

    ❖ Ethical perspective of Engineering research vs Technology

    ❖ By setting Ethically right requirements for research outcomes.

    ❖ following ethical values during design process as well as decision making process.

    ❖ Choose different alternatives fulfilling similar functions

    Plagiarism takes place when someone uses or reuses the work (including portions) of others (text, data, tables, figures, illustrations or concepts) as if it were his/her own without explicit acknowledgement.

Verbatim copying or reusing one’s own published work is termed as self-plagiarism and is also an unacceptable practice in scientific literature. The increasing availability of scientific content on the internet seems to encourage plagiarism in certain cases, but also enables detection of such practices through automated software packages.

5. Scholarly publications are authored by researchers in specific fields, undergo peer review, and target experts and students in the field.
   While engineering researchers often refer to scholarly journals and peer-reviewed sources, useful content can also be found in popular publications for broader readership.
   A comprehensive search involves using various search tools and considering the type and availability of information
   Way Searching is an iterative process:
   • Experiment with different keywords and operators;
   • Evaluate and assess results, use filters;
   • Modify the search as needed; and
   • When relevant articles are found, look at their citations and references.

6. Critical and Creative Reading

Reading a research paper is a critical process. The reader should not be under the assumption that reported results or arguments are correct. Rather, being suspicious an asking appropriate questions is in fact a good thing.

Asking the Right Questions:

The reader should ask the following questions during research paper analysis:

(i) Problem Solving: Have the authors attempted to solve the right problem?

(ii) Consideration of Alternatives: Are there simpler solutions that have not been

considered?

(iii) Limitations: What are the limitations (both stated and ignored) of the solution?

(iv) Missing Links: Are there any missing links or gaps in the presented work?

(v) Reasonable Assumptions: Are the assumptions made by the authors reasonable?

(vi) Logical Flow: Is there a logical flow to the paper, or are there flaws in the reasoning?

Importance of Note-Taking and methods:

Building Knowledge: Notes aid in building on acquired knowledge.

Memory Aid: There is a well-known saying that the faintest writing is better than thebest memory, and this holds true for researchers who need to read and build on acquired knowledge.

Marginal Notes: Many researchers take notes on the margins of their copiesof papers or even digitally(annotate) on an article.

Contents to Highlight: In each research paper, there are a lot of things that one might like to highlight for later use such as Definitions, explanations, key concepts, questions, and criticisms.

Long-Term Benefits : Efforts in note-taking become particularly significant when re-visiting and rereading the material after a long time.

Reading Mathematics and Algorithms

Mathematics serves as the foundation for new advances in engineering research, for evolution and development of engineering research and practice.

Algorithm Implementation:

(i) Error-Prone Algorithm Implementation: Implementing intricate algorithms in programming languages like C, C++, or Java is error-prone, even if the researcher is confident. Quick coding may be necessary to verify functionality.

(ii) Practical Testing of Algorithms: Despite the researcher's confidence in the paper and belief in the algorithm's functionality, there's a fair chance it may not work. Quick coding becomes essential to promptly verify its actual functionality.

7.

A researcher should analyze the relevant information ascertained in Table by undertaking the following steps:

(i) Understanding the hypothesis,
(ii) Understanding the models and the experimental conditions used,
(iii) Making connections,
(iv) Comparing and contrasting the various information, and
(iv) Finding out the strong points and the loopholes.

The goal of literature survey is to bring out something new to work on through the identification of unsolved issues, determine the problems in the existing models or experimental designs, and present a novel idea and recommendations.

Here are a few criteria that could help the researcher in the evaluation of the information under study:

• Authority: What are the author's credentials and affiliation? Who publishes the Information?
• Accuracy: Based on what one already knows about the topic or from reading other sources, does the information seem credible? Does the author cite other sources in a reference list or bibliography, to support the information presented?
• Scope: Is the source at an appropriate comprehension or research level?

There are other criteria to consider as well, such as currency, objectivity, and purpose.