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## INTERNAL ASSESSMENT TEST – I – Dec 2023

Sub:	<b>Research Methodology &amp; Intellectual Property Rights</b>							Code:	21RMI56
Date:	20/12/2023	Duration:	90 mins	Max Marks:	50	Sem:	V	Branch:	All

Answer any 5 full questions

		Marks	CO	RBT
1	<p>What is research? Briefly explain the categories of knowledge in research. Explain the objectives of the research.</p> <p><b>Ans:</b> 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.</p> <p><b>Knowledge in categories of Research:</b></p> <ul style="list-style-type: none"> <li>• <b>Observation</b> <ul style="list-style-type: none"> <li>✓ Fundamental way for obtaining information.</li> <li>✓ Eg., laboratory experiments, firmwares etc.</li> <li>✓ Processed observation leads to model.</li> </ul> </li> <li>• <b>Model</b> <ul style="list-style-type: none"> <li>✓ Approximate representations.</li> <li>✓ Statistical models, Mathematical models etc.</li> <li>✓ Modeling equation captures the relationship between different attributes or the behaviour of the device in an abstract form.</li> </ul> </li> <li>• <b>Processes</b> <ul style="list-style-type: none"> <li>✓ Systematic arrangement of doing things.</li> <li>✓ Algorithms, procedures, reference designs etc.</li> <li>✓ Objective is to get the result.</li> </ul> </li> </ul> <p><b>Objectives of Research:</b></p> <ul style="list-style-type: none"> <li>✓ The research must be applied to human systems;</li> <li>✓ The research must yield practical outcomes;</li> <li>✓ The research must yield outcomes which benefit humanity;</li> <li>✓ The research must be ethically based;</li> <li>✓ The research should consider environmental outcomes;</li> <li>✓ The research must be based on standard industry based testing.</li> </ul>	10	CO1	L2
2	<p>Discuss in detail the different types of engineering research.</p> <p><b>Descriptive versus Analytical</b></p> <ul style="list-style-type: none"> <li>✓ Descriptive research asks “what?” It describes something. Meanwhile, analytical research asks “why?” We try to find out how something came to be.</li> <li>✓ Descriptive research classifies, describes, compares, and measures data. Meanwhile, analytical research focuses on cause and effect.</li> </ul> <p><b>Applied versus Fundamental</b></p> <ul style="list-style-type: none"> <li>✓ Applied research finds a solution for immediate problem</li> <li>✓ Fundamental research is gathering knowledge – theory formulation</li> </ul> <p><b>Quantitative versus Qualitative</b></p> <ul style="list-style-type: none"> <li>✓ Qualitative – phenomena related to quality or kind</li> <li>✓ Quantitative – based on the measurement of some characteristics like economics</li> </ul>	10	CO1	L2
3	<p>Briefly discuss the attributes to be considered for finding a worthwhile research problem and explain the steps to solve it.</p> <ul style="list-style-type: none"> <li>• Research problem given by the research supervisor <ul style="list-style-type: none"> <li>• Otherwise, rethinking of a basic theory and information from various research papers</li> </ul> </li> <li>• Research Scholars need a skill to identify the research problem <ul style="list-style-type: none"> <li>• Address a critical problem and not taught</li> </ul> </li> <li>• Next, literature survey and technical reading, to confirm its worthiness</li> </ul>	10	CO1	L2

	<ul style="list-style-type: none"> <li>From where to start your literature survey – initial spark, idea gained through lectures or development in another subject, may lead to problem identification</li> <li>A worthwhile research problem would have one or more attributes <ul style="list-style-type: none"> <li>Nonintuitive/counterintuitive even to someone who knows the area</li> <li>Something that the research community had been expecting for sometime</li> <li>major simplification of a central part of the theory</li> <li>a new result which would start off a new subject or an area</li> <li>provides a new method or improves upon known methods of doing something which has practical applications, or a result which stops further work in an area.</li> </ul> </li> <li>The researcher has to be convinced that the problem is worthwhile before beginning to tackle it <ul style="list-style-type: none"> <li>because best efforts come when the work is worth doing, and the problem and/or solution has a better chance of being accepted by the research community.</li> </ul> </li> <li>Some problems are universally considered hard and open, and have deep implications and connections to different concepts.</li> </ul>			
4	<p>What do ethics generally refer to? What are the ethical concerns in Engineering research? What is Plagiarism? State possible reasons for Plagiarism.</p> <ul style="list-style-type: none"> <li>Ethics generally refers to a set of rules distinguishing acceptable and unacceptable conduct, distinguishing right from wrong</li> <li>Ethical principles can be used for evaluation, proposition or interpretation of laws.</li> <li>Although ethics are not laws, but laws often follow ethics because ethics are our shared values.</li> <li>Technological developments raise a whole range of ethical concerns such as privacy issues and data related to surveillance systems <ul style="list-style-type: none"> <li>Researchers need to make ethical decisions and are answerable for the repercussions borne out of their research as outcomes</li> </ul> </li> <li>The reason that ethics matter in data used in engineering research <ul style="list-style-type: none"> <li>Acceptable by few and not acceptable by others</li> </ul> </li> <li>Engineering ethics gives us the rule book; tells us, how to decide what is feasible to do and what is not.</li> <li>Researchers make many choices that matter from an ethical perspective</li> </ul> <ol style="list-style-type: none"> <li>By setting the ethically right requirements at the very outset, engineering researchers can ultimately influence the effects of the developed technology.</li> <li>Influence may also be applied by researchers through design (a process that translates the requirements into a blueprint to fulfill those requirements). During the design process, decision is to be made about the priority in importance of the requirements taking ethical aspects into consideration.</li> <li>Thirdly, engineering researchers have to choose between different alternatives fulfilling similar functions.</li> </ol>	10	CO1	L2
5	<p>Discuss the effective way of searching the literature.</p> <p>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.</p> <p>Diverse Sources and Considerations:</p> <ol style="list-style-type: none"> <li>Scholarly vs. Popular Publications: Scholarly publications are formal, peer-reviewed, and aimed at experts, while popular publications are informal and cater to a broader audience.</li> <li>Multiple Sources Needed: No single source provides all required information; researchers must explore various sources.</li> <li>Availability and Timing: Not all information is online; scholarly information may take time to publish, and current news may not have scholarly coverage.</li> <li>Iterative Process: Searching involves experimenting with keywords, evaluating results, modifying searches, and analyzing citations and references.</li> </ol> <p>Research Process Steps:</p> <ol style="list-style-type: none"> <li>Literature Survey: Engage in an iterative process of searching, evaluating, and modifying</li> </ol>	10	CO2	L2

	<p>searches to identify relevant sources.</p> <p>2. Critical Reading: Thoroughly read and observe salient points in selected sources, making notes and summarizing findings.</p> <p>3. Comparison and Contrast: Compare and contrast findings to identify patterns, trends, and inconsistencies.</p> <p>4. Continuous Process: Literature survey is ongoing, as new literature appears and understanding grows, leading to new connections and related problems.</p>			
6	<p>Explain in detail the steps to be taken to analyze and synthesize the prior art search of research work.</p> <p>After collecting relevant sources, researchers engage in breaking down and synthesizing each article's content to construct a cohesive literature review. This process involves understanding the articles' hypotheses, models, experimental conditions, and drawing connections between different pieces of information. The goal is to identify unsolved issues, flaws in existing models, and propose novel ideas.</p> <p>Steps in Analyzing Literature :</p> <p>1. Understanding the Hypothesis: Grasp the central research question or hypothesis of each article. This helps establish the context and purpose of the research.</p> <p>2. Understanding Models and Experimental Conditions: Delve into the models and experimental setups used in the articles. This understanding helps in comparing and contrasting findings and methodologies.</p> <p>3. Making Connections: Identify common themes, similarities, and differences across the articles. This step involves synthesizing the information to derive meaningful insights.</p> <p>4. Comparing and Contrasting: Compare various pieces of information, methodologies, and results across different sources. This comparison can reveal trends, contradictions, or gaps in the existing knowledge.</p> <p>5. Finding Strong Points and Loopholes: Evaluate the strengths and weaknesses of each article. Identify areas where the research is robust and where there might be limitations or areas that need further investigation.</p>	10	CO2	L2