Module-2 Technical Writing and Presentations (5 hours)

> **Research Paper Writing:** Importance, steps of writing research papers, Contents of a research article, Illustrations.
> **Thesis Writing:** Synopsis, Introduction, Literature review, Aim and Objectives, Methodology, Time frame, Results and discussions, Conclusions. Illustrations.
> **Research Proposal Writing:** Preliminary requirements for proposal writing, Standard heads in research proposal. Illustrations.

2.1 Research Paper Writing

2.1.1 Importance of Research Paper Writing

A research article is a written document which contains the critical presentations of the results of an original research and is published in peer reviewed scholarly journal.

Writing research papers serves several crucial purposes across various academic and professional fields. Here are some key reasons why writing research papers is important:

(i). Contribution to Knowledge: Research papers contribute to the existing body of knowledge in a particular field. They allow researchers to share their findings, insights, and discoveries, thereby advancing the understanding of a subject.

(ii). Critical Thinking and Problem-Solving: The process of researching and writing a paper encourages critical thinking. It involves analyzing information, synthesizing ideas, and drawing conclusions, which are essential skills for problem-solving in academia and the workforce.

(iii). Documentation of Findings: Research papers document the methods, results, and conclusions of a study. This documentation provides a reference for other researchers, allowing them to replicate experiments or build upon previous work.

(iv). Communication Skills: Writing research papers hones communication skills. Researchers need to articulate their ideas clearly and effectively to convey complex information to a broader audience.

(v). Academic Recognition and Career Advancement: Publishing research papers is often a requirement for academic advancement. It helps researchers gain recognition within their field and can lead to opportunities for grants, collaborations, promotions, and tenure.

(vi). Peer Review and Quality Assurance: Publishing papers involves peer review, where experts in the field evaluate the research for its quality, accuracy, and contribution. This process ensures the credibility and validity of the research.

(vii). Impact and Influence: Well-written and impactful research papers can influence policies, practices, and further research in a particular area. They can shape discussions, inspire new ideas, and drive innovation.

(viii). Education and Learning Process: Writing research papers is an integral part of the educational process. It allows students to delve deep into a subject, fostering a deeper understanding and appreciation for the research process itself.

(ix). Documentation and Preservation of Knowledge: Research papers serve as a permanent record of scholarly work. They contribute to the preservation of knowledge for future generations of researchers and students.

(x). Personal and Intellectual Growth: Engaging in research and writing papers is intellectually stimulating. It challenges individuals to expand their knowledge, explore new concepts, and develop their abilities as researchers and scholars.

In summary, writing research papers plays a crucial role in advancing knowledge, fostering critical thinking skills, communicating ideas effectively, and contributing to the growth and development of individuals and their respective fields of study.

2.1.2 Steps of Writing Research Papers
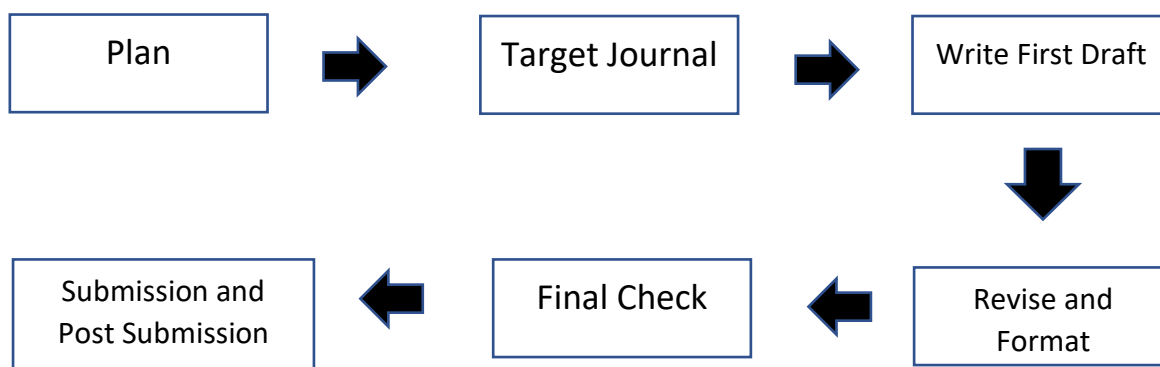The steps in writing the research papers are illustrated in the following figure.

Figure. Steps in Writing Research Papers

Step 1 Plan: Planning the paper writing shall be in terms of Time, Studies to be included, Language , Author's Name and Outline of the Paper.
Time - It is suggested to start early and do not wait up to the end of your entire research work.
Studies to be included – Plan the preliminary promising studies which yielded good and novel results. Do not cut the work intentionally in smaller pieces of work in order to make more number of papers.
Language - English is the most widespread language with respect to readership in international scientific communication and shall be the first choice while writing research papers.
Author's Name - Authorship denotes an "intellectual contribution" to the work, and that an author should be able to explain and defend the work. At this stage itself, it is better to decide on the authorship numbers and their sequence in the research paper.
Outline of the Paper - Plan the outline of your article as per the scope and type of your article. One possible could be:

- Body of knowledge (LR),
- Rational,
- Aim/objectives,
- Methods, and
- Results & Discussion

Step 2: Target Journal: For targeting your manuscript/research article to a suitable journal one must take care of the following points.
- Match your topic with scope of journal
- Refer Databases for targeting
- Reputation (IF or other journal metrics: Impact, speed and reach)
- Time
- Availability (online/ offline)

- Indexing
- Format (See the guidelines for authors and general submission guidelines)
- Article Processing Charges

Step 3: Write the First Draft: While preparing the first draft, one shall maintain a systemic flow in writing and presenting information following the journal guidelines. Avoiding grammatical mistake and plagiarism is very crucial at this stage. Reader friendliness and clarity brings more value to the first draft. Focus shall be given at every section of the article.

Step 4: Revision: In revision, make major alterations to make your manuscript attractive and easy to read. Fill in gaps. Correct flaws in logic restructure the document to present the material in most logical order.

Polish the style, refine the text. Focus on correct grammar and spelling polish the style, refine the text and focus on correct grammar and spelling. Ensure cohesion and coherence. Format the document and page setting as recommended by the journal.

Revision is an ongoing process. The most practiced strategy is to write out an initial draft and leave it for a day. Then again come back to it and revise and always be ready for multiple revisions.

Step 5: Final Check: Final check must be done by all co-authors. Co-authors should check the final draft to make sure it satisfies their expectations. Check the overall appearance, identify any break in inconsistency page breaks etc. Check compliant to formatting guidelines.

Check table and figure number and their text citation. Finalize abstract and check the accuracy of the abstract. Lastly finalize the title and see the accuracy alphabet by alphabet.

Step 6: Submission and Post Submission:

Submission*:* This step involves preparing a cover letter (for Journal Submission), Submission to Journals/Conferences and awaiting the Review/Feedback.

Post Submission includes Response to Reviewers (if applicable), Revision and Resubmission, Acceptance and Publication, Proofreading and Final Checks, Publication and Dissemination.

2.1.3 Contents of a Research Article
The most commonly used style of writing Research Article is IMRaD style of writing. IMRaD stands for Introduction, Methods, Results, and Discussion, which is a common structure used in scientific and academic writing, especially for research papers and articles. A brief description of each section in the IMRaD format is as follows:

a. Introduction: The Introduction section sets the stage for the research paper by providing context, background information, and the research problem or question. It includes a brief overview of the topic, the significance of the study, and the objectives or hypotheses. The introduction ends with a clear and concise statement of the research aim or the purpose of the study, often culminating in the presentation of the research question or the hypothesis.

b. Methods: The Methods section details the methodology used to conduct the research. It describes the research design, materials, and methods employed in data collection or experimentation. This section includes information on the participants or subjects (if applicable), the procedures followed, data

collection techniques, and any tools or instruments used. It should be written in a way that another researcher could replicate the study based on the information provided.

c. Results: The Results section presents the findings obtained from the research. It includes raw data, statistical analyses, graphs, tables, and any other forms of data representation to illustrate the outcomes of the study. This section focuses on presenting the results objectively without interpretation or discussion of their implications.

d. Discussion: The Discussion section interprets and explains the significance of the results. It analyzes the findings in the context of the research question or hypothesis stated in the introduction. The discussion compares the results to previous research, identifies limitations, and discusses the implications, applications, and potential future directions for further research. This section often concludes by summarizing the main findings and their broader implications in the field.

Following the IMRaD structure provides a clear and systematic organization for research articles, guiding readers through the logical progression of the research process from introduction to discussion and aiding in better comprehension of the study's purpose, methodology, results, and implications.

2.1.4 Referencing and Citations: Referencing and Citations are crucial components of research article writing as they acknowledge and credit the sources of information used in the paper, support arguments, and provide credibility to the work.

Referencing:
Definition: Referencing refers to the systematic way of acknowledging sources used in a research paper by providing detailed information about those sources in a standardized format.

Citations:
Definition: Citations are specific mentions within the text of the research paper that indicate the source of information or ideas being referenced.

Importance:
a. Avoid Plagiarism: Proper referencing and citations help to avoid plagiarism by giving credit to the original authors or sources of information.
b. Support Arguments: Citations strengthen arguments by providing evidence from existing literature, research, or expert opinions.
c. Credibility and Validity: Referencing adds credibility and validity to the research by demonstrating that the author's claims are supported by established sources.

Elements of Referencing and Citations:
a. In-text Citations: These appear within the text of the paper and typically include the author's last name and publication year (e.g., (Smith, 2019)).
b. Reference List/Bibliography: This is a list of all the sources cited in the paper. It includes detailed information such as author(s), title, publication date, publisher, and page numbers (based on the citation style used).
c. Citation Styles: Different academic disciplines use specific citation styles (e.g., APA, MLA, Chicago, Harvard) that dictate the format for in-text citations and the reference list. Each style has its guidelines for citing different types of sources like books, journals, websites, etc.

d. Direct and Indirect Citations: Direct citations involve quoting directly from a source, while indirect citations involve paraphrasing or summarizing the information from a source.

How to Use Referencing and Citations in Research Article Writing?
- Ensure every idea, fact, or direct quote that is not common knowledge is properly cited.
- Use in-text citations whenever you refer to or quote from a source.
- Create a comprehensive reference list or bibliography at the end of the paper, listing all sources used in the paper.
- Follow the specific citation style required by the journal or academic institution.

Proper referencing and citations are essential not only for academic integrity but also for acknowledging the contributions of others, allowing readers to trace and verify information, and situating your research within the existing body of knowledge.

2.1.5 Submission and Post-submission: These steps in research paper writing involve finalizing the paper and handling the publication or dissemination process.

A. Submission

1. Final Review:
• Before submission, thoroughly review the entire paper for accuracy, coherence, and adherence to guidelines.
• Check citations, formatting, grammar, and spelling to ensure the paper meets the required standards.

2. Prepare Cover Letter (for Journal Submission):
• When submitting to a journal, craft a cover letter addressing the editor, briefly summarizing the paper's significance, and highlighting its contribution to the field.

3. Submission to Journals/Conferences:
• Submit the paper to a relevant journal or conference based on the guidelines provided by the publication or event.
• Follow the submission instructions carefully regarding formatting, file types, word count, and supplementary materials.

4. Await Review/Feedback:
• After submission, the paper undergoes a peer review process where experts in the field evaluate its quality, validity, and significance.
• This stage may take time, and authors typically receive feedback from reviewers or editors regarding acceptance, revisions, or rejection.

B. Post-Submission

1. Response to Reviewers (if applicable):
• If reviewers request revisions, carefully address each comment or suggestion, making necessary changes to improve the paper.
• Craft a detailed response letter outlining the revisions made and the reasons for those changes.

2. Revision and Resubmission:
• Revise the paper based on the feedback received from reviewers or editors.
• Ensure all required changes are implemented effectively and the paper meets the publication's standards.

3. Acceptance and Publication:

• If the paper is accepted, the publication process begins, and the paper moves towards publication.

• Authors might need to sign publication agreements, provide copyright permissions, or make final formatting adjustments.

4. Proofreading and Final Checks:

• Before publication, carefully proofread the paper to catch any last-minute errors or formatting issues.

• Ensure all citations, references, figures, and tables are accurate and properly formatted.

5. Publication and Dissemination:

• Once finalized, the paper is published in the journal or presented at the conference.

• Share the paper with colleagues, peers, and relevant communities through presentations, social media, or academic networks to maximize its impact.

6. Post-Publication Communication:

• Engage with readers, respond to queries, and participate in discussions related to your published work.

• Consider writing blog posts, press releases, or summaries to reach wider audiences.

The submission and post-submission stages are crucial in the research paper writing process, as they determine the visibility, impact, and dissemination of your findings within the academic or professional community.

2.2 Thesis Writing

Thesis writing is a structured process that involves presenting an original research project or study in a formal academic document. The breakdown of the typical components included in a thesis are:

i. Synopsis: A synopsis is a brief overview of the entire thesis. It outlines the main research problem, objectives, methodology, and expected outcomes. It serves as a snapshot of what the thesis is about.

ii. Introduction: The introduction sets the stage for the thesis. It provides background information on the topic, explains the research problem, states the objectives or hypotheses, and outlines the significance or relevance of the study.

iii. Literature Review: This section critically examines existing scholarly works, research, and literature relevant to the thesis topic. It discusses and analyzes the key theories, concepts, findings, and debates in the field, highlighting gaps that the current research aims to fill.

iv. Aim and Objectives: The aim defines the overall purpose or goal of the research, while objectives break down this aim into specific, measurable, and achievable tasks. Objectives guide the research process and help in achieving the overall aim.

v. Methodology: This section details the methods and procedures used to conduct the research. It describes the research design, data collection methods, sampling techniques (if applicable), tools or instruments used, and data analysis techniques.

vi. Time Frame: Sometimes included in the methodology section, the time frame outlines the schedule or timeline for completing different stages of the research, including data collection, analysis, and writing.

vii. Results and Discussions: The results section presents the findings obtained from the research. It can include tables, graphs, or statistical analyses. The discussion section interprets these findings, relates them to the research questions or objectives, compares them with existing literature, and explores their implications.

viii. Conclusions: This section summarizes the key findings of the research, reiterates the significance of the study, and discusses its implications. It may also suggest areas for further research.

Each of these components contributes to the overall structure and coherence of the thesis, helping to present a well-rounded and thorough investigation into the chosen research topic. The specific format and requirements for a thesis can vary based on academic disciplines and institutions.

These components of the Thesis are further discussed in detail as follows.

2.2.1 Synopsis

This is presented in the form of a brief research proposal for approval of the topic from the authorities. The length of each part of the synopsis may vary depending on the requirement of individual institutional guidelines, trend and as per the instructions of Supervisor.

a. Title
Choosing a research topic or title (i.e., getting started) is perhaps the most difficult part of writing a synopsis. Title tells us the full story and it reflects the ascent of the complete research. Title of a synopsis must be the same (word to word) the title of your thesis.

Title should be – Catchy, Should not be too lengthy, Broadly cover the topic, Should easily create Interest, Clear, Precise, Justify the time limit.

b. Introduction
Introduction of synopsis should cover the little background information of the topic. In brief one must explain that what work already exists in this area. And What are its strength and deficiencies?

Thing to remember
- Should be started reflecting background
- Justifying the need of research
- Statement of problem
- How your research is different from existing one?
- References should be cited

Things which you should never do
- Should not write about yourself and your supervisor
- Don't expose the whole idea and about your expertise
- Don't forget to relate your work with basic literature

c. Literature review

Literature review (LR) can be defined in many ways.

"Systematic and organized compilation and critical study of related body of knowledge is literature survey."

"A literature review surveys books, scholarly articles, and any other sources relevant to a particular issue, area of research, or theory, and by so doing, provides a description, Summary, and critical evaluation of these works in relation to the research problem being investigated."

What are the criteria for selecting literature...?
- Should be restricted to 10 to 20 research paper (Important)
- References should be latest
- Research paper should be preferred over review
- Should be 100 percent relevant to the topic

For synopsis there can be two ways of writing literature review
- Paragraph wise little description of paper
- Running discussion of all the selected papers

d. Aims and Objectives

Aim of the study should be in the form of a statement which somewhere reflects the hope what you want to do and where you want to finish. Aim is about what you want to do and objective is about how you are going to do that.

Aim should be –
- Brief and concise
- Realistic (Means weather you can achieve them in the given time period)

Objectives

These objectives should be SMART (Specific, Measurable, Attainable, Relevant and Time bound). In totality the set of objectives should meet the aim of the study. Objectives are list of things (Point wise) you are going to do to achieve your aim and it visualizes the sequence of each step of your research.

Objectives should **not** be
- ✓ Be too vague, ambitious
- ✓ Repetitive
- ✓ Lengthy
- ✓ Messy

e. Methodology

Methodology involves the process of carrying out the actual research. In case of sciences state the method which you used to prepare. synthesize, to analyze and mention how did you perform it and describe the materials and equipment used in the research.

For humanities you should state which method you used to collect data/ information/cases etc...and explain if any randomization techniques/statistical methodology you are going to apply. Methodology can usually be divided into a few sections depending upon the area of research.
Methodology should be
- Clear
- Concise
- Conclusive

f. Time Schedule of Work

This is just like a simple time table of your work. This part should tell when you are going to finish a task in the entire duration and also tells how the completion of a phase of the work is related with the commencement of the next phase. Once your problem statement / formulation and objectives are approved by your supervisor, all details should be added to your time plan.

This is either given by CPM (Critical path method), PERT chart (Performance evaluation review technique) or by simple tabular presentation. It covers –

- Literature search,
- Potential fieldwork (e.g. interviews and/or questionnaire administration),
- Procurement of raw materials
- Compilation of data/preparation and synthesis
- Data analysis /Evaluation
- Result writing /Discussion

g. References

A synopsis should have limited references depending upon the prescribed guidelines. In general, a synopsis should have about 10-15 latest references. References should be properly and uniformly cited in the text. The way of references writing should be uniform as there are number of reference writing styles.

All references should be

- Relevant to the topic
- Latest one
- Research articles
- Authentic one (should be of reputed journals and books)

2.2.2 Results and Discussion

Results

The result part is very easy to write, as it is just compilation of facts and observations. And discussion is discussing the observed facts and data with the help of supporting papers (literature). In general practice one can write results and discussions in two ways.

- Write results and discussions separately
- one can write the results and discussion simultaneously

Or there may be specific guidelines of writing the same (it depends) or you may have to follow the instructions of your supervisor. But in any way, it is up to you that how effectively you can present it so that it is very easy to understand. You should guide the findings of your study in a logical sequence by using non-textual elements (mostly if possible), such as, figures, charts, photos, maps, tables, etc.

You can start the section stating in brief that with what you have done in the study. Then take the results of experiments one by one. And if you are little Confused about certain results just recall your research question and then decide What and in which sequences it must be written. The sequences of the results Should follow the listed methodology, or you can write in order from most relevant to least important one.

Points to remember while writing the results -

- Always write results section in past/ past perfect tense
- Make sure that each table and figure has a number and a title
- There should be one single way of writing table
- Focus on writing just observations and data (interpretation relevance and justification of observed data you can do in discussion part)

Things you should never do while writing -

- Do not manipulate the finding (An expert reviewer can easily trace the manipulations, and this may result in bad consequences. Even a small manipulation can make your whole work questionable and unreliable).
- Do not ignore negative results
- Do not over actualize the findings
- Do not repeat the same information
- Do not confuse table with figure

Discussions

Discussion of a thesis is the centric part that everyone wants to read. It shall be strong enough to deal with the all probable queries of readers and evaluator. Discussion involves the interpretation of your research findings and, significance in the related area of research and finally stating the addition of new findings along with existing one.

The discussion part grooms your findings and enforces the reader to think critically and analyze the research problem and of course it brings out the space for further extension of the study. Overall it reflects the importance of your Study in the existing area.

- You can start by writing your research problem in brief following importance of your study.
- Mention similar studies (compare and contrast Your research findings with existing one /and Discuss possible reasons of similarity and dissimilarities with other related studies.)
- Follow the same sequence of writing as you did in results section.
- Discuss how other researches supported your findings (other researches include references of reputed and high impact journals.
- Mention if any clinical relevance (supported by literature).
- Consider alternative findings if you can justify with the supportive literature.
- State limitations and weakness of your study (mention wisely).
- Make suggestions for further research (In brief).
- Lastly concise the summary of the principal findings regardless of their significance.

Things you should not do ...while writing discussions

- Do not over interpret (interpretation should be supported by literature)
- Do not rewrite results
- Do not add new results
- Do not repeat the things
- Do not criticize others (if you find anything in contrast, just mention, professionally)

2.2.3 Conclusions

Writing a conclusion for a thesis is crucial as it's the final part that summarizes your work and presents key findings. The structured approach to crafting a strong conclusion for thesis includes:

a. Summarize Your Thesis Statement:

Revisit your thesis statement and briefly restate it, emphasizing its significance in light of the research/work conducted.

b. Recap Key Points:

Summarize the main points and arguments presented in your thesis. Highlight the essential findings, methodologies used, and the significance of your research/work in addressing the research question or problem statement.

c. Discuss Contributions and Implications:

Discuss the contributions your research/work has made to the field. Explain how your findings fill gaps in existing knowledge, offer new perspectives, or suggest practical implications for the subject area.

d. Reflect on Limitations:

Acknowledge any limitations in your research methodology, data collection, or analysis. Discuss how these limitations might have impacted your findings and suggest areas for future research to address these limitations.

5. Reinforce the Significance:

Reiterate the importance of your research in the broader context of the field. Discuss how your work adds value, contributes to the existing knowledge base, and why it's relevant.

6. End with a Strong Closing:

Finish your conclusion with a strong closing statement that reinforces the significance of your work. You can provide a thought-provoking remark, suggest practical applications, or propose avenues for further research.

Tips:

Be Concise: Keep the conclusion concise while covering all necessary points.

Avoid Introducing New Information: The conclusion isn't the place to introduce new ideas or information.

Connect Back to Introduction: Create a link between the introduction and conclusion to provide a sense of closure.

Example:

In summary, this thesis explored [topic] through [methods]. The findings underscore the importance of [thesis statement] and contribute significantly to the understanding of [subject]. While limitations exist, such as [limitations], the implications of this research for [field] are noteworthy. Moving forward, further investigations could delve into [potential future research]. Ultimately, this study highlights the relevance of [topic] and its impact on [field], emphasizing the need for continued exploration in this area.

Remember, the conclusion serves as the final impression for your reader, so ensure it effectively encapsulates the essence and importance of your research.

2.3 Research Proposal Writing

2.3.1 Types of Research Projects:

Research projects can be categorized into various types based on their aims, methodologies, and purposes. A brief introduction to some common types of research projects are given as under:

i. Descriptive Research:

Descriptive research aims to describe characteristics or traits of a particular phenomenon without manipulating variables. It provides a comprehensive picture of the subject, such as demographics, behaviors, or trends, using methods like surveys, observations, or case studies.

ii. Experimental Research:

Experimental research involves manipulating variables to establish cause-and-effect relationships. Researchers control and manipulate variables to observe their impact on the outcome. It often includes

a control group and an experimental group, utilizing methods such as randomized controlled trials (RCTs) to test hypotheses.

iii. Exploratory Research:

Exploratory research seeks to explore new areas or gain insights into poorly understood phenomena. It focuses on generating ideas, hypotheses, or initial understandings rather than testing specific hypotheses. Methods include literature reviews, interviews, or focus groups.

iv. Correlational Research:

Correlational research examines the relationship between two or more variables without establishing causation. It measures the degree of association between variables using statistical analysis to determine if changes in one variable relate to changes in another.

v. Qualitative Research:

Qualitative research aims to understand underlying reasons, motivations, and attitudes by exploring in-depth perspectives and experiences. It often involves methods like interviews, focus groups, or ethnographic observations to gather rich, subjective data.

vi. Quantitative Research:

Quantitative research involves collecting numerical data and analyzing it using statistical methods. It aims to quantify relationships, patterns, or behaviors and relies on surveys, experiments, or structured observations to collect data.

vii. Longitudinal Research:

Longitudinal research studies a group of subjects over an extended period, observing changes or developments over time. It's useful in understanding trends, developmental patterns, or the long-term effects of interventions.

vii. Action Research:

Action research involves collaboration between researchers and practitioners to address real-world problems or improve practices. It emphasizes practical solutions, often conducted within a specific organizational or community context.

ix. Mixed Methods Research:

Mixed methods research combines both qualitative and quantitative approaches to gain a comprehensive understanding of a research problem. It allows researchers to triangulate findings, providing a more holistic view.

These types of research projects serve diverse purposes and employ various methodologies, catering to different research questions and objectives within academia, industry, or other fields of study.

2.3.2 Major Funding Agencies in India

Following is a list of some major funding agencies in India across various sectors:

A. Government Funding Agencies:

Department of Science and Technology (DST): Supports scientific research, technology development, and innovation.

Indian Council of Medical Research (ICMR): Promotes biomedical research and supports medical studies.

Department of Biotechnology (DBT): Focuses on biotechnology research, development, and application.

Council of Scientific and Industrial Research (CSIR): Encourages scientific and industrial research.

University Grants Commission (UGC): Provides funding for higher education and research in universities and colleges.

All India Council for technical Education (AICTE): Promotes Quality in Technical Education through funded Trainings, Research & Scholarships

Ministry of Electronics and Information Technology (MeitY): Supports research and development in electronics, IT, and related areas.

Indian Council of Agricultural Research (ICAR): Promotes agricultural research and education.

B. Non-Governmental Funding Agencies:

Tata Trusts: Engages in various philanthropic activities, including funding research and social programs.

Infosys Foundation: Supports various social causes, including education, healthcare, and research.

Reliance Foundation: Engages in initiatives across education, healthcare, rural transformation, and other sectors.

Wellcome Trust/DBT India Alliance: Funds biomedical research and fellowships in India.

Azim Premji Foundation: Focuses on education and supports initiatives in the field.

Indian National Science Academy (INSA): Provides funding for research and fellowships in sciences.

Human Frontier Science Program (HFSP): Offers grants for international collaborations in life sciences research.

Please note that this list might not be exhaustive, and the landscape of funding agencies in India can change with time. Additionally, there might be other regional or specialized funding organizations operating in specific states or focusing on particular research domains.

2.3.3 Preliminary Requirements for Research Proposal Writing
Preliminary requirements for creating a comprehensive research proposal include:
i. Identification of Research Problem:
Define and articulate the research problem or question clearly. Ensure it is specific, researchable, and relevant to the field of study.
ii. Literature Review:
Conduct a thorough review of existing literature related to your research topic. Identify gaps, controversies, or areas requiring further exploration.
iii. Research Objectives and Hypotheses/Research Questions:
Clearly state the objectives of your research. Formulate hypotheses (for quantitative studies) or research questions (for qualitative studies) that guide your investigation.

iv. Methodology:

Detail the research design, approach, methods, and techniques you intend to employ. Explain how you will collect, analyze, and interpret data. Consider ethical considerations and address them in this section.

v. Research Plan/Timeline:

Develop a timeline or plan that outlines the various stages of the research process. Include milestones, deadlines, and activities to demonstrate the feasibility of your research.

vi. Significance/Justification:

Explain the significance of your research. Highlight its potential contributions, implications, or applications to the field. Justify why this research is important and relevant.

vii. Research Team and Resources:

Outline the qualifications of the research team, if applicable, and describe the resources needed (such as equipment, facilities, funding) to conduct the research.

viii. Budget:

Prepare a detailed budget outlining the expected expenses for the research, including costs for materials, personnel, travel, and other relevant expenditures.

ix. References:

Provide a comprehensive list of references cited in your proposal, adhering to the required citation style.

x. Proposal Formatting and Structure:

Follow the guidelines provided by the funding agency or institution regarding proposal structure, length, font, spacing, and any specific formatting requirements.

xi. Proof reading and Editing:

Ensure your proposal is free from grammatical errors, typos, and inconsistencies. Edit and revise the content to ensure clarity, coherence, and logical flow.

xii. Compliance with Guidelines:

Adhere strictly to the guidelines provided by the funding agency, institution, or specific call for proposals. Ensure you cover all required sections and meet submission criteria.

xiii. Feedback and Revisions:

Seek feedback from mentors, colleagues, or advisors and revise your proposal based on constructive criticism and suggestions to strengthen its quality.

Crafting a research proposal involves meticulous planning, thorough research, and clear articulation of the research plan to persuade reviewers or evaluators of the merit and feasibility of your proposed study.

2.3.4 Standard Heads in Research Proposal

Following are the standard heads in a research proposal.

(i). Title of the Project: Title shall be representative and related to the need-based research/ hot topic/ within the scope of the funding agency. One can go through the titles which have been granted funds by the agency earlier and see what kinds of projects are prioritized or preferred for funding, Title shall be specific, unambiguous, clear and error free.

(ii). Summary of the Project: Should be of one page/ 300-500 words. It should be concise and provide complete roadmap of research. It should contain need, Aim/objective, methodology, plan and expected outcome in a concise way. It must be flawless, and should be cohesive and coherent.

(iii). Origin of Idea/ Background/ Introduction/ Rational:

Origin of Idea: This section typically elucidates how the idea for the research emerged. It could stem from gaps in existing literature, personal experiences, observations, or practical problems. Explaining the genesis of the idea helps reviewers or readers understand the context and motivation behind your research.

Background: Here, you provide a detailed overview of the existing knowledge related to your research topic. This involves summarizing relevant theories, studies, and findings that form the foundation upon which your research stands. It's crucial to showcase your understanding of the subject matter and highlight what is already known.

Introduction: This part introduces the main topic of the research proposal. It serves as a bridge between the background information and the specific focus of your study. The introduction often includes the research objectives, questions, and hypotheses, setting the stage for the proposed investigation.

Rationale: This section outlines the justification for conducting the research. It explains why the study is necessary, what knowledge gaps it aims to address, and the potential contributions to the field. Presenting the rationale involves emphasizing the significance and relevance of your research, underscoring its potential impact or practical implications.

(iv). Aim and Objectives:

Aim: The aim encapsulates the overarching goal or the broad purpose of the research. It's a concise statement that explains the ultimate outcome or what the research intends to accomplish. The aim provides direction and focus to the entire study, guiding the formulation of research questions, methodologies, and analysis.

Objectives: Objectives break down the aim into specific, measurable, achievable, relevant, and time-bound targets that the researcher aims to accomplish within the study. They represent the smaller, more manageable steps that collectively lead to fulfilling the broader aim. Objectives should be clear, realistic, and directly related to addressing the research problem. They provide a roadmap for the research process, guiding the methods, data collection, and analysis.
It is essential to ensure that the objectives are: SMART
Specific: Clearly defined and focused.
Measurable: Able to be quantified or assessed.
Achievable: Realistic and feasible within the scope of the study.
Relevant: Directly aligned with the aim and research questions.
Time-bound: Clearly specifying when the objectives are expected to be achieved

(v). Literature Review and Methodology

Literature Review: This section summarizes and critically evaluates existing literature relevant to the research topic. It demonstrates an understanding of the current state of knowledge, identifies gaps or controversies, and justifies the need for the proposed study. The literature review provides a foundation for the research by highlighting key findings, theories, and methodologies used in previous studies related to the research question.

Methodology: The methodology section outlines the research design, approach, methods, and techniques that will be employed to address the research objectives. It details how the research will be

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conducted, including data collection methods, sample selection, data analysis techniques, and any tools or instruments to be used. Clarity and justification of the chosen methodology are crucial to convince the funding agency of the study's feasibility and reliability.

(vi). Time-line: A timeline is a chronological plan outlining the proposed schedule or sequence of activities to be conducted throughout the research project. It presents a structured breakdown of tasks, milestones, and their anticipated durations. The timeline helps demonstrate the feasibility of the research by indicating when specific phases of the study will be undertaken. Usually time-line is presented through tabular and/or graphical way.

(vii). Budget with the Justification: This section shall include itemized breakdown of anticipated expenses required to conduct the proposed research project. It includes all costs associated with the study, such as personnel, equipment, materials, travel, participant compensation, and other relevant expenditures.

The justification part explains and validates each budget item, providing a rationale for why these expenses are necessary for the successful completion of the research. This section helps reviewers or funding agencies understand the financial needs of the project and evaluate its feasibility and cost-effectiveness.

(viii). Expertise/facilities available: It outlines the expertise relevant to the proposed research, showcasing the capability to successfully execute the project. This section may include the educational background, previous research experience, publications, and any specialized skills or knowledge that the team members possess, emphasizing their suitability for conducting the proposed research.

Additionally, the facilities aspect refers to the resources, equipment, and infrastructure available or accessible to the research team for carrying out the study. It details any specialized facilities, laboratories, computing resources, or other physical infrastructure that will support the research activities. Highlighting the available expertise and facilities helps demonstrate the capability and readiness of the research team to undertake and accomplish the proposed research objectives.

(ix). Expected Outcome: This section outlines the anticipated results or findings that the researcher foresees as a result of conducting the proposed study. These outcomes represent the specific contributions or impacts the research aims to achieve.
Expected outcomes can include:
Findings: Anticipated discoveries, results, or data that the research is likely to produce.
Conclusions: Expected interpretations or implications drawn from the findings.
Contributions: Potential advancements in knowledge, theory, practice, or policy.
Impact: Expected effects on the field of study, industry, community, or society at large.

(x). References: This section shall provide a list of all the sources cited within the proposal. It includes the bibliographic details (such as author(s), title, publication year, etc.) of the books, articles, research papers, and other materials referenced throughout the proposal. This section is crucial as it acknowledges the existing literature, theories, and research that inform and support the proposed study. It follows a specific citation style (e.g., APA, MLA, Chicago) and helps readers locate and verify the sources used to develop the research proposal.

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Short Answer Type Questions:

1. Define a research paper briefly.
2. What role does the literature review play in a research paper?
3. Explain the role of proper referencing in a research paper.
4. Define the function of the methodology section in a thesis.
5. What information should be included in the budget section of a research proposal?
6. Mention any two key objectives of writing a research paper.
7. Define 'Literature Review' and state its importance in thesis writing.
8. List any two differences between a thesis and a research proposal.
9. What is a Gantt chart and how is it useful in thesis writing?
10. What are preliminary requirements before writing a research proposal?

Descriptive type Questions:

1. State and explain at least 8 key reasons why writing research papers is important.
2. Explain briefly the steps involved in writing research papers with the help of a flow chart.
3. Discuss briefly the different sections in the IMRaD style of writing research article.
4. Explain the importance and elements of 'Referencing and Citations' with respect to research article writing.
5. Explain Submission and Post-submission step in research article writing.
6. What do you mean by Thesis Writing? Explain briefly the typical components of a Thesis.
7. Briefly explain the common types of research projects.
8. Discuss the preliminary requirements for research proposal writing.
9. Briefly explain the different standard heads in research proposal writing.
10. Describe the common mistakes to avoid in writing research papers, theses, and proposals. Suggest strategies to improve clarity and impact.

Discussion type Questions:

1. Given the abstract of a research article, identify and explain whether it effectively presents the aim, methodology, key findings, and conclusion. Justify your answer.
2. Analyze a sample thesis introduction and literature review. Identify gaps, redundancies, and areas needing improvement. Suggest revisions.
3. Evaluate two research proposals on the same topic submitted to different funding agencies. Discuss which one is better and why, using clear criteria.
4. Design a graphical abstract or flow diagram to represent the methodology section of your current or proposed research work.
5. Break down the components of a published research paper and map them to the IMRaD structure (Introduction, Methods, Results, and Discussion). Comment on the logical flow.
6. Assume you are guiding a junior student in writing their thesis. Prepare a week-wise timeline (Gantt chart) for completing each chapter efficiently.
7. Critique the referencing style and ethical integrity of a given research article. Discuss whether proper citation and plagiarism avoidance measures have been followed.
8. Draft a short research proposal (one page) on a topic of your choice, including title, objectives, methodology, expected outcomes, and budget outline.
9. Compare and contrast the role of illustrations in a research paper versus a thesis. Which format benefits more from visual aids and why?
10. Develop a checklist for students to self-assess their research paper or thesis before submission. The checklist should include technical, ethical, and formatting aspects.