



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## RESEARCH AND CONTENT DEVELOPMENT

**V Semester: AE / CSE / IT / ECE / EEE / MECH**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS106	Skill	-	-	2	1	30	70	100

### OBJECTIVES:

The course should enable the students to:

- I. Gain a practical understanding of the various methodological tools used for social scientific research.
- II. Learn the ethical, political, and pragmatic issues involved in the research process.
- III. Improve their ability to develop technical writing.
- IV. Identify the overall process of designing a research study from its inception to its report.

### LATEX FOR DOCUMENTATION

Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check and Track Changes using LaTeX; Mathematical expressions, Subscripts and superscripts, brackets and parentheses, fractions and binomials, aligning equations, operators, spacing in math mode, integrals, sums and limits, display style in math mode, list of Greek letters and math symbols, mathematical fonts; Prepare class timetable and student marks list using LaTeX;

### RESEARCH FORMULATION AND DESIGN

Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

### DATA COLLECTION AND SAMPLING DESIGN

Sources of Data: Primary Data, Secondary Data; Procedure Questionnaire -Survey and Experiments - Design of survey and Experiments- Sampling Merits and Demerits - Control Observations - Procedures - Sampling Errors.

### CONTENT DEVELOPMENT

Document design and layout; Papers; Articles; E-book formats. Forums; Multimedia tutorials; Wikis; Blogs; Websites.

### PROOF READING PROCESS AND REPORT WRITING

Definition, purpose, difference between content and copy, editing, competing priorities, elements of structure, style and appearance, evaluation, overall organizing, clarity of expression, grammatical accuracy, correctness of layout; Meaning of Interpretation, technique of Interpretation, precaution in Interpretation; Significance of report writing, different steps in writing report, layout of the research

report, types of reports, oral presentation, mechanics of writing a research report, precautions for writing research reports, conclusions.

**Text Books:**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, “An Introduction to Research Methodology”, RBSA Publishers. U.K., 2002.
2. Kothari, C.R, “Research Methodology: Methods and Techniques”. New Age International. 418p, 1990.
3. Stefan Kottwitz , “ LATEX Beginner’s Guide”, Packt Publishing Limited, 2011.

**Reference Book:**

1. Meenakshi Raman, Sangeeta Sharma, “Technical Communication”, Oxford Publishers, 1<sup>st</sup> Edition, 2004.
2. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, ESS Publications. 2 volumes.

**Web References:**

1. <https://www.techwhirl.com/what-is-technical-writing/>
2. <https://www.mit.edu/me-ugoffice/communication/technical-writing>
3. <https://www.vocabulary.com/dictionary/technical>

**E-Text Books:**

1. [www.ebooksgo.org/](http://www.ebooksgo.org/)
2. [www.e-booksdirectory.com](http://www.e-booksdirectory.com)

**Expected Outcome:** Students are expected to write and publish a Research paper (Literature survey on any selected topic). File a patent or copyright.

### **RESEARCH AND CONTENT DEVELOPMENT**

<b>S. No</b>	<b>Week</b>	<b>Description</b>
1	1	Introduction to Research Methodology, Documentation and Content Development
2	2	Topic selection, Research Formulation and Design for writing working paper by students
3	3	Data Collection and Sampling Design exercises for writing working paper by students
4	4	Data Collection and Sampling Design exercises for writing working paper by students
5	5	Abstract Writing by using LATEX software
6	6	Writing a Working Paper using LATEX software (Introduction)
7	7	Writing a Working Paper using LATEX software (Literature Survey with References)
8	8	Report Submission and Seminar of Working Paper (till Literature Survey only)
9	9	Writing a Working Paper using LATEX software (Research Methodology)
10	10	Writing a Working Paper using LATEX software (Research Methodology)
11	11	Writing a Working Paper using LATEX software (Results and Discussion)
12	12	Writing a Working Paper using LATEX software (Results and Discussion)
13	13	Writing Working Paper using LATEX software (Conclusion)
14	14	Proof reading exercises on Working Paper
15	15	Plagiarism Analysis and Paraphrasing Exercises on Working Paper
16	16	Report Submission and Seminar on Full Length Working Paper

#### **Evaluation Criteria:**

1. Internal Evaluation
  - a. Day to Day Lab Evaluation **(20 Marks)**
  - b. Internal Examination **(10 Marks)**
2. External Evaluation:
  - a. Appropriateness of topic **(5 marks)**
  - b. Writing Skills of Working Paper **(25 Marks)**
  - c. Content Development **(40 Marks)**

## Rubric of External Evaluation on Working Paper:

### **1. Appropriateness of topic (5 Marks maximum)**

- Inadequate (0 Marks): Technical topic is not in field of Engineering and technology, and is unlikely to be of interest to consumers.
- Acceptable (3 Marks): Topic is either not in field of Engineering and technology, or is unlikely to be of interest to consumers.
- High Quality (5 Marks): Technical topic is in field of Engineering and technology, and is likely to be of interest to consumers.

### **2. Writing Skill of Working Paper (25 Marks maximum)**

#### ***a. Organization (10 Marks)***

- Inadequate (0 Marks): There appeared to be no organization of the article's contents.
- Needs improvement (3 Marks): Organization of the topic is difficult to follow, due to inadequate transitions and/or rambling format.
- Acceptable (7 Marks): The article can be easily followed. Basic transitions are used and a structured format is followed.
- High quality (10 Marks): The main points in the article can be easily followed. Effective transitions are used and a structured format is followed.

#### ***b. Communication style (10 Marks)***

- Inadequate (0 Marks): The article is difficult to follow due to excessive scientific jargon. The technical material is vague and ambiguous.
- Needs improvement (3 Marks): Some scientific jargon is used. Technical material is somewhat confusing.
- Acceptable (7 Marks): Minimal scientific jargon. Technical material is mostly understandable. A creative element introduced to persuade reader.
- High quality (10 Marks): The article is written in a creative style without the use of scientific jargon. The importance of the topic is clearly conveyed to the lay reader. The technical material is explained in understandable and concise language.

#### ***c. Mechanics and grammar (5 Marks)***

- Inadequate (0 Marks): Sentences and paragraphs are difficult to read and understand due to poor grammar or mechanics.
- Needs improvement (2 Marks): The article contains numerous grammatical and mechanical errors.
- Acceptable (3 Marks): The article contains minimal grammatical and mechanical errors.
- High quality (5 Marks): The article contains no grammatical or mechanical errors.

### **3. Content Development (40 Marks maximum)**

#### ***a. Correctness of facts (20 Marks)***

- Inadequate (5 Marks): Many "facts" are erroneous, misinterpreted, or misleading.
- Needs improvement (10 Marks): Some technical details and "facts" are incorrect.
- Acceptable (15 Marks): Technical details and "facts" are generally correct.
- High quality (20 Marks): All facts appear to be correct.

***b. Completeness ( 20 Mark)***

- Inadequate (5 Marks): The article did not address some of the important points mentioned in the references the author selected. No reference citation.
- Needs improvement (10 Marks): Addressed some of the important points, but provided few details. Reference included but citations are incomplete.
- Acceptable (15 Marks): Addressed the main points, but left out some important details. Mostly complete reference citations.
- High quality (20 Marks): Addressed all the important points completely. Complete reference citation using prescribed format.