TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING & TECHNOLOGY
Wardha Road, Nagpur - 441108
Accredited with NAAC A+ Grade
Approved by AICTE, New Delhi, Govt. of Maharashtra
(An Autonomous Institution Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)

DEPARTMENT OF AERONAUTICAL ENGINEERING

Teaching Scheme & Syllabus (As per NEP_2020)

SCHEME OF INSTRUCTION & SYLLABI

Semester -Eighth

Programme: Aeronautical Engineering

From

Academic Year 2026-27

Institute Vision & Mission

Vision:

- To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission:

- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
- To provide facilities and services to meet the challenges of Industry and Society.
- To facilitate socially responsive research, innovation and entrepreneurship.
- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

Program Outcomes (POs)

1. Engineering Knowledge
2. Problem Analysis
3. Design/development of solutions
4. Conduct investigations of complex problems
5. Modern tool usage
6. The engineer and society
7. Environment and sustainability
8. Ethics
9. Individual and team work
10. Communication
11. Project management and finance
12. Lifelong learning

Department Vision & Mission

Vision:

- To foster technically skilled Aeronautical Engineers of the utmost academic principles, to convene the needs of academia, industry and society.

Mission:

- Impart quality technical education and unique interdisciplinary experiences.
- Develop the analytical, computational and design capabilities to provide sustainable solutions.
- Expose the students to the current trends and opportunities in the Aerospace industry.
- Inculcate professional responsibility based on an innate ethical value system.

Program Educational Objectives (PEOs)

1. Undergraduate students will acquire knowledge to investigate and solve Aeronautical Engineering problems using basics of applied science and engineering.
2. Undergraduate students will utilize the modern technology and techniques to explore new skills and ideas to satisfy the need of society as well as industry.
3. Undergraduate students will get finest employment opportunities in the field of Aeronautical Engineering.
4. To develop the environment of societal and ethical values to concern with engineering issues.
5. Undergraduate students will contribute in the domain specific and interdisciplinary research through the project based learning.

Program Specific Outcomes (PSO)

- Develop profound working knowledge to solve combination of complex problems in aerodynamics, propulsion, structures, flight mechanics and allied courses.
- Be equipped to use CAE packages, simulation languages and advanced tools to solve practical design and analysis problems.
- Undergraduates will be able to utilize the extensive knowledge of design, manufacturing, testing or maintenance of systems and sub systems to pursue career in aeronautical engineering.

Scheme of Instructions: Fourth Year B. Tech. in Aeronautical Engineering (As Per NEP 2020)

Semester–VIII

S N.	Sem	Type	BoS/ Dept	Sub Code	Subject	T/P	Contact Hours			Credits	% Weightage			ESE Duration	Total Marks
							L	P	Hrs		CT/IA	CA	ESE		
1	VIII	CEP	AE	BAE34801	Research Methodology	T	4	-	-	4	30	10	60	3Hrs	100
2	VIII	CEP	AE	BAE34802	On Job Training/ Industrial Training	T	-	24	24	12	-	100	200	2 Hrs	300
Total							-	24	24	16	30	110	260	2 Hrs	400

Course Category	HSSM (Humanities Social Science & Management)	BSC (Basic Science Course)	ESC (Engg. Science Course)	PCC (Programme Core Courses)	PEC (Program Elective Courses)	OEC (Open Elective Courses)	MDM (Multi-disciplinary Courses)	SEC (Skill Course)	ELC/FP/CEP (Experiential Learning Courses)	CC (Liberal Learning Courses)
Credits	--	--	--	-	-	--	--	--	16	--
Cumu. Sum	12	16	13	56	13	08	14	08	22	04

PROGRESSIVE TOTAL CREDITS:150+16=166

Chairperson	Director Academics/ Vice Principal	Director Administration	Principal	March, 2026 Date of Release	1.00 Version	Applicable For AY2023-24 Onwards

Head
Aeronautical Engineering
TGPCET, Nagpur

Director Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
And Technology, Nagpur

Dr. Premanand Naktode
Principal
TGPCET, Nagpur

Programme: Aeronautical Engineering

List of **Program Electives** offered By Aeronautical Engineering Department

Program Elective- I	Program Elective-II	Program Elective- III	Program Elective- IV
Semester V	**Semester VI**	**Semester VI**	**Semester VII**
BAE33504: Boundary Layer Theory	**BAE33603:** Drone Technology	**BAE33607:** Control Theory & Systems	**BAE34703:** Unmanned Aerial vehicle and systems
BAE33505: Aircraft Systems & Instruments	**BAE33604:** Spacecraft Technology	**BAE33608:** Aviation Management	**BAE34704:** Composite Materials & NDT
BAE33506: Space Flight Mechanics	**BAE33605:** Aircraft Navigation & Communication Systems	**BAE33609:** Helicopter Engineering	**BAE34705:** Vibrations and Aero-elasticity
BAE33507: Industrial Aerodynamics	**BAE33606:** Aircraft Maintenance & Repair	**BAE33610:** Finite Element Methods (FEM)	**BAE34706:** Computational Fluid Dynamics

Programme: Aeronautical Engineering

List of **Open Electives** offered By **Aeronautical Engineering** Department (NBA Accredited if applicable)

Open Elective-I	Open Elective-II	Open Elective-III
Semester-III	**Semester-IV**	**Semester-V**
BAE32310: Introduction to Aerospace Engineering	**BAE32406: Avionics**	**BAE33511: Unmanned Arial Systems**

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Course Category	HSSM (Humanities Social Science & Manag.)	BSC (Basic Science Course)	ESC (Engineering Science Course.)	PCC (Programme Core Courses	PEC (Programme Elective Courses)	OEC (Open Elective Courses)	MDM (Multi-disciplinary Course)	SEC (Skill Course)	ELC/FP/CEP Experien-tial Learning Courses)	CC (Liberal Learning Courses)	Semester Wise Credits
Semester-I	04	08	05	--	--	--	--	02	--	02	**21**
Semester-II	02	08	08	--	--	--	--	02	--	02	**22**
Semester-III	02	--	--	11	--	04	02	--	02	--	**21**
Semester-IV	04	--	--	11	--	02	02	02	--	--	**21**
Semester-V		--	--	12	04	02	04	--	--	--	**22**
Semester-VI		--	--	10	06	--	02	02	--	--	**20**
Semester-VII	--	--	--	**10**	**03**	--	**04**	**02**	**4**	--	**23**
Semester-VIII		--	--	-	-	--	--	--	16	--	**16**
Cumu. Sum	**12**	**16**	**13**	**54**	**13**	**8**	**14**	**10**	**22**	**4**	**166**

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Fourth Year (Semester-VIII) B. Tech. Aeronautical Engineering

BAE34801: Research Methodology

4thYear- (8th Semester)

BAE34801: Research Methodology

Teaching Scheme			**Examination Scheme**	
Lectures	3 Hr / Week		**ESE**	60 Marks
Tutorial	-		**CIE**	40 Marks
Practical	-		**Total**	100 Marks
Theory Credits : 3			**Duration of Exam:** 3 Hours	

Course Objectives

The Objectives of this course is:

1.	Understand the research process, types, and ethical practices.
2.	Develop the ability to design research studies and collect relevant data.
3.	Apply statistical methods for analyzing and interpreting data.
4.	Develop skills in technical writing and use of research tools.
5.	Understand intellectual property rights and research dissemination practices.

Course Contents

Unit I	**Introduction to Research** Definition and objectives of research, Types of research: Fundamental vs applied, Qualitative vs quantitative, Research process and steps, Identification of research problems, Literature survey and review techniques, Sources of information: Journals, conferences, patents, Ethics in research and plagiarism
Unit II	**Research Design and Data Collection** Research design: Exploratory, descriptive, analytical, Formulation of hypothesis, Variables and measurement scales, Data collection methods: Primary (survey, questionnaire, interview), Secondary data, Sampling techniques: Probability and non-probability sampling
Unit III	**Data Analysis and Interpretation** Data processing and classification, Descriptive statistics: Mean, median, mode, Standard deviation, variance, Correlation and regression analysis (basic), Hypothesis testing: t-test, chi-square test (concept), Interpretation of results
Unit IV	**Research Tools and Technical Writing** Use of software tools: MATLAB / Excel / SPSS (intro), Graphical representation of data, technical paper writing: Structure of research paper, Abstract, introduction, methodology, results, Referencing styles (APA, IEEE), Citation tools (Mendeley, Zotero)
Unit V	**Advanced Research Practices** Intellectual Property Rights (IPR), Patents: Filing process, Patent search, Research proposal writing, Project report writing, Presentation skills, Case studies in engineering research

Text Books	
1	Research Methodology: Methods and Techniques – C.R. Kothari
2	Research Design: Qualitative, Quantitative and Mixed Methods – John W. Creswell
3	Research Methods for Engineers – David V. Thiel
Reference Books	
1	Research Methodology: A Step-by-Step Guide – Ranjit Kumar
2	Engineering Research Methodology – Dipankar Deb
3	Research Methodology for Engineers – R. Ganesan
Useful Links	
1	https://nptel.ac.in/courses/101/106/101106033/
2	https://nptel.ac.in/courses/101/101/101101002/
3	https://nptel.ac.in/courses/101/106/101106082/

BAE34801	**Course Outcomes**	**CL**	**Class Sessions**
CO1	Describe research types and processes.	**2**	**9**
CO2	Formulate research problems and design experiments.	**3**	**9**
CO3	Apply statistical tools for data analysis.	**3**	**9**
CO4	Develop technical reports and research papers.	**4**	**9**
CO5	Explain IPR concepts and research dissemination methods.	**4**	**9**

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