GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

BASIC AIRCRAFT SCIENCE
(Code: 3330101)

Diploma Programme in which this course is offered	Semester in which offered
Aeronautical Engineering	Third

1. RATIONALE

The main objective of this course is to understand the aircraft components. This subject addresses the aircraft history, parts, engine and associated control surfaces.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies:

i. **Understand the different components of aircrafts.**
ii. **Understand the working of aircrafts engines and control surfaces.**

3. TEACHING AND EXAMINATION SCHEME.

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
04	00	02	06	70	30	20	30	

Legends: **L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Topics and Sub-topics	Outcomes (in cognitive domain)
UNIT– I HISTORY OF FLIGHT	To study about flight history, nomenclature and definition of aircrafts.	1.1 History of Flight 1.2 Nomenclature and definition of Aircraft. 1.3 Components of an airplane and their functions. 1.4 Different types of flight vehicles and its application.

UNIT– II INTRODUCTION TO PRINCIPLES OF FLIGHT	To study about structure of the atmosphere, newton's & bernoulli's principle, lift generation phenomenon and airfoil design.	2.1 Physical properties and structure of the atmosphere. 2.2 Temperature, pressure and altitude relationships. 2.3 Newton's Basic Laws of Motion 2.4 Theories in the Production of Lift 2.5 Forces Acting on an Aircraft • Thrust • Drag • Weight • Lift 2.6 Airfoil 2.7 Airfoil Nomenclature
UNIT– III INTRODUCTION TO AIRPLANE STRUCTURES	To study about major components of airplane structure.	3.1 Major components of an Aircraft 3.2 Fuselage 3.3 Wing 3.4 Empennage 3.5 Landing Gear 3.6 Power plant
UNIT– IV CONTROL SURFACES	To study about the flight control systems uses to control the forces of flight, and the aircraft's direction and altitude.	4.1 Introduction to control surfaces 4.2 Airplane controls, movement, axes of rotation, and type of stability 4.3 Primary control surfaces a. Ailerons b. Elevator c. Rudder d. Canard 4.4 Secondary control surfaces a. Flaps (Trailing & Leading edge) b. Slats c. Trim Tabs d. Air brakes 4.5 Autopilot
UNIT– V POWERPLANT USED IN AIRPLANES	To study power plant which includes both the airbreathing and non airbreathing engines.	5.1 History 5.2 Classification of power plants 5.3 Reciprocating Engine Operating Principles 5.4 Turbine Driven Engines 5.5 Working of propeller 5.6 Working of Jet Engines 5.7 Principles of operation of rocket, types of rockets and typical applications.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY).

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	HISTORICAL EVALUATION AND AIRCRAFT CONFIGURATIONS	04	02	03	03	08
II	INTRODUCTION TO PRINCIPLES OF FLIGHT	08	04	04	06	14
III	INTRODUCTION TO AIRPLANE STRUCTURES	08	06	04	06	16
IV	CONTROL SURFACES	08	05	05	06	16
V	POWERPLANT USED IN AIRPLANES	08	06	05	05	16
TOTAL		**36**	**23**	**21**	**26**	**70**

Legends: R = Remember **U**= Understand; **A**= Apply and above levels (Bloom's revised taxonomy)

6. SUGGESTED LIST OF EXERCISES/PRACTICALS.

The tutorial exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned competencies.

SR. NO.	UNIT NO.	EXPERIMENT
1	I	Nomenclature and definition of aircrafts.
2	III	Prepare small model of wing.
3	III	Prepare small model of fuselage.
4	III	Prepare small model of Empennage.
5	III	Prepare small model of Landing gear.
6	III	Assemble all above parts.

7. SUGGESTED LIST OF STUDENT ACTIVITIES.

Following is the list of proposed student activities like:

SR.NO.	ACTIVITY
1	Course/topic based seminars.
2	Chapter based assignments.
3.	Teacher guided self-learning activities.
4.	Course/lab based mini-projects etc.
5.	Prepare small models of aircraft.

8. SUGGESTED LEARNING RESOURCES.

A. List of Books:

SR. NO.	TITLE OF BOOK	AUTHOR	PUBLICATION
1.	Understanding Flight	David F. Anderson Scott Eberhardt	McGraw-Hill
2.	Flight Without Formulae	A.C. Kermode	Pearson
3.	Introduction To Flight	John D. Anderson	McGraw-Hill

B. List of Major Equipment/ Instrument

- Variety of kits
- Scale models of aircarft & helicopters
- Rc plane engines
- Prefabricated models
- Rc sets

C. List of Software/Learning Websites

- https://www.youtube.com/watch?v=isATVRTV0r4&hd=1
- https://www.youtube.com/watch?v=RMRBt0G4vaU&hd=1
- https://www.youtube.com/watch?v=AuqapG1H2AE
- https://www.youtube.com/watch?v=AiTk5r-4coc
- https://www.youtube.com/watch?v=_nwf7wL7L9Y&hd=1
- https://www.youtube.com/watch?v=IMAk_3W73aw&hd=1
- https://www.youtube.com/watch?v=QUfRv1kXU2U&hd=1
- https://www.youtube.com/watch?v=8Wzmr2vhZY4&hd=1
- https://www.youtube.com/watch?v=ud5Ke6IcQMM&hd=1
- https://www.youtube.com/watch?v=vHLUg5Ktdwc&hd=1’https://www.youtube.com/watch?v=21ipfkuicTc
- https://www.youtube.com/watch?v=st-2A1T6vrI&hd=1
- https://www.youtube.com/watch?v=76y4hNcuKgE&hd=1
- https://www.youtube.com/watch?v=H6MAqCmygbI&hd=1
- https://www.youtube.com/watch?v=ChPLaXqO0eQ&hd=1
- www.youtube.com/watch?v=NtVCaIuDOcA&hd=1
- https://www.youtube.com/watch?v=E_pGmwdCBgc&hd=1
- www.youtube.com/watch?v=czqxWF2OdME&hd=1
- https://www.youtube.com/watch?v=KjiUUJdPGX0&hd=1
- https://www.youtube.com/watch?v=eA699AKxT7s&hd=1
- https://www.youtube.com/watch?v=p1TqwAKwMuM&hd=1
- https://www.youtube.com/watch?v=3gfGdKs9xGM&hd=1
- https://www.youtube.com/watch?v=PjkKvekODQw&hd=1
- https://www.youtube.com/watch?v=teICr3Yg14U&hd=1
- https://www.youtube.com/watch?v=0TCxj_u0CKY&hd=1
- https://www.youtube.com/watch?v=MiFNUIifWd4&hd=1
- https://www.youtube.com/watch?v=uxZQa5s_94c&hd=1

- https://www.youtube.com/watch?v=IcYlYpMChTo&hd=1
- https://www.youtube.com/watch?v=1DG4f2umclk&hd=1
- https://www.youtube.com/watch?v=ebBMopLoOOQ&hd=1
- https://www.youtube.com/watch?v=tf6slGC9Va4&hd=1
- https://www.youtube.com/watch?v=XT68QsD_zz8&hd=1
- https://www.youtube.com/watch?v=ovU3ziWkZWU&hd=1
- https://www.youtube.com/watch?v=aBXZLxrhP-8&hd=1
- https://www.youtube.com/watch?v=z0QQwFHzJfc&hd=1
- https://www.youtube.com/watch?v=8K62MuaT9mU&hd=1
- https://www.youtube.com/watch?v=zUehWUoiPHQ&hd=1
- https://www.youtube.com/watch?v=2UEuHczduXg&hd=1
- https://www.youtube.com/watch?v=twxKVnPID-w&hd=1
- https://www.youtube.com/watch?v=CwNi8Mtf_iM&hd=1

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics.

- **Prof. ANKIT PATEL**, H.O.D., Aeronautical Dept. Parul institute of engg. & tech-Diploma studies