

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**

**COURSE CURRICULUM**

**AIRCRAFT NAVIGATION & RADIO SYSTEMS**

**(Code : 3360107 )**

<b>Diploma program in which this course is offered</b>	<b>Semester in which offered</b>
Aeronautical Engineering	SIXTH

### 1. RATIONALE

The main objective of this course is to understand the basic of navigation and radio system, communication systems navigation equipment, nautical charts and navigation systems.

### 2. LIST OF COMPETENCIES

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

- **To know about navigation methods and equipment.**
- **To study about basic nautical chart design.**

### 3. TEACHING AND EXAMINATION SCHEME.

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	100
04	00	00	04	70	30	00	00	

**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)
<b>UNIT– I INTRODUCTION</b>	<ul style="list-style-type: none"> <li>• History of navigation</li> <li>• Digital system</li> <li>• Radio equipment</li> <li>• Nomenclature</li> </ul>	1.1 History 1.2 Basic Principal of Radio 1.3 Electromagnetic Spectrum 1.4 Radio Frequency Categorization 1.5 Categorization of Airborne Radio Equipment 1.6 Navigation Nomenclature

<b>UNIT– II INERTIAL SYSTEMS</b>	<ul style="list-style-type: none"> <li>• Inertial guidance system</li> <li>• Inertial navigation system</li> </ul>	2.1 Inter continental ballistic missile navigation system 2.2 Rumblineline/Greatcircle cross country flying without using radio navigation Aids 2.3 Aircraft balancing through Autopilot
<b>UNIT– III NAVIGATION SYSTEM</b>	<ul style="list-style-type: none"> <li>• To study about categories of navigation</li> <li>• Hyperbolic navigation</li> <li>• Omega navigation</li> </ul>	3.1 Dead Reckoning 3.2 Radio Navigation 3.3 Map Matching Navigation 3.4 Celestial Navigation 3.5 CW Rho-Rho System 3.6 CW Rho-Rho-Rho System 3.7 Propagation and Interface
<b>UNIT– IV NAUTICAL CHARTS</b>	<ul style="list-style-type: none"> <li>• To study about basic of nautical chart and purpose plotting</li> </ul>	4.1 Purpose And Role Of Nautical Chart 4.2 Types Of Charts 4.3 Source Of Charts 4.4 Longitude and Latitude 4.5 Anatomy of Nautical Chart 4.6 Plotting: Position Of North 4.7 Instrument For Plotting 4.8 Arithmetic For Plotting 4.9 Plotting Problems
<b>UNIT– V MISCELLANEOUS SYSTEMS</b>	<ul style="list-style-type: none"> <li>• Autopilot Flight director system</li> <li>• Flight Management system</li> <li>• Flight Data and cockpit voice Recorder</li> <li>• Air data computer</li> <li>• Black box</li> </ul>	5.1 Interrelationship of Autopilot, FMS, and ADC 5.2 Cockpit voice recorder 5.3 Flight data recorder 5.4 Night Vision Camera

### 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	INTRODUCTION	4	5	2	3	10
II	INERTIAL SYSTEMS	6	5	5	4	14
III	NAVIGATION SYSTEM	7	4	8	6	18
IV	NAUTICAL CHARTS	6	7	7	4	18
V	MISCELLANEOUS SYSTEMS	10	2	2	6	10
<b>Total</b>		<b>33</b>	<b>23</b>	<b>24</b>	<b>23</b>	<b>70</b>

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

### 6. SUGGESTED LIST OF STUDENT ACTIVITIES.

Following is the list of proposed student activities like:

**SR.NO. ACTIVITY**

- 1 Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory.

**7. SUGGESTED LEARNING RESOURCES.**

**A. List of Books:**

SR. NO.	TITLE OF BOOK	AUTHOR	PUBLICATION
1.	AIRCRAFT RADIO SYSTEMS	J. Powell	Reprinted in India by HIMALAYAN BOOKS
2.	NAUTICAL CHARTS AND BASIC PLOTTING	Gary C. Kessler	Gary C. Kessler

**B. List of Software/Learning Websites**

1. [https://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aircraft/amt\\_airframe\\_handbook/media/ama\\_Ch11.pdf](https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_airframe_handbook/media/ama_Ch11.pdf)
2. [https://www.faa.gov/regulations\\_policies/handbooks\\_manuals/aviation/advanced\\_avionics\\_handbook/media/aah\\_ch03.pdf](https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/advanced_avionics_handbook/media/aah_ch03.pdf)
3. [http://www.aircadetonline.com/flash\\_site/assets/pdf\\_files/ACP%2032%20Volume%203%20AIR%20NAV.pdf](http://www.aircadetonline.com/flash_site/assets/pdf_files/ACP%2032%20Volume%203%20AIR%20NAV.pdf)

**8. COURSE CURRICULUM DEVELOPMENT COMMITTEE**

**Faculty Members from Polytechnic.**

- **Mr. Dipesh Khunt**, Lecturer, Aeronautical Dept. Parul institute of Engg. & tech-Diploma studies
- **Prof. Ankitkumar Patel**, H.O.D., Aeronautical Dept. Parul institute of Engg. & tech-Diploma studies

**Faculty Members from Engineering.**

- **Capt. Umang Jani**, Asst. Professor, Aeronautical Dept. SVIT, Vasad.
- **Ms. Dimpal Parmar**, Asst. Professor, Aeronautical Dept. SVIT, Vasad