



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3172425

Subject Name: DEFENCE ELECTRONICS

Semester VII

Type of course: Professional Elective Course

Prerequisite: Basic knowledge of Electronics, Communication Engineering,

Rationale: The course has been designed to introduce fundamental of usage engineering. This subject of concepts of electronics and communication engineering in field of defense. It intended to make student aware with various methods and concepts radar-Infrared sensors, weapons systems, Electronic Intercept Systems, Electronic Countermeasures, and counter - countermeasures Systems in this course.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Course Content	Total Hrs.
1	Introduction: Systems in Use in the Armed Forces, The Main Weapon Systems, The Objectives of Electronic Defense, The Organization of Electronic Defense, Electronic Defense Systems and Their Operational Objective, information, Need for the Study of Weapon Systems.	5
2	Radar Sensors: Review of Electromagnetic Signal Transmission, The Radar Equation, Radar Equation in the Operational Environment, Radar Techniques, Search Radar Synthetic Aperture Radar (SAR), Tracking Radars, Airborne Radars (Interceptors).	6
3	Infrared Sensors: Review of Radiant Energy, Infrared Radiation Produced by Targets of Interest, IR Range Equation, Suppression of Background Effects, To study.	6
4	Weapon Systems: Artillery Systems, Missile Systems, Passive Ant radiation Missiles, Laser Weapon Systems, Stealth Aircraft, Communications Systems, Information Operations.	8
5	Electronic Intercept Systems: The Equation of a Passive System, Radar Warning Receivers, RWR Sensitivity, electronic Support Measures, ELINT Systems	8
6	Electronic Countermeasures Systems: Operational Jamming Modes: SPJ, SOJ, and EJ, Onboard ECM Systems, ECM Techniques, Infrared Countermeasures, Off-Board ECM Systems, Communications Countermeasures (COM-ECM), Information Warfare	6
7	Electronic Counter-Countermeasures Systems: Search Radar, Tracking Radar, Infrared Counter, communications Counter-	6



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Countermeasures.	
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Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	30	10	05	10	05

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested Reading:

1. Filippo Neri "Introduction to Electronic Defense Systems", 2nd Edition, Published by SciTech Publishing Inc.

References Books:

1. K. Main "Handbook of Defence Electronics and Optronics: Fundamentals, Technologies and Systems, IEEE Press.
2. Andrea De Martino "Introduction to Modern EW Systems" Artech House pub.

Course Outcomes: At the end of this course, students will be able to clarify.

Sr. No.	CO statement	Topics of the Syllabus	Marks % weightage
CO1	To understand various functions of electronic defense system.	1, 4	20
CO2	To study various sensors used in defense system.	2,3	20
CO3	To understand the usage of Electronic Intercept Systems.	5	20
CO4	To study the electronic countermeasures Systems.	6	20
CO5	To study the electronic counter- countermeasures Systems	7	20

List of Experiments: The following are suggested list of experiments based on theme.

Sr. No.	Theme
1	To study electronic defense systems and their operational objective.
2	To derive the radar equation.



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3	To study about airborne radars (Interceptors).
4	To obtain IR range equation.
5	To study the IR System.
6	To study artillery systems/missile systems/passive ant radiation missiles.
7	To study about stealth aircraft.
8	To study about ELINT systems.
9	To study operational jamming modes: SPJ, SOJ, and EJ.
10	To study about communications Counter-Countermeasures.

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