



# SWARNANDHRA

(AUTONOMOUS)

COLLEGE OF ENGINEERING AND TECHNOLOGY  
SEETHARAMAPURAM, NARSAPUR-534280, W. G. DT., A. P.

Course File & Plan: IGPS

Acc. Year: 2025-2026

Program & Semester: B. Tech-VII

## DEPT. OF ELECTRONICS AND COMMUNICATION ENGINEERING

### LESSON PLAN (2025-2026)

Course Code	Course Title	Semester	Branches	Contact Periods / Week	Academic Year	Date of Commencement of Semester
20EC7001	IGPS	VII	CSE-A & C, MECH-ROBOTICS	4	2025-26	09-06-2025

#### COURSE OUTCOMES

1	Describe the concepts of GPS-based positioning methods, the core components of a satellite navigation system and their purposes (K1).
2	Estimate and represent the GPS coordinate frames and GPS orbits (K2).
3	Analyze the impact of various error sources on the precision of positioning (K3).
4	Dramatize the examples of their role of goods and services based on the GSP in sustainable development (K4)

Unit	Out Comes / Bloom's Level	Topics No.	Text Book Reference	Contact Hour	Delivery Method
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#### UNIT-I: OVERVIEW OF GPS

I	CO1: Describe the concepts of GPS-based positioning methods, the core components of a satellite navigation system and their purposes. (K1, K2)	1.1.1	Basic concept about GPS	T1	1	Chalk, talk
		1.1.2	Basic concept about Frequencies	T1	1	Chalk, talk
		1.1.3	System architecture	T1	1	Chalk, talk
		1.1.4	System architecture-SS, US, CS	T1	1	Chalk, talk
		1.1.5	Space segment -GNSS Satellites	T1	1	Chalk, talk
		1.1.6	Space segment	T1	1	Chalk, talk
		1.1.7	User segment -Receiving Signals	T1	1	Chalk, talk
		1.1.8	User segment	T1	1	Chalk, talk
		1.1.9	Control Segment-Master Control, Base Station	T1	1	Web Resources
		1.1.10	Control Segment	T1	1	Chalk, tal
		1.1.11	Services of GPS	T1	1	Web Resources
		1.1.12	Applications of GPS	T1	1	Chalk, talk
			Class Test-I		1	
Total					13	

#### UNIT-II: GPS SIGNALS

	CO2: Describe the concepts of GPS-based positioning methods, the core components	2.1.1	Basic Signals-L1, L2, L3, L4 & L5.	T1	1	Chalk, talk
		2.1.2	Signal structure-Signal frequencies	T1	1	Chalk, talk
		2.1.3	Signal structure	T1	1	Chalk, talk
		2.1.4	Spoofing (S)	T1	1	Web Resources
		2.1.5	Anti-spoofing (AS)	T1	1	Chalk, talk
		2.1.6	Selective availability	T1	1	Chalk, talk



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II	of a satellite navigation system and their purposes (K2).	2.1.7	GALILEO Satellite	T1	1	Chalk, talk
		2.1.8	GPS Satellite	T1	1	Chalk, talk
		2.1.9	Difference between GPS and GALILEO satellite construction.	T1	1	Chalk, talk
			Class Test-II		1	
Total					10	
UNIT-III: GPS COORDINATE FRAMES, TIME REFERENCES						
III	CO3: Estimate and represent the GPS coordinate frames and GPS orbits (K3).	3.1.1	What is Geodetic	T1	1	Chalk, talk
		3.1.2	Geodetic coordinate systems	T1	1	Chalk, talk
		3.1.3	What is Geocentric	T1	1	Chalk, talk
		3.1.4	Geocentric coordinate systems	T1	1	Chalk, talk
		3.1.5	ECEF coordinate world geodetic 1984 (WGS 84)	T1	1	Web Resources
		3.1.6	GPS time	T1	1	NPTEL video
		Class Test-III		1		
Total					7	
UNIT-IV: GPS ORBITS AND SATELLITE POSITION DETERMINATION						
IV	CO4: Analyze the impact of various error sources on the precision of positioning (K4).	4.1.1	Orbital Parameters	T1	1	PPT
		4.1.2	GPS orbital parameters	T1	1	Chalk, talk
		4.1.3	What is RINEX	T1	1	Web Resources
		4.1.4	Description of receiver independent exchange format (RINEX)–	T1	1	Chalk, talk
			Observation data	T1	1	Chalk, talk
		4.1.5	Navigation Message	T1	1	PPT
		4.1.6	Navigation message data parameters	T1	1	Chalk, talk
		GPS position determination	T1	1	Chalk, talk	
	Content beyond Syllabus (if needed)		Precise Orbital Determination (POD), Reference Frames and Time Standards, Keplerian and Perturbed Orbital Elements & Satellite Position via Broadcast Ephemeris.		1	Chalk, talk, ppt
			Class Test-IV		1	
Total					10	
UNIT-V: GPS ERRORS						
V	CO5: Dramatize the examples of their role of goods and services based on the GSP in	5.1.1	Error models	T1	1	Web Resources
		5.1.2	GPS error models	T1	1	Chalk, Talk
		5.1.3	Error Sources	T1	1	Web Resources
		5.1.4	GPS error sources	T1	1	Chalk, Talk
		5.1.5	– clock error	T1	1	Chalk, talk, ppt
		5.1.6	Ionospheric error	T1	1	PPT



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sustainable development (K4).	5.1.7	Tropospheric Errors	T1	1	Chalk, Talk
	5.1.8	Multipath error	T1	1	Chalk, Talk
	5.1.9	Delay errors	T1	1	Web Resources
	5.1.10	Atmospheric delay errors	T1	1	Chalk, Talk
	5.1.11	Receiver noise	T1	1	Web Resources
	5.1.12	Ionospheric effects	T1	1	Chalk, Talk
	5.1.13	Ionospheric effects on GPS signals	T1	1	Web Resources
		Class Test -V			1
Content beyond Syllabus (if needed)	Ionospheric Errors (Advanced Concepts), Tropospheric Errors (Non-Dispersive), Satellite Clock and Ephemeris Errors & Multipath Errors (High-Level).			1	Web Resources
Total				15	
CUMULATIVE PROPOSED PERIODS				55	

## Text Books:

S. No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	G. S. RAO, Global Navigation Satellite Systems, 2nd Edition, McGraw-Hill publications, New Delhi, 2010. (UNIT-I-V)

## Reference Books:

S. No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
1	B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, „GPS – Theory and Practice“, 4th Edition, Springer – Wien, New York ,2001. (UNIT-I-III)
2	Sateesh Gopi, “Global & System: Principles and Applications”, 3rd Edition, TMH, 2005. (UNIT-I-II)
3	James Ba – Yen Tsui, „Fundamentals of GPS receivers – A software Approach“, 3rd Edition, John Wiley & Sons,2001. (UNIT-IV-V)
4	Elliot D. Kaplan, “Understanding GPS Principles and Applications”, 2nd edition, Artech House, 2005. (UNIT-I-III)

## Web Details

1	<a href="https://www.unoosa.org/oosa/sk/ourwork/psa/gnss/gnss.html">https://www.unoosa.org/oosa/sk/ourwork/psa/gnss/gnss.html</a> 2.
2	<a href="https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps/how_it_works/">https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps/how_it_works/</a>
3	<a href="https://www.princeton.edu/~alaink/Orf467F07/GNSS.pdf">https://www.princeton.edu/~alaink/Orf467F07/GNSS.pdf</a>
4	<a href="https://www.euspa.europa.eu/european-space/eu-space-programme/what-gnss">https://www.euspa.europa.eu/european-space/eu-space-programme/what-gnss</a> 5. <a href="https://www.gps.gov/systems/gnss/">https://www.gps.gov/systems/gnss/</a>



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	Name	Signature with Date
i. Faculty	Dr. S. Silali	<i>S. Silali</i>
ii. Faculty II (for common Course)	Mr. D. Rahul Khanna	<i>D. Rahul Khanna</i>
iii. Course Coordinator	Dr. S. Srilali	<i>S. Srilali</i>
iv. Module Coordinator	Dr. Sekhar Didde	<i>Sekhar Didde</i>
v. Programme Coordinator	Dr. B. S. Rao	<i>B. S. Rao</i>

*A. J. A.*  
PRINCIPAL  
Swarnandhra College of  
Engineering & Technology  
SEETHARAMAPURAM  
NARSAPUR - 534280, W.G.D.