

BITS PILANI, DUBAI CAMPUS
INSTRUCTION DIVISION
First Semester 2016 – 2017

Course Handout (Part – II)

Date: 18.08.2016

In addition to Part I (General Handout for all courses appended to the Time Table) this portion further specific details regarding the course.

Course No. : ECE/EEE F472 (3 0 3)
Course Title : Satellite Communications
Course Instructors : Dr. A. R. Abdul Rajak
Instructor-in-charge : Dr. A. R. Abdul Rajak

Scope and Objective of the Course:

The objective of this course is to provide the students with the basic understanding Satellite Communications. The material covered in this course is basic to the train of electrical engineers and electronics engineer in the area of Satellite Communications.

Course Pre/Co- requisite (if any) & Catalogue / Bulletin Description:

Given in the Catalogue 2014 – 2015 CD

Text book [TB]:

1. T. Pratt, C. W. Bostian and J. E. Allnut, "Satellite Communications," 2nd ed., Wiley India, 2006.

Reference book(s) [RB]:

1. G. Maral and M. Bousquet, "Satellite Communications Systems , Techniques and Technology" 4 th edition, John Wiley & Sons, 2009 (R1)
2. Dennis Roddy , "Satellite communications"3rd edition McGraw-Hill. (R2)

Course Plan / Schedule:

Sl.#	Learning objectives	Topics to be covered	Chapter No	No. of lectures
1	The history and the essential components of a satellite communication system.	Introduction.	Ch-1--TB	1
2	The radio wave propagation effects and how it influences the choice of frequencies for satellite communication.	Radio wave propagation	Ch-8--TB	1
3-6	LEO, MEO & GEO, their merits and demerits. The different types of launch vehicles and their features.	Satellite Orbits.	Ch-2 & 10--TB Ch-2 & 11--R1.	3
7	The outer space and its impact on the design of spacecraft subsystems.	Space environment.	Ch-3--TB Ch-12-R1.	1
8-10	The various sub-systems of the satellite like, Power, Telemetry, AOCS, Sensors, thermal systems, propulsion etc.	Spacecraft sub-systems.	Ch-3--TB Ch-10-R1.	3
11-13	Communication channel and its components like antenna, LNA, wideband receiver, demultiplexer, HPA like SSPA/ TWTA, transponder etc. INSAT-II transponder and its specifications.	The communication transponder	Ch-3--TB Ch-9-R1	3
14	Design of satellite systems for unattended operation and incorporation of reliability into system design.	Reliability	Ch-3--TB Ch-13 R1.	1
15-18	Introduction of terms like EIRP, G/T, uplink C/N, downlink C/N, overall C/N, C/N ₀ and illustration with a typical link design.	Satellite RF link analysis.	Ch-4--TB Ch-5--R1	4
19-20	Two-tone third order IM, IM noise and its effect on overall link design.	Intermodulation (IM)	Ch-6-TB.	2
21-22	Apportionment of various noise budgets and methods to obtain a desired C/N in presence of IM.	Link design with IM	Ch-6-TB.	2
23-26	The modulation and error correction techniques employed.	Analog & Digital signals.	Ch-5 & 7--TB Ch-3 & 4--R1.	4
27-32	FDMA, TDMA and CDMA and their merits and demerits will be highlighted. On board processing or regenerative transponders will be discussed.	Satellite Multiple Access.	Ch-6--TB Ch- 6-R1.	5
33-35	Earth station engineering aspects: transmitters, receivers, antenna and feed systems, INTELSAT	Earth Segment.	Ch-8-R1. Supp.	3

	earth station standards.		References	
36	The Indian National Satellite Programme, & its services and the salient features of the satellites.	INSAT Program. INTELSAT, EUTELSAT etc.	Supp. References	1
37-38	VSAT system planning, implementation and VSAT earth station engineering.	Very Small Aperture Terminal (VSAT) systems.	Ch-9--TB	2
39-40	The third generation satellite communication and the need for mobile and personal communication.	Mobile Satellite Comm. and non-geostationary satellite systems.	Supp. References Ch-10-TB.	2
41-42	GPS principles, receivers and its application. Emerging trends in both the payloads and spacecraft.	Global Positioning System (GPS) and Future trends.	Ch-12---TB Supp. References	2

Evaluation scheme:

EC No	Evaluation Components	Nature of Component	Duration	Weightage %	Date & Time	Venue
1	Test-1	Closed Book	50 minutes	25	27-09-16 T5	To be announced later
2	Quiz-1	Closed book	20 minutes	08	09-10-16 Su8	
3	Test - 2	Open book*	50 minutes	20	10-11-16 Th5	
4	Quiz – 2 / Assignment	Closed book	20 minutes	07	23-11-16 W2	
5	Compre Exam	Closed Book	3 hours	40	21-12-16 AN	

* Only prescribed text book(s) and hand written notes are permitted

Mid-Sem Grading:

Mid-sem grading will be displayed after two evaluation components. (Refer Academic calendar for schedule).

Note: A student will be likely to get “NC”, if he / she doesn't appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-compre total.

Makeup and Attendance policies:

Make-ups: are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the Instructor-in-Charge (I/C). Students with less than 50% of attendance will not be allowed to avail the make-ups. The decision of the I/C in the above matter will be final.

Attendance: Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. A student should have a minimum of **60%** of attendance in a course to be eligible to appear for the Comprehensive Examination in that course. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student which may be directly / indirectly related to grading.

General timings for consultation:

Each instructor will specify his / her chamber consultation hours during which the student can contact him / her in his / her chamber for consultation.

General instructions:

Students should come prepared for classes and carry the prescribed text book(s) or material(s) as advised by the Course Faculty to the class.

Notices:

All notices concerning the course will be displayed on the respective Notice Boards.

Dr. A. R. Abdul Rajak
Instructor – In- Charge

Instructor's Contact details

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