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 F314 **(3 0 3)**
Course Title **:** Electromagnetic Fields and Microwave Engineering
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 of electromagnetic waves and Microwave engineering. The material covered in this course is basic to the training of electrical engineers.

Course Pre/Co- requisite (if any) **& Catalogue / Bulletin Description:**
Given in the Catalogue 2015 – 2016 CD

Text book [TB]:
1. Samuel Y. Liao, "Microwave devices and circuits" 3rd ed., PHI 2008. **(T1)**

Reference book(s) [RB]:
1. Kraus/Fleisch "Electromagnetics with applications", 5th ed., McGraw-Hill New York, 1999.**(R1)**
2. David K. Cheng, "Field and Wave Electromagnetics" 2nd ed. Pearson Education, New Delhi, 2009. **(R2)**
3. Matthew N. O. Sadiku, "Principles of Electromagnetics" 4th ed. Oxford University Press, New Delhi, 2009. **(R3)**
4. EDD Notes: "Smith Chart and its Applications", BITS, Pilani, 2009. **(R4)**
5. Annapurna Das and Sisir Das, "Microwave Engineering", TMH 2009. **(R5)**

Course Plan / Schedule:

Sl.#	Learning objectives	Topics to be covered	Chapter No	No. of lectures
1.	Introduce the fundamental concepts culminating in Maxwell's Equations	Maxwell's Equations, Constitutive relations and Boundary Conditions Time-varying Fields	(1 , 2-R1) &(2-T1) class notes	3
2.	Understand the propagation of waves through space and various kinds of media	Plane wave propagation in conducting and dielectric media	(4.2-4.6 R1) & (2.5-T1) class notes	3
3.	To understand the plane wave at interface and analogous transmission lines, Radar absorbing material	Plane Waves at interfaces, phase and group velocity	(4.7-4.9- R1) & (2.3-T1) class notes	3
4.	How energy is stored and transmitted by EM wave	Energy relations and Poynting Vecto	(4.10-R1)& (2.2 -T1)	3
5.	Understand various types of polarization of EM waves.	Wave polarization	(4.11-4.12 -R1) & class notes	3
6.	Behaviour of plane waves at the interface between two media	Reflection & refraction of plane waves	(4.14 -R1) & class notes	3
7.	Analysis of transmission lines and their circuit behavior	Transmission lines	(3.4 -R1)& (3-T1) class notes	3
8.	How to solve transmission line problems using Smith Chart	Impedance matching	(3.4-3.5-R1) &(3 -T1) class notes	3
9.	General Wave behaviour along uniform guiding structures, TEM waves, TM waves, TE waves	Waveguides	(8.1-8.3-R1) & class notes	3
10.	Study of Radiation Mechanism and Antennas construction , Antenna parameters, basic antenna elements, Antenna Equivalent circuit	Introduction of Antennas	(5.1 -R1) & class notes	3
11.	Antenna parameters, basic antenna elements, Antenna Equivalent circuit,	Antennas and Antennas Arrays	(5.2-5.3-R1) & class notes	3

	Antenna arrays, Antenna patterns, Small loop antenna, Slot antenna, Horn antenna, Helical antenna and Log periodic antenna			
12.	Retarded Potential, Hertzian dipole, Half wave dipole	Dipole antennas	(5.4-5.9 -R1) & class notes	3
13.	Microwave hybrid circuits, Directional couplers, Circulators and Isolators.	Microwave Passive circuit elements	(4.3- 4.5-T1) class notes,	3
14.	Klystron, multi cavity klystron , reflex klystron and traveling wave tubes and Magnetron Gunn diode, IMPATT diode, TRAPATT diode and parametric amplifier Microwave measurements	Microwave Semiconductor devices and Microwave measurements	(5.3&7.1, 8.2,8.3,9.2,9.4,9.5,10.1-T1) & class notes,	3
			Total no. of classes planned	42

Evaluation scheme:

EC No	Evaluation Components	Nature of Component	Duration	Weightage %	Date & Time	Venue
1	Test-1	Closed Book	50 minutes	25	**26-09-16 M8**	**To be announced later**
2	Quiz-1	Closed book	20 minutes	05	**10.10.16 M9**	
3	Test - 2	Open book*	50 minutes	20	**09-11-16 W8**	
4	Quiz – 2	Closed book	20 minutes	05	**24.11.16 Th1**	
5	Assignment	Laboratory Practice		05	**TBA**	
6	Compre Exam	Closed Book	3 hours	40	**22-12-16 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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