

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech Communication Systems		
Course Title	Electromagnetic Interference and Compatibility		
Course Code	EC 635	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	Jan. 2021	Section (if, applicable)	-
Name of Faculty	Dr. S S Karthikeyan	Department	ECE
Email	sskarthikeyan@nitt.edu	Telephone No.	8903859762
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	Core course	<input checked="" type="checkbox"/>	Elective course
Syllabus (approved in BoS)			
<p>Introduction to EMI and EMC- Various EMC requirements and standards-Need for EMC and its importance in electronic product design - sources of EMI - few case studies on EMC.</p> <p>Conducted and radiated emission -power supply line filters-common mode and differential mode currentcommon mode choke- switched mode power supplies. Shielding techniques-shielding effectiveness-shield behavior for electric and magnetic field -aperture-seams-conductive gaskets- conductive coatings.</p> <p>Grounding techniques- signal ground-single point and multi point grounding-system ground-common impedance coupling -common mode choke-Digital circuit power distribution and grounding.</p> <p>Contact protection - arc and glow discharge-contact protection network for inductive loads-C, RC, RCD protection circuit- inductive kick back. RF and transient immunity-transient protection network- RFmitigation filter-power line disturbance- ESD- human body model- ESD protection in system design.</p> <p>PCB design for EMC compliance-PCB layout and stack up- multi layer PCB objectives- Return</p>			

path discontinuities-mixed signal PCB layout. EMC pre compliance measurement-conducted and radiated emission test-LISN-Anechoic chamber.

Reference Books

1. H. W. Ott, *Electromagnetic Compatibility Engineering*, 2nd edition, John Wiley & Sons, 2011, ISBN: 9781118210659.
2. C. R. Paul, *Introduction to Electromagnetic Compatibility*, 2nd edition, Wiley India, 2010, ISBN: 9788126528752
3. L. Kaiser, *Electromagnetic Compatibility Handbook*, 1st edition, CRC Press, 2005. ISBN: 9780849320873

COURSE OBJECTIVES

This subject introduces the essential Microwave Circuit Theory and the design aspects of Microwave Integrated Circuit components.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Students are able to	
1. Understand the various sources of Electromagnetic interference	1
2. Familiarize the fundamentals those are essential for product design with EMC compliance and various EMC standards	2,3
3. Would gain knowledge to understand the concept of Shielding and grounding related to product design.	2,3,4
4. Design PCBs which are electromagnetically compatible	2,4,5
5. Understand and differentiate the various EMC pre compliance measurement	1,4,5

COURSE PLAN – PART II

COURSE OVERVIEW

Electromagnetic interference (EMI) is a potential threat to the present day electronic systems. The main objective of the course is to provide insight into various sources of electromagnetic interferences and how to design an electronic product which is electromagnetically compatible with each other

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Introduction to EMI and EMC- Various EMC requirements and standards-	Online-PPT

2	Week 2	Need for EMC and its importance in electronic product design - sources of EMI	Online-PPT
3	Week 3	Few case studies on EMC	Online-PPT
4	Week 4	Conducted and radiated emission - power supply line filters-common mode and differential mode current-common mode choke	Online-PPT
5	Week 5	switched mode power supplies. Shielding techniques- shielding effectiveness-shield behavior for electric and magnetic field	Online-PPT
6	Week 6	Aperture-seams-conductive gaskets-conductive coatings.	Online-PPT
7	Week 7	Grounding techniques- signal ground-single point and multi point grounding	Online-PPT
8	Week 8	system ground-common impedance coupling -common mode choke-Digital circuit power distribution and grounding.	Online-PPT
9	Week 9	Contact protection - arc and glow discharge-contact protection network for inductive loads-C, RC, RCD protection circuit- inductive kick back.	Online-PPT
10	Week 10	RF and transient immunity-transient protection network- RFmitigation filter-power line disturbance	Online-PPT
11	Week 11	ESD- human body model- ESD protection in system design. CB design for EMC compliance-	Online-PPT
12	Week 12	PCB layout and stack up- multi layer PCB objectives	Online-PPT
13	Week 13	Return path discontinuities-mixed signal PCB layout.	Online-PPT
14	Week 14	EMC pre compliance measurement-conducted and radiated emission test-LISN-Anechoic chamber.	Online-PPT

COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test I (Online)	February 4 th Week	1 Hour	20%
2	Cycle Test II (Online)	March 4 th Week	1 Hour	20%
3	Seminar/Case Study Presentation (Online)			15%
4	Surprise Test (MCQ) (Online)	April 4 th week	15 Minutes	15%
CPA	Compensation Assessment* (Online)	May 1 st Week	1 Hour	20%
5	Final Assessment * (Online)	May Second Week	2 Hours	30%
*mandatory; refer to guidelines on page 4				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
Course Feedback is assessed through class committee meeting, frequently ask the questions in the class and analyze the responses and course exit survey				
COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)				
<ol style="list-style-type: none"> 1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information Regarding this course) will be intimated in Class Only through Class representative. 2. Attending all the assessment is Mandatory for every student. 3. If any of the student is not able to attend the Cycle Test 1 and Cycle Test 2 due to genuine reasons (any academic related work through department or Medical grounds) may appear for compensation assessment. 4. There will not be any improvement test for the students who scores low in the cycle test 5. Mobile phones will not be allowed for all the assessments. 				
ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none"> ➤ At least 75% attendance in each course is mandatory. ➤ A maximum of 10% shall be allowed under On Duty (OD) category. ➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade. 				


ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.


The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

FOR APPROVAL


Course Faculty **Dr. S S Karthikeyan**

CC-Chairperson


HOD

Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) **Every course shall have a final assessment on the entire syllabus with at least 30% weightage.**
- c) **One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.**
- d) **The passing minimum shall be as per the regulations.**

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or class average/2 whichever is greater.		Peak/3 or class average/2 whichever is lower		40%

- e) **Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.**
- f) **Absolute grading policy shall be incorporated if the number of students per course is less than 10.**
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.