Department of Physics

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	**Electronics**		
Course Code	**PH 657**	**No. of Credits**	**3**
Department	**Physics**	**Faculty**	**Dr. Santhosh Kumar M.C.**
Pre-requisites Course Code	**Nil**		
Course Coordinator(s) (if, applicable)	**Dr. A. Chandra Bose**		
Other Course Teacher(s)/Tutor(s) E-mail	**santhoshmc@nitt.edu**	**Telephone No.**	**04312503611**
Course Type	☑ **Core course** ☐ **Elective course**		

COURSE OVERVIEW

This course deals with the fundamentals electronics. It covers topics like network theorems and applications, Bipolar Transistor Amplifiers and FETs, Oscillators, operational amplifiers and Digital Circuits Logic gates. This course will help the student to understand the working principle of many practical electronic equipment used in day today life.

COURSE OBJECTIVE

To impart a diversified knowledge on circuit analysis, the semiconductor devices, FETs, operational amplifiers and digital circuits and their applications

COURSE OUTCOMES (CO)

Course Outcomes On successful completion of this course, students would be able to	**Aligned Programme Outcomes (PO)**
Network theorems and applications	Student will be able to apply network theorems in circuits
Bipolar Transistor Amplifiers and FETs	Understand the principle of FETs
Oscillators	Will be able construct oscillator circuits

Operational amplifiers			Understand the working of Op-amp
Digital Circuits Logic gates			Understand the working of Logic gates
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topic**	**Mode of Delivery**
1	Aug 1st week	Introduction to the course Network theorems, Special Diodes Kirchoff's laws for current and voltage	PPT/Chalk & Talk
2	Aug 2nd week	Thevenin's and Norton's theorems, superposition and reciprocity theorems with examples	C &T
3	Aug 3rd week	p-n junction diodes – Zener diode – tunnel diode – Schottky barrier diode – varactor diode-photodiode	PPT
4	Aug 4th week	solar cell – photodiodes and transistors – light emitting diode – semiconductor laser – UJT – opto-couplers	PPT
5	Aug 5th week	Bipolar Transistor Amplifiers and FETs Biasing characteristics of junction transistors – analysis using re model-fixed bias-voltage divider bias-emitter bias —– frequency response	C &T/PPT
6	Sep 1st week	Direct coupled transistor amplifiers – single stage transistor amplifier	C &T
7	Sep 2nd week	Feed back in amplifiers – effect of negative feedback in amplifiers – FETs – different types-low and high frequency FETs, frequency response of FET – applications	C &T
8	Sep 3rd week	Oscillators Oscillator principle – oscillator types – frequency stability	C &T
9	Sep 4th week	RC oscillators – phase shift oscillator – Wein bridge oscillator – LC tunable oscillators – limitations	C &T
10	Oct 1st week	multivibrators – monostable and astable – 555 IC timer – sine wave and triangular wave generation – crystal oscillators and their applications.	C &T
11	Oct 2nd week	Operational Amplifiers Basis of operational amplifier – characteristics– feedback types.	C &T

12	Oct 3rd week	CMRR – inverting and non-inverting modes- sum and difference amplifiers – integrating and differentiating circuits	C &T
13	Oct 4th week	Current to voltage (ICVS) and voltage to current (VCIS) conversion —- op-amp application – instrumentation amplifiers – low pass and high pass active filters	C &T
14	Nov 1st week	Digital Circuits Logic gates: De Morgan's law, binary adder, comparators, decoders, multiplexers.	C &T/PPT
15	Nov 2nd week	Flipflops: RS flip-flop, JK flip- flop, JK master-slave flip-flops, T flip-flop, D flip-flop. Shift registers	C &T/PPT
16	Nov 3rd Week	synchronous and asynchronous counters – registers – A/D and D/A conversion.	C &T
17	Dec 1st week	Final Examination	

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	**Quiz -1**	**Sep 1st week**	**30 minutes**	**5%**
2	**Cycle Test - 1**	**Sep 3rd Week**	**1 hour**	**20%**
3	**Quiz -2**	**October 2nd week**	**30 minutes**	**20%**
4	**Cycle Test - 2**	**November 2nd week**	**1 hour**	**5%**
5	**Re-Test**	**November 3rd week**	**1 hour**	**20%**
6	**End Semeter Exam**	**Decemebr 1st week**	**3 Hours**	**50%**

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. **J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).**
2. **Albert Malvino, David J Bates, Electronics Principles, Tata McGraw-Hill (2007).**
3. **R.J. Higgins, Electronics with Digital and Analogue Integrated Circuits, Prentice Hall (1983).**
4. **R. L. Boylsted and L. Nashelsky, Electronic Device and Circuits, Pearson Education (2003).**
5. **C.L Wadhwa, Network Analysis and Synthesis, New Age International Publishers, (2007).**
6. **G.B. Calyton, Operation Amplifiers, ELBS (1980).**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)
Feedback from the students will be collected after 15th week :on knowledge gained, subjects relevant to the course, methodology adopted, aspect of improvement, whether the topics fulfill the course outcome and program outcome.
COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)
Attendance : 75% Mandatory **Minimum Mark for a Pass = 35% Marks or Class average/2 whichever in higher** **Re-assessment: Based on the production of valid proof of absence; One test covering 4 units and 1 hour**
ADDITIONAL COURSE INFORMATION
The faculty member is available for consultation in the evenings. Queries may also be emailed to directly at santhoshmc@nitt.edu
FOR SENATE'S CONSIDERATION
Course Faculty _____ **CC-Chairperson** _____ **HOD** _____