

**Department of Physics**

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE OUTLINE TEMPLATE</b>			
<b>Course Title</b>	<b>Electronics</b>		
<b>Course Code</b>	<b>PH 657</b>	<b>No. of Credits</b>	<b>3</b>
<b>Department</b>	<b>Physics</b>	<b>Faculty</b>	<b>Dr. Santhosh Kumar M.C.</b>
<b>Pre-requisites Course Code</b>	<b>Nil</b>		
<b>Course Coordinator(s) (if, applicable)</b>	<b>Dr. A. Chandra Bose</b>		
<b>Other Course Teacher(s)/Tutor(s) E-mail</b>	<b>santhoshmc@nitt.edu</b>	<b>Telephone No.</b>	<b>04312503611</b>
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Core course</b> <input type="checkbox"/> <b>Elective course</b>		
<b>COURSE OVERVIEW</b>			
<p>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.</p>			
<b>COURSE OBJECTIVE</b>			
<p><b>To impart a diversified knowledge on circuit analysis, the semiconductor devices, FETs, operational amplifiers and digital circuits and their applications</b></p>			
<b>COURSE OUTCOMES (CO)</b>			
<b>Course Outcomes</b>		<b>Aligned Programme Outcomes (PO)</b>	
On successful completion of this course, students would be able to			
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
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week</b>	<b>Topic</b>	<b>Mode of Delivery</b>
<b>1</b>	Aug 1 <sup>st</sup> week	Introduction to the course Network theorems, Special Diodes Kirchoff's laws for current and voltage	PPT/Chalk & Talk
<b>2</b>	Aug 2 <sup>nd</sup> week	Thevenin's and Norton's theorems, superposition and reciprocity theorems with examples	C & T
<b>3</b>	Aug 3 <sup>rd</sup> week	p-n junction diodes – Zener diode – tunnel diode – Schottky barrier diode – varactor diode-photodiode	PPT
<b>4</b>	Aug 4 <sup>th</sup> week	solar cell – photodiodes and transistors – light emitting diode – semiconductor laser – UJT – opto-couplers	PPT
<b>5</b>	Aug 5 <sup>th</sup> 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
<b>6</b>	Sep 1 <sup>st</sup> week	Direct coupled transistor amplifiers – single stage transistor amplifier	C & T
<b>7</b>	Sep 2 <sup>nd</sup> 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
<b>8</b>	Sep 3 <sup>rd</sup> week	Oscillators Oscillator principle – oscillator types – frequency stability	C & T
<b>9</b>	Sep 4 <sup>th</sup> week	RC oscillators – phase shift oscillator – Wein bridge oscillator – LC tunable oscillators – limitations	C & T
<b>10</b>	Oct 1 <sup>st</sup> week	multivibrators – monostable and astable – 555 IC timer – sine wave and triangular wave generation – crystal oscillators and their applications.	C & T
<b>11</b>	Oct 2 <sup>nd</sup> week	Operational Amplifiers Basis of operational amplifier – characteristics– feedback types.	C & T

12	Oct 3 <sup>rd</sup> week	CMRR – inverting and non-inverting modes – sum and difference amplifiers – integrating and differentiating circuits	C &T
13	Oct 4 <sup>th</sup> 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 1 <sup>st</sup> week	Digital Circuits Logic gates: De Morgan's law, binary adder, comparators, decoders, multiplexers.	C &T/PPT
15	Nov 2 <sup>nd</sup> 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 3 <sup>rd</sup> Week	synchronous and asynchronous counters – registers – A/D and D/A conversion.	C &T
17	Dec 1 <sup>st</sup> week	Final Examination	

#### **COURSE ASSESSMENT METHODS**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Quiz -1	Sep 1 <sup>st</sup> week	30 minutes	5%
2	Cycle Test - 1	Sep 3 <sup>rd</sup> Week	1 hour	20%
3	Quiz -2	October 2 <sup>nd</sup> week	30 minutes	20%
4	Cycle Test - 2	November 2 <sup>nd</sup> week	1 hour	5%
5	Re-Test	November 3 <sup>rd</sup> week	1 hour	20%
6	End Semester Exam	Decemehr 1 <sup>st</sup> 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. Boylestad 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 is higher

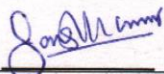
Re-assessment: Based on the production of valid proof of absence; One test covering 4 units and 1 hour

**ADDITIONAL COURSE INFORMATION**

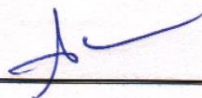
The faculty member is available for consultation in the evenings. Queries may also be emailed to directly at [santhoshmc@nitt.edu](mailto:santhoshmc@nitt.edu)

**FOR SENATE'S CONSIDERATION**

Course Faculty



CC-Chairperson



HOD

