

**GOVERNMENT POLYTECHNIC KORAPUT**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**

**TH2. ANALOG ELECTRONICS AND OP-AMP**

Name of the Course: Diploma in Electrical Engineering			
Faculty: S Bichiballi		<i>Semester duration: 10/03/2022 to 10/06/2022</i>	
Course code:	Th2	Semester	4 <sup>th</sup>
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Internal Assessment :	20
Maximum marks:	100	End Semester Examination:	80

**VISION:**

To create competent & industry ready Electrical Diploma Engineers with professional and social values to meet future challenges.

**MISSION:**

- To prepare diploma holders through "qualitative competency based education system" to compete with national requirement along with core values.
- To produce dynamic Electrical Engineers to serve the society and industry.
- To develop leadership qualities, communication skills, critical thinking and attitude for lifelong learning.

**PROGRAM EDUCATIONAL OBJECTIVES:**

PEO1	Apply technical knowledge and skills learned in the field of Electrical Engineering to excel in Professional and/or higher education.
PEO2	To provide students an excellent academic environment and make them aware the needs of Society and Industry to become a successful Professional Entrepreneur.
PEO3	To engage in lifelong learning, career enhancement to adopt emerging technologies

**COURSE OUTCOMES:**

CO1	Enumerate various semiconductor devices.
CO2	Analyze characteristics of different electronic circuit.
CO3	Illustrate and classify amplifiers and oscillators.
CO4	Assess different signal processing devices and circuits for their real time applications.

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**TOPIC WISE DISTRIBUTION OF PERIODS**

Sl. No.	Topics	Periods
1.	PN junction diode	6
2.	Special semiconductor devices	5
3.	Rectifier circuits & filters	7
4.	Transistors	7
5.	Transistor circuits	7
6.	Transistor amplifiers & oscillators	13
7.	Field effect transistor	6
8.	Operational amplifiers	9
<b>Total</b>		<b>60</b>

**LESSON PLAN**

Week	Day	Theory topic
1 <sup>st</sup>	1 <sup>st</sup>	<b>PN junction diode:</b> P-N Junction Diode, Working of Diode.
	2 <sup>nd</sup>	V-I characteristic of PN junction Diode, DC load line.
	3 <sup>rd</sup>	Important terms such as Ideal Diode, Knee voltage.
	4 <sup>th</sup>	Junctions break down: Zener breakdown, Avalanche breakdown
2 <sup>nd</sup>	1 <sup>st</sup>	P-N Diode clipping Circuit.
	2 <sup>nd</sup>	P-N Diode clamping Circuit
	3 <sup>rd</sup>	<b>Special semiconductor devices:</b> Thermistors.
	4 <sup>th</sup>	Sensors & Barretters.
3 <sup>rd</sup>	1 <sup>st</sup>	Zener Diode.
	2 <sup>nd</sup>	Tunnel Diode.
	3 <sup>rd</sup>	PIN Diode
	4 <sup>th</sup>	<b>Rectifier circuits &amp; filters:</b> Classification of rectifiers.
4 <sup>th</sup>	1 <sup>st</sup>	Analysis of half wave rectifier and calculate: DC output current and voltage, RMS output current and voltage, Rectifier efficiency, Ripple factor, Regulation, Transformer utilization factor, Peak inverse voltage.
	2 <sup>nd</sup>	Analysis of full wave centre tapped rectifier and calculate: DC output current and voltage, RMS output current and voltage, Rectifier efficiency, Ripple factor, Regulation, Transformer utilization factor. Peak inverse voltage.
	3 <sup>rd</sup>	Analysis of Bridge rectifier and calculate: DC output current and voltage, RMS output current and voltage, Rectifier efficiency, Ripple factor, Regulation, Transformer utilization factor, Peak inverse voltage.
	4 <sup>th</sup>	Filters: Shunt capacitor filter.
5 <sup>th</sup>	1 <sup>st</sup>	Choke input filter.
	2 <sup>nd</sup>	$\pi$ filter .
	3 <sup>rd</sup>	<b>Transistors:</b> Principle of Bipolar junction transistor.
	4 <sup>th</sup>	Different modes of operation of transistor.
6 <sup>th</sup>	1 <sup>st</sup>	Current components in a transistor.



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7 <sup>th</sup>	2 <sup>nd</sup>	Transistor as an amplifier.
	3 <sup>rd</sup>	Transistor circuit configuration & its characteristics: CB Configuration.
	4 <sup>th</sup>	CE Configuration.
	1 <sup>st</sup>	CC Configuration.
8 <sup>th</sup>	2 <sup>nd</sup>	<b>Transistor circuits:</b> Transistor biasing.
	3 <sup>rd</sup>	Stabilization, Stability factor.
	4 <sup>th</sup>	Different methods of Transistors Biasing: Base resistor method.
	1 <sup>st</sup>	Collector to base bias.
9 <sup>th</sup>	2 <sup>nd</sup>	Self bias or voltage divider method.
	3 <sup>rd</sup>	Previous year question discussion.
	4 <sup>th</sup>	Previous year question discussion.
	1 <sup>st</sup>	<b>Transistor amplifiers &amp; oscillators:</b> Practical circuit of transistor amplifier.
10 <sup>th</sup>	2 <sup>nd</sup>	DC load line and DC equivalent circuit, AC load line and AC equivalent circuit.
	3 <sup>rd</sup>	Calculation of gain, Phase reversal.
	4 <sup>th</sup>	H-parameters of transistors.
	1 <sup>st</sup>	Simplified H-parameters of transistors, generalised approximate model.
11 <sup>th</sup>	2 <sup>nd</sup>	Analysis of CB, CE, CC amplifier using generalised approximate model.
	3 <sup>rd</sup>	Multi stage transistor amplifier: R.C. coupled amplifier, Transformer coupled amplifier.
	4 <sup>th</sup>	Feed back in amplifier, General theory of feedback.
	1 <sup>st</sup>	Negative feedback circuit, Advantage of negative feedback.
12 <sup>th</sup>	2 <sup>nd</sup>	Power amplifier and its classification. Difference between voltage amplifier and power amplifier.
	3 <sup>rd</sup>	Transformer coupled class A power amplifier: Class A push – pull amplifier, Class B push – pull amplifier.
	4 <sup>th</sup>	Oscillators: Types of oscillators, Essentials of transistor oscillator.
	1 <sup>st</sup>	Principle of operation of tuned collector, Hartley, Colpitt, phase shift, wein-bridge oscillator (no mathematical derivations).
13 <sup>th</sup>	2 <sup>nd</sup>	<b>Field effect transistor:</b> Classification of FET.
	3 <sup>rd</sup>	Advantages of FET over BJT.
	4 <sup>th</sup>	Principle of operation of BJT.
	1 <sup>st</sup>	FET parameters (no mathematical derivation): DC drain resistance, AC drain resistance, Trans-conductance.
14 <sup>th</sup>	2 <sup>nd</sup>	Biasing of FET.
	3 <sup>rd</sup>	Biasing of FET.
	4 <sup>th</sup>	<b>Operational Amplifiers:</b> General circuit simple of OP-AMP and IC – CA – 741 OPAMP
	1 <sup>st</sup>	Operational amplifier stages.
15 <sup>th</sup>	2 <sup>nd</sup>	Equivalent circuit of operational amplifier.
	3 <sup>rd</sup>	Open loop OP-AMP configuration, OPAMP with fed back.
	4 <sup>th</sup>	Inverting OP-AMP.
	1 <sup>st</sup>	Non inverting OP-AMP.
	2 <sup>nd</sup>	Voltage follower & buffer.
	3 <sup>rd</sup>	Differential amplifier: Adder or summing amplifier, Subtractor.
	4 <sup>th</sup>	Integrator, Differentiator, Comparator.

Signature of faculty concerned

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10/3/22

H.O.D. Electrical  
*[Handwritten Signature]*  
10/3/22