GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology					Branch/Spec.	Biomedical Engineering		
Semester	IV					Version	2.0.0.1		
Effective from Academic Year	2022-23					Effective for the Batch admitted in			July 2022
Course Code	2BM4101		Course Name			Analog Integrated Electronics			
Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	-	1	-	4	Theory	40	60	100
Hours	3	-	2	-	5	Practical	30	20	50

Pre-requisites

Prior knowledge of linear components and understanding of transistor based circuits will be required.

Course Outcomes

On successful completion of the course, the students will be able to:

CO1	Getting **familiarized** with basic integrated circuit components, its designing & packaging.
CO2	**Understanding** various operating modes of Op-amp and its linear/non-linear applications.
CO3	**Designing** of signal generators and low and high order filters.
CO4	**Understanding** and **designing** of multi-vibrator and power supply circuit.

Theory Syllabus

Unit	Content	Hrs.
1	INTEGRATED CIRCUITS: Types, Package type, Pin identification, Temperature range, Scale of Integration, Analog and Digital ICs difference, Advantages of ICs, Understanding data sheets.	4
2	OP-AMP BASICS: Differential amplifier circuit using transistor, Basic block diagram, Ideal OP-AMP with transfer curve, Pin diagram, Equivalent circuit, Open loop configurations and Closed loop configuration: Inverting & Non-inverting and Differential amplifiers.	6
3	OP-AMP PERFORMANCE PARAMETERS: Introduction , Input offset voltage, Input bias current, Input offset current, Total output offset voltage, Thermal drift, Effect of variation in power supply voltage on offset voltage, Common mode configuration and common mode rejection ratio, Offset nulling techniques	5
4	GENERAL APPLICATIONS: Summing & averaging amplifier, Instrumentation amplifier, Inverter, Voltage follower, Voltage to current and current to voltage converters, Integrator, Differentiator, Sample & hold circuits, Basic Comparators, Schmitt trigger, Peak detector. Log & Anti-log amplifiers, Precision Rectifier, free running oscillator.	9
5	ACTIVE FILTERS: Types of filters, Butterworth filters – Low Pass, High Pass, Band pass, Notch filter, 1st and 2nd order Butterworth filters, All Pass filter.	4
6	SIGNAL GENERATORS, FEEDBACK AMPLIFIERS & OSCILLATORS: Sine Wave, Square wave, Triangular Wave and Sawtooth Wave generators, Voltage controlled Oscillator (Voltage to Frequency convertor), Frequency to voltage convertor. Feedback concept, negative & positive feedback, voltage/ current, series/shunt feedback, Berkhausen criterion, Colpitts, Hartley's, Phase shift, Wein bridge and crystal oscillators.	5

7	TIMERS: Introduction to 555 timer, Pin diagram, Monostable and Astable operations with application.	4
8	POWER AMPLIFIERS: Power amplifier, Class A, B, AB, C, Conversion efficiency, Tuned amplifier	4
9	APPLICATIONS: Design fixed and variable power supply using voltage regulator IC 78XX, IC 79XX , LM 317 & IC723.	4
Practical Content		
Practical, assignments and tutorials are based on above syllabus.		
Text Books		
1	Op Amp and Linear Integrated Circuits. By – Ramakant Gayakwad	
Reference Books		
1	Operational Amplifiers: Design & Applications. By – Driscoll and Coughlin	
2	Op Amp & Linear Integrated Circuit. By – James M.Fiore	
3	Operational Amplifiers & Linear Integrated Circuits. By – K. Lal Kishore	
4	Analog Electronic Circuits. By – Lakmi Jain & Swash Hungenehally	
ICT/MOOCs Reference		
1	https://nptel.ac.in/courses/117106087/32	
2	https://nptel.ac.in/courses/117107094	
3	https://www.electronics-tutorials.ws/blog/variable-voltage-power-supply.html	
4	https://www.onsemi.com/pub/Collateral/LM317-D.PDF	
5	https://www.electronics-tutorials.ws/opamp/opamp_1.html	

Mapping of CO with PO and PSO:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	1	0	0	0	0	1	0	0	2	1	2	1
CO2	2	2	3	1	0	0	0	0	1	0	0	1	2	2	1
CO3	3	1	3	1	0	3	0	0	1	0	0	1	2	3	2
CO4	3	2	3	3	0	0	0	0	1	0	0	1	3	3	2