Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Second Year Bachelor of EE Engineering- Semester IV

With effect from: Academic Year 2018-19

EE406-N	**Analog Electronics**
Pre-requisite	

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
					Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
L	T	P	Total							
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Realization concepts of the characteristics of transistors.
- Design and analyses various rectifier and amplifier circuits.
- Understand the functioning of Op-amp and design Op-amp based circuits applications.

Outline Of The Course:

Sr. No	Title of the Unit	Minimum Hours
1.	Introduction of BJT circuits	08
2.	Differential, multi-stage and operational amplifiers	08
3.	MOSFET circuits	08
4.	Linear applications of op-amp	08
5.	Nonlinear applications of op-amp	12
	Total	44

- **Total hours (Theory): 44**
- **Total hours (Lab): 30**
- **Total hours: 74**

DETAILED SYLLABUS

Sr. No	Title	Lecture Hours	Weightage(%)
1.	**Introduction of BJT circuits** Structure and V-I characteristics of a BJT, BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror, common-emitter, common-base and common collector amplifiers,Small signal equivalent circuits BJT.	**08**	**10%**
2.	**MOSFET circuits** MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, transconductance	**08**	**20%**
3.	**Differential, multi-stage and operational amplifiers** Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)	**08**	**20%**
4.	**Linear applications of op-amp** Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp.	**08**	**20%**
5.	**Nonlinear applications of op-amp** Signal Generators: Square, triangle and ramp generator circuits using opamps - Effect of slew rate on waveform generation- monostable circuits- Principles of VCO circuits. Comparator Circuits: Zero Crossing Detector- Regenerative comparator circuits. Timer IC 555: Functional diagram- astable and monostable modes Phase locked loops: Principles – Building blocks of PLL-Lock and Three terminal regulator ICs: basic block schematic - 78 x x& 79 x x series - Adjustable output voltage regulator LM 317, LM 340 and LM 337 series power supply ICs. their use and basic design considerations for designing regulated power supplies.	**12**	**30%**
	Total	**44**	**100**

INSTRUCTIONAL METHOD AND PEDAGOGY:

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

LEARNING OUTCOME:

- The student can be acquired the basic knowledge of electric circuits, electrical fundamentals, thus being prepared to pursue any area of engineering spectrum in depth as desired.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use.

Text/References :

1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, “Introduction to Operational Amplifier theory and applications”, McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.

4. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
5. P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

Suggested List of Experiments:

Sr. No.	Name of Experiment
1	Study the different parameter of Op-amp IC 741
2	To Study an Op-ampIC 741 Inverting Amplifier.
3	To Study an Op-ampIC 741Non-Inverting Amplifier.
4	To configure Op-amp IC 741 as a summing amplifier
5	To Study an Op-amp IC 741Integrator &Differentiator.
6	To configure Op-amp IC 741 as a Schmitt Trigger.
7	To configure Op-amp IC 741 as an Instrumentation amplifier
8	Configure IC 555 as Monostable multivibrator
9	Confige IC 555 as an Astable (free running) multivibrator.
10	Mini project: Application based using Op Amp or 555 timer ICs.