RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
New Scheme Based On AICTE Flexible Curricula
Electrical Engineering, III-Semester
EE-303 Analog Electronics

COURSE OBJECTIVE
The primary objective of this course is to develop an in-depth understanding of the design principles and applications of integrated analog circuits.

COURSE CONTENT

Semiconductor Diodes: Theory of P-N junction, temperature dependence and break down characteristics, junction capacitances, Zener diode, Varactor diode, Tunnel diode, PIN diode, LED, Photo diode, Schottky diode, Diode applications: series –parallel configurations, full wave and half wave rectification, voltage multiplier circuits, diode testing

Transistors: BJT, types& configuration, working principal, characteristics, and region of operation, load line, biasing methods, Small signal analysis of transistor (low frequency) using h-parameters, thermal runaway and thermal stability.FET, MOSFET, Transistor as an amplifier, gain,bandwidth, frequency response,

Feedback amplifierand Oscillators: Feedback amplifier, negative feedback, voltage-series, voltage shunt,current series and current shunt feedback, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, Wien bridge, and Crystal oscillators. Power amplifiers, class A, class B, class A B, C amplifiers, their efficiency and power Dissipation, Push-pull and complimentary symmetry push-pull amplifier.

Wave Shaping circuits: Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibrators. Clipper and clamper circuit, Differential amplifier, calculation of differential, common mode gain and CMRR using h- parameters, Darlington pair, Boot strapping technique. Cascade and cascade amplifier.

Operational Amplifier: Operational amplifier basics, practical Op-amp circuits & characteristics, slew rate , bandwidth, offset voltage ,basic current, application, inverting, non-inverting amplifier, summer, average, differentiator, integrator, differential amplifier, instrumentation amplifier, log and antilog amplifier, voltage to current and current to voltage converters, comparators Schmitt trigger , active filters, 555 timer and its application.

COURSE OUTCOME:

After successful completion of course, Students are expected to able in applying theory and realize analog filter circuits, Understand the circuit operation of the 555 timer IC and regulator IC and identifying the faulty components within a circuit.

EVALUATION
Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on external assessment, assignments, presentations, and interview of each candidate.

REFERENCES
1.Robert L Boylestad, Louis Nashelsky; Electronic Devices and Circuits; Pearson
2.Jacob Millman, Cristos C Halkias, Satyabrata Jit; Electronic Devices and Circuits; McGraw-Hill
3.Anil K Maini, Electronic Devices and Circuits, Wiley
4.S Salivahanan, N Suresh Kumar; Electronic Devices and Circuits; McGraw- Hill

Topics for the laboratory (Expandable):

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.

2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth.

3. Study the effect of voltage series,- current series, voltage shunt and current shunt- feedback on amplifier using discrete components.

4. Design & realize inverting, non inverting and buffer amplifier using 741 op amps.

5. Verify the operation of a differentiator circuit using op amp IC 741 and show that it acts as a high pass filter.

6. Verify the operation of a integrator circuit using op amp 741 and show that it acts as a low pass filter.

7. Design & Verify the operation of adder and subtractor circuit using op amp 741.

8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain- of the amplifier.

9. Study of IC 555 as astable and monostable multivibrator.

10. Design & realize using op amp 741, wein bridge oscillator