RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/5

Branch	Electrical and Electronics Engineering	Semester	IV

Course Code	403	Course Name	Linear Integrated Circuits

Course Outcome 1	Describe the construction of operational amplifiers.	Teach Hrs.	Marks
Learning Outcome 1	Construct Op-Amp using basic amplifier circuits. **(Cognitive)**	7	10
Contents	Four stage Block diagram of an Operational Amplifier(Op-Amp), equivalent circuit of a typical Op-Amp (4 stages), differential and common mode of operation, concept of inverting and non-inverting input, schematic symbol and equivalent circuit of Op-Amp, Ideal Characteristics		
Method of Assessment	*Internal: Mid Semester Exam-I, Pen paper test & Assignment*		
Learning Outcome 2	Explain basic Op-Amp circuit parameters.**(Cognitive)**	8	10
Contents	IC Packages of Op-Amps,Basic Parameters of Op-Amp: Inputoffsetvoltage, Inputresistance, Common Mode Rejection Ratio (CMRR), Slew rate, Gain, Bandwidth, Op-Amp 741IC characteristics,pinoutandpowersupplyrequirements **(Cognitive)**		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 3	Measure basic characteristics of Op-Amps. **(Psychomotor)**	6	10
Contents	MeasurementofDifferentcharacteristicsofanOp-Amp Viz. Output Resistance, Input Resistance, Voltage Gain, gain-bandwidth product. (On Trainer-Kit and/or Simulation)		
Method of Assessment	*External: Laboratory observation and viva voce*		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 2/5

Branch	Electrical and Electronics Engineering	Semester	IV

Course Code	403	Course Name	Linear Integrated Circuits

Course Outcome 2	Classify different Op-Amps based circuits.	Teach Hrs.	Marks
Learning Outcome 4	Construct general Op-Amp based circuits.**(Cognitive)**	8	10
Contents	**Different Circuits of Op-Amps** Circuit diagram, working concept and formula derivation of: Inverting amplifier, non-invertingamplifier, Voltage follower, Adder and Subtractor, Differentiator, Integrator, LogarithmicamplifierandAntilogarithmicamplifier		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 5	Describe general Op-Amp based filter circuits**.** **(Cognitive)**	7	10
Contents	Op-Amp based circuit diagram, working concept and frequency response of: Active filters such aslowpass, highpass, band pass, band reject and all pass filter. Simple numerical problems on Op-amp based filter design.		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 6	Verify different Op-Amps based circuits. **(Psychomotor)**	6	10
Contents	AC/DC analysis of inverting and non-inverting amplifier, verification of voltage follower, adder and differentiatoramplifier, Verification of Op-amp low pass filter(On Trainer-Kit and/or Simulation)		
Method of Assessment	*Internal: Laboratory observation and viva voce*		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 3/5

Branch	Electrical and Electronics Engineering	Semester	IV

Course Code	403	Course Name	Linear Integrated Circuits

Course Outcome 3	ConstructOp-Amp based circuit for differentapplications.	Teach Hrs.	Marks
Learning Outcome 7	Model Op-Amp in comparator and Schmitt trigger circuits. **(Cognitive)**	7	10
Contents	Comparators:functionsof acomparator, inverting and non-inverting operation ofcomparator Schmitttrigger: inverting andnon-inverting with circuit diagram, input and output waveforms and threshold levels, hysteresisvoltage curve		
Method of Assessment	*Internal: Mid Semester Exam*-I, *Pen paper test & Assignment*		
Learning Outcome 8	Explain Op-Amp based S&H circuits, rectifiers and function generators. **(Cognitive)**	8	10
Contents	Sample andHold circuit, Half Wave PrecisionRectifier, Op-Amp based WeinBridgeOscillator, PhaseshiftOscillator, Square Wave Generator, Triangular Wave Generator		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 9	Verify different applications of Op-Amp. **(Psychomotor)**	6	10
Contents	Verification of comparator, Schmitt trigger andPhase Shift using Op-Amp, (On Trainer-Kit and/or Simulation)		
Method of Assessment	*Internal: Laboratory observation and viva voce*		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 4/5

Branch	Electrical and Electronics Engineering	Semester	IV

Course Code	403	Course Name	Linear Integrated Circuits

Course Outcome 4	Compare voltage regulators and converters	Teach Hrs	Marks
Learning Outcome 10	Classify different voltage regulator ICs.**(Cognitive)**	7	10
Contents	Voltage regulators: Fixed voltage regulator-78XX and 79XX series ICswith typical connection diagram and working Adjustable voltage regulator – using LM317 IC with typical connection diagram and working Simple numerical problems on fixed and adjustable voltage regulators.		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 11	Describe operation of converter ICs. **(Cognitive)**	8	10
Contents	Converters: Voltage to current converter with floating load its application in low voltage DC and AC voltmeter, Diode match finder. Voltage to current converter with grounded load. Current to voltage converter and its application in digital to analog converter using IC 1408. Digital to Analog Conversion using binary weighted registers, R2R registers using Op-Amp IC 351. Analog to digital conversion using successive approximation using Op-Amp as comparator.		
Method of Assessment	*Internal: Mid Semester Exam-II, Pen paper test & Assignment*		
Learning Outcome 12	Verify the working of voltage regulatorICs. **(Psychomotor)**	6	10
Contents	Verification of 78XX, 79XX , using Op-Amp ICs (On Trainer-Kit and/or Simulation)		
Method of Assessment	*External: Laboratory observation and viva voce*		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 5/5

Branch	Electrical and Electronics Engineering	Semester	IV

Course Code	403	Course Name	Linear Integrated Circuits

Course Outcome 5	Illustrate 555 timer and PLL ICs for various applications.	Teach Hrs	Marks
Learning Outcome 13	Construct multi-vibrator circuits using 555 timer **(Cognitive)**	7	10
Contents	Functional block diagram of a timer 555 IC, Pin configuration of 555, Multi-vibrator using 555 IC: mono-stable, bi-stable and astable.		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 14	Explain working and applications of PLL. **(Cognitive)**	7	10
Contents	Phase Lock Loop (PLL) 565 IC: functional block diagram with working principle, Lock & Capture range, transfer characteristicsApplications of PLL – FM demodulation and frequency multiplier		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 15	Assemble and verify 555-timer and PLL based circuits.**(Psychomotor)**	7	10
Contents	Astable multivibrator & Sawtooth waveform generator using 555 IC. PLL 565 IC as a frequency multiplier. (On Trainer-Kit and/or Simulation Software)		
Method of Assessment	*Internal: Laboratory observation and viva voce*		

SuggestedListofExperiments:

S.N.	Experiment	CO
1.	Measurement of Different characteristics of an Op-Amp inopen loop configuration. 1.Output Resistance 2.Different Input Resistance	
2.	Measurement of Differential characteristics of an Op-Amp inopen loop configuration. 1.Voltage Gain 2.Unity Gain Bandwidth	
3.	InvertingAmplifier : 1.AC analysis 2.DC analysis 3.Unity Gain Buffer	
4.	Non –Inverting Amplifier: 1.AC analysis 2.DC analysis 3.Unity Gain Buffer	
5.	Op-Amp as: 1.Adder 2.Subtractor 3.Multiplier 4.divider	
6.	Op-Amp as : Integrator Differentiator Inverter Buffer	
7.	Op-Amp as active Filter : Low pass filter High pass filter Band pass filter	
8.	Signal Generator using Op-Amp and Timer IC) Triangular wave generator) Schmitt Trigger	
9.	Signal generator using Op-Amp and Timer IC (a) Saw tooth wave generator Ramp generation	
10.	Oscillator using Op-Amp: Wein Bridge Oscillator, R.C.Phase Shift Oscillator	
11.	Sample & hold circuit operation	
12.	Precision Rectifier using an Op-Amp and Voltage regulations.	
13.	Phase lock loop as frequency multiplier.	

14.	4 bit D/A converter addition experiments.	
15.	A/D Converter	

Twentyexperimentsinasemesterasperthediscretionofthesubjectteacher.

ReferenceBooks/WebPortals:

S.N.	Title	Author
1	Op-Amps and Linear Integrated Circuit	Ramakant A. Gayakwad PHI
2	Operational Amplifiers and Linear Integrated Circuits	by R.F. Coughlin F.F Driscall PHI.
3	Electronic Devices & Circuits	Robert boylestad Pearson
4	Integrated Circuit	K. R. Botkar Khanna Publisher
5	spoken-tutorial.org	
6.	nptel.ac.in	
7.	swayam.gov.in	