RGPV (Diploma Wing) Bhopal

SCHEME FOR LEARNING OUTCOME

	LO Code	CO Code	de	urse Co	Co	le	ranch Cod	В
Format No. 4	1	1	4	0	4	1	0	0

COURSE NAME	Analog Integrated Circuit
CO Description	Describethe construction of operational amplifiers.
LO Description	Construct Op-Amp using basic amplifier circuits.

SCHEME OF STUDY

S. No.	Learning Content	Teaching — Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-01	Four stage Block diagram of an Operational Amplifier(Op-Amp), equivalent circuit of a typical Op-Amp (4 stages), differential andcommonmodeofoperation, concept ofinverting andnon-invertinginput, schematic symbol and equivalent circuit of Op-Amp, Ideal Characteristics	classroom lecture,	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/ assignments/ tutorial.	8		Text Books, PPT, Handouts, chalk board, charts.Videos lectures- NPTEL& others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-01	Mid Semester Theory Exam	 Student will be asked to(and/or): List out and explain 4 stages of an Op-Amp. Draw various equivalent circuit and/or symbol of Op-Amp. Explain different mode of operation. Describe various concept and op-amp characteristics. 	10	Question paper, Rating scale	Internal

DCDV/Diala		SCHEME FOR LEARNING	В	Branch Co	de	Course Code		ode	CO Code	LO Code	
RGPV (DIPIC	oma Wing) Bhopal	OUTCOME	0 0 1 4			0	4	1	2	Format No. 4	
COURSE NAME Analog Integrated Circuit											
CO Description Describethe construction of operational amplifiers.											
LO Description	Explain basic Op-Amp circu	it parameters.									

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-02	IC Packages of Op-Amps, Basic Parameters of Op-Amp: Inputoffsetvoltage, Input resistance, Common Mode Rejection Ratio (CMRR), Slew rate, Gain, Bandwidth, Op-Amp 741IC characteristics,pinoutandpowersup plyrequirements	Interactive classroom lecture, PPT, demonstration, quiz,assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/assignments/ tutorial to make students practice their knowledge.	8		Text Books, PPT, Handouts, chalk board, charts, Numerical Problems Workbook	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal	
LO-02	End Semester Theory Exam	 Student will be asked to(and/or): List the various packages of Op-Amp. Explain the given parameter of Op-Amp. Simple numerical on Op-amp parameter calculation. 	10	Question paper, Rating scale	External	

RGPV (Diploma Wing)	Bhopal
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SCHEME FOR LEARNING OUTCOME

	LO Code	CO Code	de	ourse Co	Co	le	ranch Coc	В
Format No. 4	3	1	4	0	4	1	0	0

COURSE NAME	Analog Integrated Circuit
CO Description	Describethe construction of operational amplifiers.

LO Description Measure basic characteristics of Op-Amps.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-03	MeasurementofDifferentcha racteristicsofanOp-Amp viz. Output Resistance, Input Resistance, Voltage Gain, gain-bandwidth product. (On Trainer-Kit and/or Simulation)	demonstration, hands on practice, lab assignments, V-	 Teacher with support from lab staff will demonstrate the procedure of lab experiments. Student will conduct lab assignment based on these experiments. 		8	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

			Maxim		External /
S. No.	Method of Assessment	Description of Assessment	um	Resources Required	Internal
			Marks		internal

LO-03	Practica	l test in laboratory	1. Verify	will be asked and measure eteristic of Op-	different	10		Rubrics/Rat	ing scal	le		External
		'	AD	DITIONAL INS	TRUCTIONS FOR THE	HOD/ F	ACULTY (IF	ANY)				
RGPV	/ (Diplo	oma Wing) Bh	nopal		E FOR LEARNIN		Branch Code	Course (1 4 0	Code 4	CO Code	LO Code	Format No. 4
COURS	E NAME	Analog Integrated	d Circuit									
CO Des	cription	Classify different C	p-Amps	based circuits.								
LO Desc	cription	Construct general C	p-Amp b	ased circuits.								
					SCHEME OF STU	DY						
S. No.	Le	earning Content	•	Teaching – Learning Method	Description of T-L P	rocess	Teach Hrs.	Pract. /Tut Hrs.	LRs	Requ	ired	Remarks
LO-04	Circuit d and form Inverting inverting follower, Different	t Circuits of Op-Amiagram, working concula derivation of: amplifier, non-amplifier, Voltage Adder and Subtractoriator, Integrator, micamplifier	cept cla lec de qu or, s, t	eractive ssroom ture, PPT, monstration, iz,assignment utorial	Teacher will explain the contents and provide handouts to students. will conduct assignme quiz/tutorial to make practice their knowled	Teacher nts/ students			Hando board, Video	Books, outs, charts lecture	alk , e-	
					SCHEME OF ASSESS	MENT						
S. No.	Metho	d of Assessment		Description of	f Assessment		mum irks	Resourc	es Req	uired		External / Internal

LO-04	End Semester Theory Exam	 Student will be asked to(and/or): Draw circuit diagram and explain working of any given op-amp based circuit. Derive the expression for any given op-amp based circuit. 	10	Question paper, Rating scale	External	
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ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	ЗСП
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SCHEME FOR LEARNING OUTCOME

rand	ch Coo	de	C	ourse Co	de	CO Code	LO Code	_
	0	1	4	0	4	2	5	Format No. 4

COURSE NAME	Analog Integrated Circuit
CO Description	Classify different Op-Amps based circuits.
LO Description	Describe general Op-Amp based filter circuits.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-05	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.	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8		Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

		SCHEME OF ASSESSMEN	NT		
S. No.	Method of Assessment	Description of Assessment	Maximu m Marks	Resources Required	External / Internal
LO-05	End Semester Theory Exam	 Student will be asked to(and/or): Explain working of given op-amp based filter with circuit diagram. Draw frequency response of given filter circuit. Calculate cut-off frequencies for any given filter circuit. 	10	Question paper + Rating scale.	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

DCDV/D:-I-		SCHEME FOR LEARNING	В	Branch Co	de	Co	ourse Co	de	Code	Code	
KGPV (DIPIC	oma Wing) Bhopal	OUTCOME	0	0	1	4	0	4	2	6	Format No. 4
COURSE NAME	Analog Integrated Circuit										
CO Description	Classify different Op-Amps	based circuits.									
LO Description	Verify different Op-Amps ba	sed circuits.									

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-06	AC/DC analysis of inverting and non-inverting amplifier, verification of voltage follower, adder, differentiator, and logarithmicamplifier, Verification of Op-amp low pass filter (On Trainer-Kit	Lab demonstration, PPT , hands on practice, lab assignments.	 Teacher with support from lab staff will demonstrate the procedure of lab experiments. Student will conduct lab assignment based on these experiments. 		8	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high	

	and/or Si	mulation)					snee	ed internet		
							3500	id internet		
			SCHE	ME OF ASSESSMENT						
S. No.	Met	hod of Assessment	Description of	Assessment	Maxir Mai		Resou	rces Requ	ired	External / Internal
LO-06	Pract		Student will be asked to Simulate and verify the circuit.		10)	Rubric	s, Rating s	cale	Internal
			ADDITIONAL INSTRUCTI	ONS FOR THE HOD/	FACULTY (IF ANY)				
D.C.D.V.	//Diale		SCHEME FOR		FACULTY (Course Code	e CO Code	LO Code	
RGPV	/ (Diplo	oma Wing) Bhopa	SCHEME FOR	R LEARNING		de		۱ د		Format No. 4
	/ (Diplo		SCHEME FOR	R LEARNING	Branch Coc	de	Course Code	Code	Code	Format No. 4
COURS		oma Wing) Bhopa Analog Integrated Circ	SCHEME FOR	R LEARNING OME	Branch Coc	de	Course Code	Code	Code	Format No. 4
COURS	SE NAME	oma Wing) Bhopa Analog Integrated Circu ConstructOp-Amp based	SCHEME FOR OUTC	R LEARNING OME	Branch Coc	de	Course Code	Code	Code	Format No. 4
COURS	SE NAME	oma Wing) Bhopa Analog Integrated Circu ConstructOp-Amp based	SCHEME FOR OUTCO	R LEARNING OME	Branch Coc	de	Course Code	Code	Code	Format No. 4

LO-07	inverting ofcompar crossinge Schmittti inverting	and non- rator, Ope letector rigger: In with circ aveforms	etionsof acomparator, -inverting operation en loop-zero verting andnon- cuit diagram, input and and threshold levels, curve	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	to students. Teacher will conduct assignments/		8			Text Boo PPT, Har chalk boa charts, Vi lecture- N and othe	ndouts, ard, deo NPTEL	
				SCHEN	⊥ ∕IE OF ASSESSMEN	Т						
S. No.	Meth Assess			Description of Ass	essment		1	imun arks	n	Resource Require		External / Internal
Lo-07	Theory Exam 2. Describe open loo 3. Explain Schmitt tr		ked to(and/or): n of inverting and non- op zero crossing detect trigger with circuit diag levels of Schmitt trigge	tor. gram and i/p & o/p w	aveform.		10	(Question p Rating so	-	Internal	
			ADE	SCUENAE FOR		FACULTY	•	•	urse Code	со	LO	
RGP\	/ (Diplo	ma W	ing) Bhopal	SCHEME FOR		O O		4	O O	4 3	Code 8	Format No. 4
		Analaa		OOTC	OIVIL					7 3		
	E NAME	Anaiog	Integrated Circuit									
COURS	E NAME scription		Integrated Circuit actOp-Amp based circ	uit for differentapplicat	tions							
COURS		Constru	actOp-Amp based circ	uit for differentapplicate								

Description of T-L

Process

Teach

Hrs.

Pract.

/Tut Hrs.

LRs Required

Remarks

Teaching –

Learning

S. No.

Learning Content

		Method				
LO-08	Sample andHold circuit, Half	Interactive	Teacher will explain the	8	 Text Books, PPT,	
	Wave PrecisionRectifier,	classroom	contents and provide		Handouts, chalk	
	Op-Amp based	lecture, PPT,	handouts to students.		board, charts,	
	WeinBridgeOscillator,	Video,	Teacher will conduct		Video lecture-	
	PhaseshiftOscillator, Square	demonstration,	assignments/ quiz/tutorial		NPTEL and others.	
	Wave Generator, Triangular	quiz,	to make students practice			
	Wave Generator	assignments.	their knowledge.			

S. No.	Method of Assessment	Description of Assessment	Maxim um Marks	Resources Required	External / Internal
LO-08	End Semester Theory Exam	 Student will be asked to (and/or): What is sample and hold circuitand its need. Explain given op-amp based oscillator with circuit diagram. Compare different oscillator and rectifier circuit. 	10	Question paper, Rating scale	External

DCDV/Diala	······································	SCHEME FOR LEARNING	E	Branch Co	de	Co	ourse Co	de	CO Code	LO Code	_
KGPV (DIPIO	oma Wing) Bhopal	OUTCOME	0	0	1	4	0	4	3	9	Format No. 4
COURSE NAME	Analog Integrated Circuit										
CO Description	ConstructOp-Amp based circ	cuit for differentapplications.									
LO Description	LO Description Verify different applications of Op-Amp based circuits.										
	SCHEME OF STUDY										

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	/Tut Hrs.	LRs Required	Remarks
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LO-09	Schmitt t Oscillato generator	ion of comparator, trigger, Phase Shift or and triangular wave r using Op-Amp, (On Kit and/or Simulation	Lab demonstration, PPT , hands on practice, lab assignments.	 Teacher with surfrom lab staff with demonstrate the procedure of latexperiments. Student will contain lab assignment on these experiments. 	e b nduct based	- 8	Lab man Handou experim instrum measur instrum comput relevan softwar speed in	ts, nental t ents /k ing ents, er with t simula e and h	rainer it with ation igh	
			S	CHEME OF ASSESS	MENT					
S. No.	Met	hod of Assessment	Description of	Assessment	Maximum Marks	Re	sources Re	quired		External / Internal
LO-09	Pract	ical test in laboratory	Student will be ask 1. Design and verify based comparated Schmitt trigger of	fy given op-amp or, oscillator &	10	Rı	ubrics, Ratin	g scale		Internal
	ı		ADDITIONAL INSTRU	UCTIONS FOR THE	HOD/ FACUL	TY (IF ANY)				
			. SCHEME F	FOR LEARNIN	G Bran	ch Code	Course Code	CO Code	LO Code	
RGPV	/ (Diplo	oma Wing) Bhop	nal	FOR LEARNIN ITCOME		ch Code 0 1 4			1	Format No. 4
	/ (Diplo	oma Wing) Bhop Analog Integrated Ci	oal					Code	Code	Format No. 4
COURS			oal OU rcuit					Code	Code	Format No. 4

S. No. Learning Content Teaching - Description of T-L Teach Pract. LRs Required Remarks

SCHEME OF STUDY

		Learning Method	Process	Hrs.	/Tut Hrs.	
LO-10	Voltage regulators: Fixed voltage regulator-78XX and 79XX series ICs with 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.	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8		Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-10	End Semester Theory Exam	 Student will be asked to (and/or): List out fixed voltage regulator ICs with typical connection and working. Explain working of adjustable voltage regulator with circuit diagram. Solve simple numerical problemson fixed and adjustable voltage regulator. 	10	Question paper, Rating scale.	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

DCD//D: 1		SCHEME FOR LEARNING	В	ranch Co	de	Co	ourse Co	de	CO Code	LO Code	
KGPV (Diplo	oma Wing) Bhopal	OUTCOME	0	0	1	4	0	4	4	11	Format No. 4
COURSE NAME	Analog Integrated Circuit										
CO Description	Compare voltage regulators	and converters									

LO Description Describe ope

Describe operation of various converter ICs.

			SCHEME OF STUDY				
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-11	Converters: Voltage to current converter with floating load and its application in low voltage DC and AC voltmeter. 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.	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8		Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-11	Mid Semester Theory Exam	 Student will be asked to(and/or): Explain voltage to current converter with different loads and application. Draw and explain current to voltage converter andits application in DAC. Explain different types of ADC & DAC using opamp. 	10	Question paper, Rating scale.	Internal

DCD\//D:	lawa Mina N Dhana	, SCHEME F	SCHEME FOR LEARNING			Course Code		CO Code	LO Code	
KGPV (DIP	loma Wing) Bhopa	OU.	0 0	1	4 0	4	4	12	Format No. 4	
COURSE NAM	Analog Integrated Circ	uit								
CO Description	Compare voltage regulate	ors and converters								
LO Description	Verify the working of vo	ltage regulator& conver	ter ICs.							
	'		SCHEME OF STUDY							
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Prac /Tut H	_	LI	Rs Req	uired	Remarks

• Teacher with support

from lab staff will

demonstrate the

procedure of lab

• Student will conduct

lab assignment based

on these experiments.

experiments.

8

Lab manual, charts,

with measuring

internet.

Handouts, experimental

trainer instruments/kit

instruments, computer

with relevant simulation

software and high speed

Lab demonstration,

PPT, hands on

practice, lab

assignments.

Verification of 78XX, 79XX,

(On Trainer-Kit and/or

Voltage to current and current to

voltage converter using Op-Amp

LO-12

ICs

Simulation)

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-12	Practical test in laboratory	 Student will be asked to Design and verify voltage regulator for given ICs. Verify voltage to current and current to voltage converter circuit using Op-Amp ICs. 	10	Rubrics, Rating scale	External

DCDV/Diala	······································	SCHEME FOR LEARNING		Branch Code			Course Code			Code	_
RGPV (Diploma Wing) Bhopal		OUTCOME		0	1	4	0	4	5	13	Format No. 4
COURSE NAME	Analog Integrated Circuit										
CO Description	Illustrate 555 timer and PLL	Illustrate 555 timer and PLL ICs for various applications.									
LO Description	Construct multi-vibrator circ										

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-13	Functional block diagram of a 555 timer IC, Pin configuration of 555 IC, Multi-vibrator using 555 IC: mono-stable, bi-stable and astable, 555 IC as wave generators: Square wavegenerators, Saw tooth wave generatorsand Triangular wavegenerators.	Interactive classroom lecture, PPT, Video, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8		Text Books, PPT, Handouts, chalk board, charts, Video lecture- NPTEL and others.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-13	Mid Semester Theory Exam	 Student will be asked to(and/or): Draw pin and block diagram of timer 555 ICs. Explain different operation modes of 555 ICs. Construct given waveform generator using 555 ICs. 	10	Question paper, Rating scale.	External

RGPV (Diploma Wing) Bhopal		, SCHEMI	SCHEME FOR LEARNING		Branch Code (Course Code		CO Code	LO Code	
		OUTCOME				1	4	0	4	5	14	Format No. 4
COURSE NA	ME Analog Integrated Circu	ıit										
CO Descripti	Pescription Illustrate 555 timer and PLL ICs for various applications.											
LO Descripti	on Explain working and appl	ications ofPhase L	ock Loop(PLL) IC.									
			SCHEME OF STUDY									
		Teaching – Learning	Description of T-L Process	Tea		Pra /Tut		l	LRs R	equire	ed	Remarks

assignments/ quiz/tutorial

to make students practice

Teacher will explain the

contents and provide

handouts to students.

Teacher will conduct

their knowledge.

8

Text Books, PPT,

Handouts, chalk

board, charts,

Video lecture-NPTEL and others.

Method

Interactive

classroom

Video,

quiz,

lecture, PPT,

demonstration,

assignments.

Phase Lock Loop (PLL) 565 IC:

functional block diagram with

characteristics Applications of

PLL – FM demodulation and

working principle, Lock &

Capture range, transfer

frequency multiplier

LO-14

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-14	End Semester Theory Exam	 Student will be asked to (and/or): Explain working principle of PLL. Define capture and lock range of PLL. List out application of PLL and explain it. 	10	Question paper, Rating scale.	External

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING		Branch (Code	e Course Code			LO Code				
		31 (OUTCOME	0 0	1	4	0 4	5	15	Format No.			
COURSE NAME Analog Integrated Circuit			cuit						·				
CO Des	cription	Illustrate 555 timer and I	PLL ICs for variou	s applications.									
LO Des	cription	Assemble and verify 555	-timer and PLL ba	sed circuits.									
				SCHEME OF STUDY									
S. No.	Le	earning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	_	Pract. LRs Required		LRs Require		LRs Required		Remarks
LO-15	waveform IC. PLL5 multiplie	nultivibrator & Sawtooth n generator using 555 65 IC as a frequency r. (On Trainer-Kit and/or on Software)	Lab demonstration, PPT, hands on practice, labassignments.	 Teacher with support from lab staff will demonstrate the procedure of lab experiments. Student will conduct lab assignment based on these experiments. 		8	Han experted train instruction in the community of the co		Lab manual, che Handouts, experimental trainer instruments/ki with measuring instruments, computer with relevant simulations software and he speed internet				
				SCHEME OF ASSESSMENT	Γ	<u> </u>		·					
S. No.	Method	of Assessment	Description	of Assessment	Maximu m Marks	Resources Required			External ,				

LO-15	Practical test in laboratory	 Student will be asked to Assemble circuit of astable multi-vibrator and verify output using 555 ICs. Simulate circuit of saw-tooth waveform generator and verify output using 555 ICs. Verify application of PLL ICs as frequency multiplier. 	10	Rubrics, Rating scale	Internal
		ADDITIONAL INSTRUCTIONS FOR THE HO	D/ FACULTY (I	F ANY)	