RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	1	1	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Explain the Pin, Symbols & block diagram of OP AMP, and state the definition of OP AMP parameters.
LO Description	Compare common mode and differential mode operation in differential amplifier and Explain the block diagram & internal characteristics of OP AMP circuit.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-01	**Introduction to Operational Amplifier :** Differential amplifier: - Principle - differential and common mode of operation , concept of inverting and non- inverting input The Op-Amp: - Block Diagram, IC Packages ,Ideal characteristics	Interactive classroom lecture, PPT, demonstration, quiz, assignments	8	2	Text Books, PPT, Handouts, chalk board, charts.Videos lectures- NPTEL& others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-01	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Sketch and explain the block diagram and ideal characteristics of OP AMP circuit. 2. Compare common mode and differential mode operation in OP AMP.	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		E	0	9	4	0	2	1	2	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Explain the Pin, Symbols & block diagram of OP AMP, and state the definition of OP AMP parameters.
LO Description	Interpret the following Electrical characteristics- Input offset voltage, Output offset voltage, CMRR, slew rate Gain & Bandwidth.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-02	**OPAMP Electrical parameters**: - Input offset voltage , Input resistance , CMRR ,Slew rate ,Gain , Bandwidth 741 OP- Amp characteristics, pin out and power supply requirements	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-02	Mid Semester Theory Exam	**Student will be asked to (**and/or) 1. Explain the terms:- Input impedance, output impedance 2. Interpret the following - Input offset voltage, Output offset voltage, CMRR, slew rate	10		Question paper, Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		E	0	9	4	0	2	1	3	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Explain the Pin, Symbols & block diagram of OP AMP, and state the definition of OP AMP parameters.
LO Description	Measurement of Different characteristics of an Op-Amp in open loop configuration.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-03	Measure Input Resistance, Output Resistance , Gain and Bandwidth of an Op-Amp in open loop configuration.	Lab demonstration, hands on practice, lab assignments, Virtual Lab.		6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-03	Practical test in laboratory	**Student will be asked to** 1. Measure given parameter of an Op-Amp in open loop configuration.	10		Rubrics/Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	2	4	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Examine Various Linear Applications Of an OPAMP.
LO Description	Use various configuration of OPAMP for Linear Application.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-04	**Linear application of OPAMP** Inverting amplifier , non-inverting amplifier ,Voltage follower , Adder and Substractor, Differentiator ,integrator, Scaling Amplifier - AC and DC Amplifier - Instrumentation amplifier	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures-NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-04	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Explain the working of OP AMP as Inverting amplifier / Non-inverting amplifier. 2. Describe the given applications of OP AMP.	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	2	5	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Examine Various Linear Applications Of an OPAMP.
LO Description	Construct Basic Filters and Converters using OPAMP.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-05	**Linear application of OPAMP** Active filters: low pass, high pass and band pass ,Voltage to Current converter - Current to Voltage converter	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures-NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-05	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Illustrate the working of OP AMP as Low pass filter/ High pass filter/ Band pass filter. 2. Describe the working of OP AMP as voltage to current/current to voltage converter	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing)	SCHEME FOR LEARNING	Branch Code	Course Code	CO Code	LO Code	Format No. 4

Bhopal	OUTCOME	E	0	9	4	0	2	2	6	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Examine Various Linear Applications Of an OPAMP.
LO Description	Setup and Demonstrate different linear applications of OPAMP on kits / simulation software.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-06	Construct Inverting and Non Inverting Amplifier. Construct Adder, Substractor, Differtiator and Integrator using OPAMP. Construct Basic Filters using OPAMP.	Lab demonstration, hands on practice, lab assignments, Virtual Lab.		6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-06	Practical test in laboratory	**Student will be asked to** 1. Setup and Demonstrate given linear applications of OPAMP on kits / simulation software	10		Rubrics/Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

	OUTCOME	E	0	9	4	0	2	3	7	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Examine Various Non Linear Applications Of an OPAMP.
LO Description	Use various configuration of OPAMP for Non Linear Application.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-07	**Non Linear application of OPAMP** Comparators: functions of a comparator, modes of operation of comparator, Open loop-zero crossing detector Schmitt trigger: Threshold levels, Inverting and non-inverting, Hystersis curve Converters: Voltage to Frequency Conversion, Frequency to Voltage Conversion	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-07	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Illustrate the working of OP AMP as Comparator/ Zero crossing detector. 2. Sketch and explain the working of OP AMP as Schmitt trigger.	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	3	8	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Examine Various Non Linear Applications Of an OPAMP.
LO Description	Describe the concept of feedback and compare different types of oscillator circuits using OP Amp.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-08	**Non Linear application of OPAMP** Sample / Hold circuit, Precision Rectifier, Oscillators: Wein Bridge Oscillator, Phase shift Oscillator, Relaxation Oscillator Logarithmic amplifier and antilogarithmic amplifier, Basics of analog multiplier and dividers	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-08	Mid Semester Theory Exam	**Student will be asked to (**and/or) 1. Describe the working of given Oscillator using OPAMP. 2. Outline the working of OPAMP as Sample & Hold circuit.	10		Question paper, Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	3	9	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Examine Various Non Linear Applications Of an OPAMP.
LO Description	Setup and Demonstrate different Non linear applications of OPAMP on kits / simulation software.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-09	Demonstrate the Operation Of Sample & Hold Circuit using OPAMP. Examine different Oscillator circuit.	Lab demonstration, hands on practice, lab assignments, Virtual Lab.		6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-09	Practical test in laboratory	**Student will be asked to (**and/or) 1. Demonstrate the operation of given oscillator using OPAMP. 2. Plot the characteristics of sample & hold circuit using OPAMP.	10		Rubrics/Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	4	10	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Distinguish the working of OP AMP as series and shunt voltage regulator
LO Description	Illustrate the working of Regulator using Transistor.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-10	**Transistor Voltage Regulators** Power supply characteristics, Need of Regulators, Series Regulator Shunt Regulator, Pass Transistor Regulator, Switching Regulator	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-10	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Sketch and Explain the given Regulator circuit. 2. List the applications of voltage regulators.	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	1	4	11	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Distinguish the working of OP AMP as series and shunt voltage regulator
LO Description	Illustrate the working of Regulator using OPAMP.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-11	**Op-Amp Voltage Regulators** Op-Amp Series voltage Regulator IC voltage regulator. Basics of Regulator ICs like 723, LM317,78XX , 79XX and SMPS TEA1507, TEA152X series	Interactive classroom lecture, PPT, demonstration, quiz, assignments	6	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-11	Assignment	**Student will be asked to (**and/or) 1. Explain the current foldback characteristics of IC723 Voltage Regulator. 2. Explain the protection used in 78XX.	10		Question paper, Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	4	12	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Distinguish the working of OP AMP as series and shunt voltage regulator.
LO Description	Construct and Observe various Regulator Circuit using OPAMP.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-12	Construct and Observe Series Regulator using OPAMP. Construct and Observe Shunt Regulator using OPAMP. Construct and Observe Switching Regulator using OPAMP.	Lab demonstration, hands on practice, lab assignments, Virtual Lab.		6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-12	Practical test in laboratory	**Student will be asked to** 1. Construct and Observe given Regulator circuit.	10		Rubrics/Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	5	13	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Describe the working and applications of IC 555 Timer and PLL.
LO Description	Explain working and applications of 555 Timer.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-13	**Timers** Introduction, functional block diagram of a timer, 555 timer: operation modes of 555: Monostable and Astable, Pin configuration of 555 ,555 as wave generators: square wave, Saw tooth wave and Tri-angular Wave	Interactive classroom lecture, PPT, demonstration, quiz, assignments	5	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-13	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Sketch and explain the Block diagram of IC 555 Timer 2. Outline the working of given Multivibrator using IC 555 Timer.	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	5	14	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Describe the working and applications of IC 555 Timer and PLL.
LO Description	Illustrate the Application Of PLL.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-14	**Phase Lock Loop (PLL)** functional block diagram, Lock & Capture range, transfer characteristics, Basic Applications of PLL 567, PLL 565, Applications of PLL	Interactive classroom lecture, PPT, demonstration, quiz, assignments	5	2	Text Books, PPT, Handouts, chalk board, charts. Videos lectures- NPTEL & others	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-14	End Semester Theory Exam	**Student will be asked to (**and/or) 1. Sketch and explain the Block diagram of PLL 2. List the application of PLL.	10		Question paper, Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		E	0	9	4	0	2	5	15	

COURSE NAME	**Electronics and Instrumentation**
CO Description	Describe the working and applications of IC 555 Timer and PLL.
LO Description	Use 555 Timer as Multivibrator.

SCHEME OF STUDY

S. No.	Learning Content	Method of teaching	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-15	Construct and test 555 Timer as Astable multivibrator. Construct and test 555 Timer as Monostable multivibrator. Generate Triangular Wave using 555 timer IC.	Lab demonstration, hands on practice, lab assignments, Virtual Lab.		6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Passing Criteria	Resources Required	External / Internal
LO-15	Practical test in laboratory	**Student will be asked to** (and/or) 1. Construct and Test given Multivibrator circuit using 555 Timer. 2. Generate Triangular Wave using 555 timer IC.	10		Rubrics/Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)