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

COURSE NAME	Electronics Measurement
CO Description	Explain characteristics of measuring instruments
LO Description	Define static and dynamic characteristics of measuring instruments.

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	Significance of Measurement and block diagram of Measurement System,Static characteristics- Accuracy, Precision, Sensitivity, Linearity, Repeatability, Reproducibility, Resolution, Threshold, Drift, Stability, Dead zone, hysteresis,Dynamic Characteristics- speed of response, measuring lag, fidelity, dynamic error,	Interactive classroom lecture, PPT, demonstration, quiz, assignments	Teacher will explain the contents and provide handouts to students. Teacher will conduct quiz/ assignments/ tutorial.	9	0	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	End Semester Theory Exam	**Student will be asked to**(and/or): 1. Describe Significance of Measurement and block diagram of Measurement System, 2. Define static and dynamic characteristics of measuring instruments.	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**
		O 0	1	4 0	1	1	2	

COURSE NAME	Electronics Measurement
CO Description	Explain characteristics of measuring instruments
LO Description	To describe various types of errors and loading effect

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	Types of Errors – Gross error, systematic errors, Random errors, loading effect	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.	6	0	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): 1. Describe Types of Errors. 2. What is loading effect.	10	Question paper, Rating scale	External

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

COURSE NAME	Electronics Measurement
CO Description	Explain characteristics of measuring instruments
LO Description	To perform calibration process

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	Calibration -static and dynamic	Lab demonstration, hands on practice, lab assignments, V-Lab.	• Teacher with support from lab staff will demonstrate the procedure of lab experiments. • Student will conduct lab assignment based on these experiments.	0	6	Lab manual, charts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-03	Practical test in laboratory	Student will be asked to 1. Perform static and dynamic Calibration.	10	Rubrics/Rating scale	Internal

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

COURSE NAME	Electronics Measurement
CO Description	Explain measuring instruments and range extension
LO Description	Differentiate between moving iron and moving coil type instruments

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-04	Construction, principle and working of PMMC and MI (moving iron) instruments	Interactive classroom lecture, PPT, demonstration, quiz,assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	7	0	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-04	End Semester Theory Exam	**Student will be asked to**(and/or): 1. Describe Construction, principle and working of PMMC instruments. 2. Explain Construction, principle and working of MI (moving iron) instruments	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**
		O	*0*	*1*	*4*	*0*	*1* *2*	*5*	

COURSE NAME	Electronics Measurement
CO Description	Explain measuring instruments and range extension
LO Description	Extend the measuring range of the meters.

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	DC voltmeter and current meters and their range extension (Shunt and Multiplier) Electronic voltmeter and its block diagram,	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.	7	0	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-05	End Semester Theory Exam	**Student will be asked to**(and/or): 1. Differentiate between DC voltmeter and current meters. 2. Explain rangeextensionmethods. 3. Calculate value of SHUNT AND MULTIPLIER.	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**
		O	*0*	*1*	*4*	*0*	*1*	*2*	*6*	

COURSE NAME	Electronics Measurement
CO Description	Explain measuring instruments and range extension
LO Description	Measure voltage and current (DC&AC) using analogue/ and digital multimeter

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	Measurement of voltage, current and Resistance using Analog and Digital Multi Meter (DMM).	Lab demonstration, PPT, hands on practice, lab assignments.	• Teacher will explain the content in class/lab. • Teacher with support from lab staff will demonstrate the procedure of lab experiments. • Student will conduct lab assignment based on these experiments.	0	7	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-06	End Semester practical Exam	**Student will be asked to** Measure electrical parameters using Analog and Digital Multi Meter (DMM).	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**
		0 *0*	*1* *4*	*0* *1*		*3*	*7*	

COURSE NAME	Electronics Measurement
CO Description	To measure electrical parameters using Bridges and Analyzers
LO Description	Explain working and application of AC & DC bridges.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-07	DC Bridges- Wheatstone bridge, Kelvin's Double Bridge AC Bridges- Maxwell's Bridge, Hay's bridge, Schering bridge and Wien's Bridge.	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	0	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-07	End semester Exam	**Student will be asked to**(and/or): 1. Describe given DC/AC Bridges with its application 2. Compare AC and DC Bridges 3. Explain frequency measurement using Wien's bridge	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**
		0	*0*	*1*	*4*	*0*	*1* 3	8	

COURSE NAME	Electronics Measurement
CO Description	To measure electrical parameters using Bridges and Analyzers:.
LO Description	Explain working principle of spectrum analyzer.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-08	Principle andworking of Signal Analyzers: Frequency Selective and Heterodyne Wave Analyzers, Spectrum Analyzers.	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.	6	0	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-08	Mid semester Exam Assignment, Quiz	**Student will be asked to** (and/or): 1. Explain working of given signal analyzer.	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**
		O	*0*	*1*	*4*	*0*	*1* *3*	*9*	

COURSE NAME	Electronics Measurement
CO Description	To measure electrical parameters using Bridges and Analyzers.
LO Description	To analyze signal waveforms using spectrum analyzers

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-09	Analysis of various waveforms using Spectrum Analyzers.	Lab demonstration, PPT , hands on practice, lab assignments.	• Teacher will explain the content in class/lab. • Teacher with support from lab staff will demonstrate the procedure of lab experiments. • Student will conduct lab assignment based on these experiments.	0	6	Lab manual, charts, Handouts, experimental trainer instruments /kit with measuring instruments, computer with relevant simulation software and high speed internet.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-09	End Semester practical Exam	**Student will be asked to** 1. Perform analysis of given waveforms using spectrum analyzers.	10	Rubrics, Rating scale	External

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME	Branch Code				Course Code		CO Code	LO Code	Format No. 4
			O	0	1	4	0	1	4	10	

COURSE NAME	Electronics Measurement
CO Description	Classify different Oscilloscopes and their application.
LO Description	Describefunction of basic building blocks of CRO

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-10	Cathode Ray Tube (CRT), Electrostatic Deflection, Post Deflection and Acceleration of Electron Beam, Screens for CRT's. Block diagram of CRO- Time-Base Generator, Delay line, Attenuators, probes.	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	0	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-10	End Semester Theory Exam	**Student will be asked to** (and/or): 1. Explain need of CRO. 2. Describe Block diagram of CRO.	10	Question paper , Rating scale.	External

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

COURSE NAME	Electronics Measurement
CO Description	Classify different Oscilloscopes and their application.
LO Description	Explain working principle of digital storage oscilloscope.

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	Digital Storage Oscilloscope (DSO): block diagram, principle, working and its application	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.	6	0	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-11	Mid semester Exam,Assignment, Quiz	**Student will be asked to**(and/or): 1. Describe principle and working ofDigital Storage Oscilloscope (DSO) 2. Describe applications of Digital Storage Oscilloscope (DSO).	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**
		O	*0*	*1*	*4*	*0*	*1*	*4*	*12*

COURSE NAME	**Electronics Measurement**
CO Description	Classify different Oscilloscopes and their application.
LO Description	Measure various parameters like Amplitude, frequency and time period using CRO.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-12	Dual trace oscilloscope, ·Applications of CRO, Measure various parameters like Amplitude, frequency and time period using CRO and Lissajous Pattern.	Lab demonstration, PPT, hands on practice, lab assignments.	• Teacher will explain the content in class/lab. • Teacher with support from lab staff will demonstrate the procedure of lab experiments. • Student will conduct lab assignment based on these experiments.	0	8	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

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** 1. Measure various parameters like Amplitude, frequency and time period using CRO.	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**
		O	0	1	4	0	1	5	13	

COURSE NAME	Electronics Measurement
CO Description	To measure physical quantities using Transducers .
LO Description	Differentiate between active and passive, primary and secondary transducers.

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	Requirements of Ideal Transducer Transducer and its classification: primary and secondary transducers	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.	6	0	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 Exam , Assignment , Quiz	**Student will be asked to**(and/or): 1.Explain Requirements of Ideal Transducer 2. Compare primary and secondary transducers.	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**
		0	*0* *1*	*4*	*0* *1*	*5*	*14*	

COURSE NAME	Electronics Measurement
CO Description	To measure physical quantities using Transducers .
LO Description	Describe working of various transducers.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-14	Resistive Transducer: Potentiometric type, Strain Gauge type (Gauge factor derivation, Bonded and unbounded strain gauges), Capacitive Transducers - Variable gap type, variable area type and dielectric type, LVDT, Temperature and Piezo Electric, Proximity sensor and touch screen sensor.	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	0	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-14	End semester Exam	**Student will be asked to** (and/or): 1. Explain working and list out applications of different types of transducers.	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**
		O	*0*	*1*	*4*	*0 1*	*5*	*15*	

COURSE NAME	**Electronics Measurement**
CO Description	To measure physicalquantities using Transducers.
LO Description	Measure various physical quantities using transducers.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-15	Measure the given parameter using resistive , capacitive and other types of transducer.	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.	0	7	Lab manual, charts, Handouts, experimental trainer instruments/kit with measuring instruments, computer with relevant simulation software and high speed internet.	

		SCHEME OF ASSESSMENT			
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-15	Practical test in laboratory	**Student will be asked to** 1.Measure various physical quantities using transducers.	10	Rubrics, Rating scale	Internal
		ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)			