Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

THEORY COURSE FILE CONTENTS

Check list Course Outcomes Attainment

S. No.	Contents	Available (Y/N/NA)	Date of Submission	Signature of HOD
1.	Authenticated Syllabus Copy	Y		
2.	Individual Time Table	Y		
3.	Students' Name List (Approved Copy)	Y		
4.	Course Plan, PO, PSO, COs, CO-PO Mapping, COA Plan, Session Plan and Periodic Monitoring	Y		
5.	Previous Year End Semester Question Papers	Y		
6.	Question Bank (All Units - Part A, Part B & C)	Y		
7.	Dissemination of Syllabus and Course Plan to Students	Y		
8.	Lecture Notes - Unit I, II & III	Y		
9.	**Sample Documents and Evaluation Sheet for Internal Assessment** – Tutorials / Assignments / Class Test / Open Book Test / Quiz / Project / Seminar / Role Play if any (Before Mid Term)			
10.	**Mid Term Examination** A. Question Paper / Any Other Assessment Tools Used B. Sample Answer Scripts (Best, Average, Poor) if required C. Evaluation Sheet D. Slow Learners List and Remedial Measures			
11.	Lecture Notes – Unit IV & V			
12.	**Sample Documents and Evaluation Sheet for Internal Assessment** – Tutorials / Assignments / Class Test /Open Book Test / Quiz / Project / Seminar / Role Play if any (After Mid Term)			
13.	Course End Survey (Indirect Assessment) & Consolidation			
14.	**End Term Examination** A. Question Paper & Answer Key B. Sample Answer Scripts (Best, Average, Poor) if required C. Evaluation Sheet			

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
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C: 0

	D. Slow Learners List and Remedial Measures.			
15.	Content Beyond the Syllabus (Proof)			
16.	Innovative Teaching Tools Used for TLP			
17.	Details of Visiting Faculty Session / Industry Expert / Guest Lecture / Seminar / Field Visit / Webinars / Flipped Class Room / Blended Learning / Online Resources etc.			
18.	Consolidated Mark Statement			
19.	CO Attainment (Mid Term + Internal Assessment + End Term)			
20.	Gap Analysis & Remedial Measures			
21.	CO - PO Attainment			
22.	Class Record (Faculty Logbook)			

Signature of HOD/ Dean **Signature of Faculty**

Date: **Date:**

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

Syllabus Copy

EEE42103	**Electrical and Electronic Measurement**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Basic Principles of Electrical Engineering (Circuit Theory), Basic Digital and Analog Electronics				
Co-requisites	--				

Course Objectives

1. The objective of the course is to introduce the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers.
2. To address the underlying concepts and methods behind Electronics measurements.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Explain** the basics of measuring instruments and recognize the terms related to basics of measurement.

CO2. **Explain** different types of instrument transformers, their construction and working. CO3. **Discuss** about power and energy measurement.

CO4. **Interpret** different methods to measure resistance using bridges.

CO5. **Demonstrate** different types of DC and AC bridges to measure resistance and inductance.

CO6. **Illustrate** the concept of electronic measurements.

Catalog Description

It is a core course for all UG Electrical Engineering students. The content of this course is also aligned to the syllabus for the GATE EE exam. The course has two halves: (1) Electrical Measurements: Working principle and Dynamics of different electro-mechanical instruments, ammeter, voltmeter, ohmmeter, wattmeter, energy meter, measurement of resistance and impedances, bridges and potentiometers, Instrument transformers. (2) Electronic Instruments: Differential amplifier, op-amp circuits, Analog DC and AC instruments, ADC and DAC, Digital instruments, function generator, oscilloscope.

Year: 2

Semester: III

6.	**Name of the Faculty: Ms. Sunam Saha**		**Course Code: EEE11002**
7.	**Course**	**: Electrical and Electronics Measurement**	**L: 3**
8.	**Program**	**: B.Tech**	**T: 0**
9.	**Target**	**: 60%**	**P: 0**
			C: 0

Course Content

Unit I: 7 lecture hours

Measuring Instruments- Classification, deflecting, control and damping torques, Ammeters and Voltmeters, PMMC, moving iron type instruments, expression for the deflecting torque and control torque, Errors and compensations, extension of range using shunts and series resistance.

Unit II: 8 lecture hours

Instrument transformers- CT and PT, Construction, Ratio and phase angle errors, uses, testing

Unit III: 6 lecture hours

Measurement of Power and Energy- Electrodynamometer type, induction type, calibration devices, errors in wattmeter, compensation, measurement of three phase power. AC induction type single phase and three phase energy meter, errors and compensations.

Unit IV: 8 lecture hours

Measurement of Resistance- Method of measuring low, medium and high resistance, sensitivity of Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance –loss of charge method.

Unit V: 10 lecture hours

DC and AC Bridges- Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge, Kelvin's double bridge for measuring lowresistance, measurement of high resistance – loss of charge method.
Measurement of inductance – Maxwell's bridge, Hay's bridge, Anderson's bridge – Owen'sbridge.Measurement of capacitance and loss angle – Desauty's Bridge, Wien's bridge, Schering Bridge.

Unit VI: 6 lecture hours

Electronic Measurement- Introduction. Essentials of electronic instruments, Advantages of electronic instruments, True rms reading voltmeter, Electronic multi-meter, Digital voltmeters (DVM) - Ramp type DVM, Integrating type DVM, Continuous – balance DVM and Successive - approximation DVM, Q meter.

Year: 2

Semester: III

6.	**Name of the Faculty: Ms. Sunam Saha**		**Course Code: EEE11002**
7.	**Course**	**: Electrical and Electronics Measurement**	**L: 3**
8.	**Program**	**: B.Tech**	**T: 0**
9.	**Target**	**: 60%**	**P: 0**
			C: 0

Text Books:

1. J. B. Gupta, Electrical and Electronic Measurements & Instrumentation, S. K. Kataria& Sons, 2013.
2. S. C. Bhargava, Electrical Measuring Instruments and Measurements, CRC Press, 2012.

Reference Books:

1. A. K. Sawhney, A Course in Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai& Co., 2005.
2. E. W. Golding and F. C. Widdis, Electrical Measurements and Measuring Instruments, Reem Publications Pvt. Ltd. 2011.

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
C: 0

Faculty Individual Time Table

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
Programme:B.Tech
Course Code & Course: EEE11002 Faculty Coordinator: Sunam Saha

Day & Time	10.30 - 11.20	11.20 - 12.10	12.10 - 01.00	01.00 - 01.50	01.50 - 02.40	02.40 - 03.30	03.30 - 04.20	04.20 - 05.10
Monday	-			LUNCH				
Tuesday								
Thursday		-			-			-
Friday	-	-	-		-			

Signature of HOD

Date:

Signature of Class Coordinator

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

Students Name List

Roll Number	Registration Number	Name of the Student
UG/02/BTEE/2020/001	AU/2020/0004481	Saptarshi Bhattacharjee
UG/02/BTEE/2020/002	AU/2020/0004560	Arkajyoti Das

Signature of HOD/Dean

Date:

Signature of Class Coordinator

Date:

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

COURSE PLAN

Target	60% (marks)
Level-1	50% (population)
Level-2	60% (population)
Level-3	70% (population)

1. Method of Evaluation

UG	PG
Internal Assessment (30%) (Quizzes/Tests, Assignments & Seminars etc.)	Internal Assessment (30%) (Quizzes/Tests, Assignments & Seminars etc.)
Mid Semester Examination (20%)	Mid Semester Examination (20%)
End Semester Examination (50%)	End Semester Examination (50%)

*Keep as per Program (UG/PG)

2. Passing Criteria

Scale	PG	UG
Out of 10 Point Scale	CGPA – "5.00" Min. Individual Course Grade – "C" Passing Minimum – 40	CGPA – "5.00" Min. Individual Course Grade – "C" Passing Minimum – 35

*Keep as per Program (UG/PG)

3. Pedagogy

- **Direct Instruction**
- Kinesthetic Learning
- **Flipped Classroom**
- Differentiated Instruction
- Expeditionary Learning
- Inquiry Based Learning
- Game Based Learning
- Personalized Learning

4. Topics introduced for the first time in the program through this course

- (New Topics Related to this Course – Syllabus Revision if any/Content Beyond Syllabus)

5. References:

Text Books	Web Resources	Journals	Reference Books
1. J. B. Gupta, Electrical and Electronic			1. A. K. Sawhney, A Course in Electrical and

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

Measurements & Instrumentation,S . K. Kataria&Sons, 2013. 2. S. C. Bhargava, Electrical Measuring Instruments and Measurements, CRC Press, 2012			Electronics Measurements and Instrumentation , Dhanpat Rai& Co., 2005. 2. E. W. Golding and F. C. Widdis, Electrical Measurements and Measuring Instruments, Reem Publications Pvt. Ltd. 2011.

Signature of HOD/Dean **Signature of Faculty**

Date: **Date:**

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

GUIDELINES TO STUDY THE SUBJECT

Instructions to Students:

1. Go through the 'Syllabus' in the LMS in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section. These are our lecture notes. Make sure you use them during this course.
4. check your LMS regularly
5. go through study material
6. check mails and announcements on blackboard
7. keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. C**ell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. **E-Mail and online learning tool:** Each student in the class should have an e-mail id and a password to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. **Attendance:** Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail XYZ@adamasuniversity.ac.in Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
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9. **Target : 60%** **P: 0**

C: 0

RELATED OUTCOMES

1. **The expected outcomes of the Program are:**

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively in complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and multidisciplinary environments.

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
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8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

PO12	**Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2. The expected outcomes of the Specific Program are: (up to 3)

PSO1	To educate students in Electrical Engineering domain and guide their instincts towards.
PSO2	To provide quality knowledge on Sustainable Energy that can be used for solving problems.
PSO3	To see our students as ethical and responsible engineering professionals.

3. **The expected outcomes of the Course are: (minimum 4 and maximum 6)**

CO1	**Explain** the basics of measuring instruments and recognize the terms related to basics of measurement.
CO2	**Explain** different types of instrument transformers, their construction and working.
CO3	**Discuss** about power and energy measurement.
CO4	**Interpret** different methods to measure resistance using bridges.
CO5	**Demonstrate** different types of DC and AC bridges to measure resistance and inductance.
CO6	**Illustrate** the concept of electronic measurements.

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

4. **Co-Relationship Matrix**

Indicate the relationships by 1- Slight (Low) 2- Moderate (Medium) 3-Substantial (High)

Program Outcomes / Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	-	-	-	2	-	-	-	-	2	3	3	-
CO2	2	3	-	3	-	-	2	-	-	-	-	2	3	-	-
CO3	2	3	3	3	-	-	2	-	-	-	-	2	3	3	-
CO4	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	2	3	-	-	-	3	-	-	-	-	-	2	3	-	-
CO6	2	3	3	-	-	-	2	-	-	-	-	2	3	3	-
Average	2	3	3	3	-	3	2	-	-	-	-	2	3	3	-

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

5. **Course Outcomes Assessment Plan (COA):**

Course Outcomes	Internal Assessment* (30 Marks)		Mid Term Exam (20 Marks)	End Term Exam (50 Marks)	Total (100 Marks)
	Before Mid Term	After Mid Term			
CO1	5	NA	7	10	22
CO2	5	NA	7	8	20
CO3	5	NA	6	8	19
CO4	NA	5	NA	8	13
CO5	NA	5	NA	10	15
CO6	NA	5	NA	6	11
Total	15	15	20	50	100

* Internal Assessment – Tools Used: Tutorial, Assignment, Seminar, Class Test etc.

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** — **Course Code: EEE11002**
7. **Course** : **Electrical and Electronics Measurement** — **L: 3**
8. **Program** : **B.Tech** — **T: 0**
9. **Target** : **60%** — **P: 0**, **C: 0**

OVERVIEW OF COURSE PLAN OF COURSE COVERAGE

Course Activities:

S. No.	Description	Planned			Actual			Remarks
		From	To	No. of Session	From	TO	No. of Session	
1.	Measuring Instruments	2/09/21	20/09/21	9				
2.	Instrument transformers	21/09/21	10/10/2021	8				
3.	Measurement of Power and Energy	11/10/2021	3/11/2021	6				
4.	Measurement of Resistance	4/11/2021	24/11/2021	8				
5.	DC and AC Bridges	25/11/2021	17/12/2021	8				
6.	Electronic Measurement	18/12/2021	15/01/2022	6				

Total No. of Instructional periods available for the course: __45_ Sessions

Signature of HOD/Dean — **Signature of Faculty**

Date: — **Date:**

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

SESSION PLAN
UNIT-I

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	2-09-21	Measuring Instruments-Classification	CO1				
2	3-09-21	D'Arsonval Galvanometer	CO1				
3	7-09-21	PMMC-Working Principle	CO1				
4	9-09-21	PMMC- Expression for the deflecting torque, Errors and compensations	CO1				
5	10-09-21	Moving Iron type instruments -Working Principle	CO1				
6	14-09-21	Moving Iron type instruments -Expression for the deflecting torque,	CO1				
7	16-09-21	Moving Iron type instruments - Errors and compensations	CO1				
8	17-09-21	Extension of range using shunts resistance	CO1				
9	21-09-21	Extension of range using series resistance	CO1				

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

Remarks:

Signature of Faculty

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

SESSION PLAN
UNIT-II

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	22-09-2021	Instrument transformers - Introduction	CO2				
2	24-09-2021	Current Transformer – Construction and Working	CO2				
3	28-09-2021	CT - Phase angle error	CO2				
4	29-09-2021	CT - Testing	CO2				
5	01-10-2021	PT - Construction and Working	CO2				
6	4-10-2021	PT -Phase angle error	CO2				
7	5-10-2021	PT - Testing	CO2				
8	8-10-2021	Application, Uses, Comparison of CT and PT	CO2				

Remarks:

Signature of Faculty

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

SESSION PLAN
UNIT-III

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	20-10-2021	Measurement of Power and Energy - Introduction	CO3				
2	22-10-2021	Electrodynamometer type Instrument	CO3				
3	26-10-2021	Calibration devices, errors in wattmeter, compensation	CO3				
4	27-10-2021	Measurement of three phase power	CO3				
5	29-20-2021	Single phase and three phase energy meter	CO3				
6	2-11-2021	Energy meter - errors and compensations	CO3				

Remarks:

Signature of Faculty

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

SESSION PLAN
UNIT-IV

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	3-11-2021	Measurement of Resistance	CO4				
2	10-11-2021	Method of measuring low, medium and high resistance	CO4				
3	16-11-2021	Wheatstone's bridge	CO4				
4	22-11-2021	Sensitivity of Wheatstone's bridge	CO4				
5	30-11-2021	Carey Foster's bridge	CO4				
6	3-12-2021	Kelvin's double bridge for measuring low resistance	CO4				
7	8-12-2021	Measurement of high resistance	CO4				
8	15-12-2021	Loss of charge method	CO4				

Remarks:

Signature of Faculty

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
   C: 0

SESSION PLAN
UNIT-V

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	4-01-2022	Measurement of inductance	CO5				
2	6-01-2022	Hay's bridge	CO5				
3	11-01-2022	Maxwell's bridge	CO5				
4	16-01-2022	Anderson's bridge	CO5				
5	18-01-2022	Owen'sbridge	CO5				
6	21-01-2022	Desauty's Bridge	CO5				
7	25-01-2022	Wien's bridge	CO5				
8	28-01-2022	Schering Bridge	CO5				

Remarks: **Signature of Faculty**

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
   C: 0

Date:

SESSION PLAN
UNIT-VI

Session Plan				Actual Delivery			
Lect.	Date	Topics to be Covered	CO Mapped	Lect.	Date	Topics Covered	CO Achieved
1	1-02-2022	Essentials of electronic instruments, Advantages of electronic instruments	CO6				
2	2-02-2022	True rms reading voltmeter	CO6				
3	4-02-2022	Electronic multi-meter	CO6				
4	8-02-2022	Digital voltmeters (DVM) - Ramp type DVM, Integrating type DVM	CO6				
5	11-02-2022	Continuous – balance DVM	CO6				
6	15-02-2022	and Successive - approximation DVM, Q meter.	CO6				

Remarks:

Signature of Faculty

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
C: 0

Date:

PERIODIC MONITORING

Actual date of completion and remarks, if any

Components		From	To	From	To
Duration (Mention from and to Dates)		02-09-21	20-11-2021	21-11-2021	14-02-2021
Percentage of Syllabus covered		50%		50%	
Lectures	Planned	1	25	26	46
	Taken				
Tutorials	Planned	NA			
	Taken				
Test/Quizzes/ Mid Semester/ End Semester	Planned	1	1(Mid)	1	1(END)
	Taken				
	CO's Addressed	CO1 CO2 CO3	CO1 CO2 CO3	CO4 CO5 CO6	CO4 CO5 CO6
	CO's Achieved				
Assignments	Planned	1	1	1	1
	Taken				
	CO's Addressed				
	CO's Achieved				
Signature of Faculty					

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

Head of the Department		
OBE Coordinator		

Signature of HOD/ Dean

Date

Signature of Faculty

Date

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
C: 0

PERIODIC MONITORING

Attainment of the Course (Learning) Outcomes:

Components	Attainment level	Action Plan	Remarks
Assignment	CO1:	Submission Target 26.10.2021	
	CO2:	Submission Target 27.11.2021	
	CO3:	Submission Target 21.12.2021	
	CO4:	Submission Target 25.01.2022	
	CO5:	Submission Target 25.02.2022	
Quiz/Test etc.	CO1:	Will conduct on 25-10-2021	
	CO2:		
	CO3:	Will conduct on 25-1-2022	
	CO4:		
	CO5:		
Mid Semester	CO1:	Scheduled on 10.01.2022	
	CO2:		
	CO3:		
	CO4:		
	CO5:		
End Semester	CO1:	Scheduled on 7-03-2022	
	CO2:		
	CO3:		
	CO4:		
	CO5:		
Any Other	CO1:		
	CO2:		
	CO3:		
	CO4:		
	CO5:		

Signature of HOD/ Dean — Signature of Faculty

Date — Date

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Previous Year Question Paper SET 1

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION : JANUARY 2021** (Academic Session: 2020 – 21)		
Name of the Program: (Example: B. Sc./BBA/MA/B.Tech.)	B.Tech	**Semester:** (I/III/ V/ VII/IX)	III
Paper Title :	Electrical and Electronics Measurement	**Paper Code:**	EEE42103
Maximum Marks :	40	**Time duration:**	3 hours
Total No of questions:	8	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)			

Answer all the Groups

Group A

Answer all the questions of the following $5\times1 = 5$

1. **a)** What is the application of a null detector in an AC bridge?

b) Why should a voltmeter be of very high resistance?

c) Can the same moving iron instrument be used for both dc and ac measurements?

d) What precautions are to be observed when using an ammeter?

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6.	**Name of the Faculty: Ms. Sunam Saha**		**Course Code: EEE11002**
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9.	**Target**	**: 60%**	**P: 0**
			C: 0

e) Which type of meter is most widely used in ac instruments for current and voltage measurements?

GROUP –B

Answer *any three* of the following $3\times5 = 15$

2. Derive the general equations for balance of an AC bridge.

3. A PMMC instrument has a coil dimension of 15mm X 12mm. The flux density in the air gap is 1.8 X 10^{-3} Wb/m^2 and the spring constant is 10^{-6}0.14X 10^{-6} Nm/rad. Determine the number of turns required to produce an angular deflection of 90 degrees when a current of 5 mA is flowing through the coil.

4. Discuss the advantages and disadvantages of moving iron instrument.

5. A bridge consists of the following:
Arm ab – a choke coil having a resistance R_1 and inductance L_1
Arm bc – a non-inductive resistance R_3
Arn cd – a mica condenser C_4 in series with non-inductive resistance R_4
Arm da- a non-inductive resistance R_2
When this bridge is fed from a source of 500Hz, balance is obtained under following conditions: $R_2 = 2410\ \Omega$; $R_3 = 750\Omega$; $C_4 = 0.35\mu F$; $R_4 = 64.5\Omega$
The series resistance of capacitor is = 0.4Ω. Calculate the resistance and inductance of the choke coil. The supply is connected between a and c and the detector between b and d.

GROUP –C

Answer *any two* of the following $2\times10 = 20$

6. Describe the construction and working of PMMC instrument.

7. Explain with proper circuit diagram, the operation of current transformer.

8. Describe the operation of a low voltage Schering bridge. Derive the equations for capacitance and dissipation factor.

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6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
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9. **Target : 60%** **P: 0**
C: 0

Previous Year Question Paper SET 2

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION : JANUARY 2021** (Academic Session: 2020 – 21)		
Name of the Program: (Example: B. Sc./BBA/MA/B.Tech.)	B.Tech	**Semester:** (I/III/ V/ VII/IX)	III
Paper Title :	Electrical and Electronics Measurement	**Paper Code:**	EEE42103
Maximum Marks :	40	**Time duration:**	3 hours
Total No of questions:	8	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)			

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** What are different types of moving iron instrument?

b) What is the significance of measurement?

c) Why should an ammeter be of very low resistance?

Year: 2

Semester: III

6.	**Name of the Faculty: Ms. Sunam Saha**		**Course Code: EEE11002**
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9.	**Target**	**: 60%**	**P: 0**
			C: 0

d) Why an electrodynamometer type of instrument can be used for both ac and dc?

e) What are the basic differences between CT and PT?

GROUP –B

Answer *any three* of the following $3\times5 = 15$

2. Discuss the advantages and disadvantages of PMMC instrument.

3. Design a multirange ammeter with range 0-1A, 5A, 25A, 125A employing individual shunt in each. A D'Arsonval movement with an internal resistance of 730Ω and a full scale current of 5mA is available.

4. Obtain torque equation of a galvanometer.

5. With proper circuit diagram explain the working of a Kelvin double bridge.

GROUP –C

Answer *any two* of the following $2\times10 = 20$

6. Describe the construction and working of attraction type moving iron instrument.

7. Explain with proper circuit diagram, the operation of a potential transformer.

8. With proper circuit diagram discuss the operation of De Sauty's bridge. Also obtain the balance equations [6+4]

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Evaluation Sheet – Internal Assessment

Roll Number	Registration Number	Name of the Student	Internal Assessment (30)				
			Assignment	Class Test	Case Study	etc.	Total

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: 2
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6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
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Question Bank

School:SOET — Department:EE
Course Code: EEE11002 — Course Name: Electrical and Electronics Measurement
Program:B.Tech — Semester: III

Sl. No.	Question	Level of Difficulty (Easy/ Medium/ Difficult)	Knowledge Level (Bloom's Taxonomy)	Course Outcome (CO)
	Part A (Multiple Choice Questions) (1 mark each)			
1.	..... type instrument has identical calibration for A.C. as well as D.C. values A.Hot wire B.Moving coil C.Induction D.Moving iron	**Easy**	**R**	**CO1**
2.	..... type instrument can have full scale deflection of 300 degrees A.Induction B.Rectifier C.Hot wire D.None of the above	**Easy**	**R**	**CO1**
3.	In ..... instruments the deflecting torque depends on the frequency	**Easy**	**R**	**CO1**

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8. **Program** : **B.Tech** **T: 0**
9. **Target** : **60%** **P: 0**
C: 0

	A.Induction type B.Hot wire C.Moving coil D.Moving iron			
4.	The sensitivity inaccuracy of an instrument does not depend on A.Frequency response B.Hysteresis C.Amplitude distortion D.All of the above	**Medium**	**Un**	**CO1**
5.	The error, when reading at half-scale in an instrument, is A.Equal to half of full-scale error B.Equal to full-scale error C.Less than full-scale error D.Greater than full-scale error	**Medium**	**Un**	**CO1**
6.	An instrument's reliability means A.The extent to which the characteristics remain linear B.The life of the instrument C.The degree to which the repeatability continues to remain within specific limits D.All of the above	**Medium**	**Un**	**CO1**
7.	Electrodynamic types of instruments are used commonly for the measurement of A.Current B.Resistance C.Voltage D.Power E.None of the above	**Difficult**	**R**	**CO1**
8.	The bandwidth of an amplifier is approximately A.Proportional to its upper 3dB frequency B.Product of its 3dB frequencies C.Inversely proportional to its upper 3dB frequency D.None of the above	**Difficult**	**R**	**CO1**

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Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
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8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

9.	In electrical measuring instruments electrical energy is converted to A.Mechanical energy B.Heat energy C.Chemical energy D.Light energy	**Difficult**	**Un**	**CO1**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	What is meant by measurement?	**Easy**	**R**	**CO1**
2.	Mention the basic requirements of measurement.	**Easy**	**R**	**CO1**
3.	What are the two methods for measurement?	**Medium**	**R**	**CO1**
4.	Explain the function of measurement system.	**Medium**	**R**	**CO1**
5.	Define Instrument.	**Difficult**	**R**	**CO1**
6.	Classify instruments based on their functions.	**Difficult**	**R**	**CO1**
	Part C (Short Questions) (3-4 marks each)			
1.	How the range of instrument can be extended in PMMC instruments	**Easy**	Un	**CO1**
2	State the advantages of Dynamometer type instruments.	**Easy**	Un	**CO1**
3.	State the advantages of Moving iron type instruments	**Easy**	Un	**CO1**
4.	State the advantages of Hot wire type instruments.	**Medium**	Un	**CO1**
5.	Why calibration of instrument is important?	**Medium**	Un	**CO1**
6.	Explain the function of measurement system.	**Medium**	Un	**CO1**
7.	Name the different essential torques in indicating instruments	**Difficult**	Un	**CO1**
8.	Name the types of instruments used for making voltmeter and ammeter.	**Difficult**	Un	**CO1**
9.	State the disadvantages of PMMC instruments	**Difficult**	Un	**CO1**

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8. **Program** : **B.Tech** **T: 0**
9. **Target** : **60%** **P: 0**
C: 0

Part D (Explanation Based Questions) (5 marks each)				
1.	List out the dynamic characteristics of any measurement system	**Easy**	**R**	**CO1**
2.	What are the types of error measurement system?	**Easy**	**R**	**CO1**
3.	What are the static characteristics important?	**Medium**	**R**	**CO1**
4.	What is standard? What are the different types of standard?	**Medium**	**R**	**CO1**
5.	What is the function of manipulation element in a measurement system?	**Difficult**	**R**	**CO1**
6.	What are the primary standards? Where are they used?	**Difficult**	**R**	**CO1**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	Distinguish re-productibility and repeatability	**Easy**	**Un**	**CO1**
2.	Show the block diagram indicating functional elements of measurement system.	**Easy**	**Un**	**CO1**
3.	Distinguish between zero drift and span drift.	**Medium**	**Un**	**CO1**
4.	Define a dynamic response of an instrument.	**Medium**	**Un**	**CO1**
5.	What are the different calibration methodologies?	**Difficult**	**Un**	**CO1**
6.	Distinguish between direct and indirect methods of measurements	**Difficult**	**Un**	**CO1**

Unit II

Part A (Multiple Choice Questions) (1 mark each)				
1.	What will happen if secondary of a current transformer is open-circuited? a) hot because of heavy iron losses b) hot because primary will carry heavy current c) cool as there is no secondary current d) depends on other parameters	**Easy**	**R**	**CO2**

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9. **Target** : **60%** **P: 0**
C: 0

2.	The secondary winding of which of the following listed transformers is always kept closed? a) Step-up transformer b) Step-down transformer c) Potential transformer d) Current transformer	**Easy**	**R**	**CO2**
3.	Current transformers are used for _____ a) to provide to measure voltages b) to measure high value of currents c) to short-circuit the unwanted instruments d) to measure low value of currents	**Easy**	**R**	**CO2**
4.	The secondary of a current transformer is always kept short-circuited while operating because it _____ a) avoids core saturation and high voltage induction b) is safe to human beings c) protects the primary circuit d) to keep temperature within limits	**Medium**	**R**	**CO2**
5.	In CT deep saturation will cause when _____ a) if circuit is short-circuited b) if circuit is open-circuited c) in both OC and SC conditions d) if operated at very high supply	**Medium**	**R**	**CO2**
6.	Current transformers are _____ a) series connected type of instrument transformers b) parallel connected type of instrument transformers c) series-parallel connected type of instrument transformers d) parallel connected normal transformers	**Medium**	**R**	**CO2**
7.	Which of the following can be considered as error for Potential transformer? a) Magnitude errors b) Phase errors c) Unit errors d) Magnitude and phase errors	**Difficult**	**R**	**CO2**
8.	Voltage transformers are designed to have _____ a) high leakage reactance b) high magnetizing current	**Difficult**	**R**	**CO2**

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C: 0

	c) high magnetizing reactance d) low magnetizing reactance			
9.	Audio frequency transformers are used _____ a) Input stage of audio frequency electronic amplifier b) Intermediate stage of audio frequency electronic amplifier c) Output stage of audio frequency electronic amplifier d) Anywhere in the amplifier circuitry	**Difficult**	**R**	**CO2**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	Define Instrument Transformer	**Easy**	**R**	**CO2**
2.	Define Current Transformer and Potential Transformer.	**Easy**	**R**	**CO2**
3.	State the advantages of instrument transformers.	**Medium**	**R**	**CO2**
4.	State the disadvantage of instrument transformers.	**Medium**	**R**	**CO2**
5.	What are the constructional parts of current transformer?	**Difficult**	**R**	**CO2**
6.	Name the errors caused in current transformer	**Difficult**	**R**	**CO2**
	Part C (Short Questions) (3-4 marks each)			
1.	How the CT and PT are connected in the circuits.	**Easy**	**R**	**CO2**
2	Name the components of iron loss.	**Easy**	**R**	**CO2**
3.	What is the Instrument Transformer?	**Easy**	**R**	**CO2**
4.	What is Current Transformer?	**Medium**	**R**	**CO2**
5.	Why Current transformers are used for measurement?	**Medium**	**Un**	**CO2**
6.	Is current transformer a step-up transformer?	**Medium**	**Un**	**CO2**
7.	What are the errors in C.T?	**Difficult**	**Un**	**CO2**
8.	What is Potential Transformer?	**Difficult**	**Un**	**CO2**
	Part D (Explanation Based Questions) (5 marks each)			

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9. **Target : 60%** **P: 0**
C: 0

1.	Why Current transformers are used for measurement?	**Easy**	**Un**	**CO2**
2.	What are the basic differences between CT and PT?	**Easy**	**Un**	**CO2**
3.	Why Current transformers are used for measurement?	**Medium**	**Un**	**CO2**
4.	Why Potential transformers are used for measurement?	**Medium**	**Un**	**CO2**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	What are the basic differences between CT and PT?	**Easy**	**Un**	**CO2**
2.	How to calculate the knee point voltage of CT?	**Easy**	**Un**	**CO2**
3.	What are the errors in C.T?	**Medium**	**Un**	**CO2**
4.	What is the effect of saturation on the performance of C.T?	**Medium**	**Un**	**CO2**
Part F (Application Based Questions) (5-10 marks each)				
1.	How to calculate the knee point voltage of CT?	**Easy**	**Un**	**CO2**
2.	What materials are used for the core of C.T and why?	**Easy**	**Un**	**CO2**
3.	What is the effect of saturation on the performance of C.T?	**Medium**	**Un**	**CO2**
4.	What are the basic differences between CT and PT?	**Medium**	**Un**	**CO2**
Part G (Short Notes) (5 marks each)				
1.	Write a short note on C.T.	**Easy**	**Un**	**CO2**
2.	Write a short note on P.T.	**Easy**	**Un**	**CO2**
3.	Draw the phasor diagram for a current transformer with explaination.	**Easy**	**Un**	**CO2**
4.	Draw the phasor diagram for a potential transformer with explaination.	**Medium**	**Un**	**CO2**

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9. **Target** : **60%** **P: 0**
C: 0

Unit III

Part A (Multiple Choice Questions) (1 mark each)				
1.	In a low power factor wattmeter the compensating coil is connected A.In series with current coil B.In parallel with current coil C.In series with pressure coil D.In parallel with pressure coil	**Easy**	**Un**	**CO3**
2.	In a 3-phase power measurement by two wattmeter method, both the wattmeters had identical readings. The power factor of the load was A.Unity B.0.8 lagging C.0.8 leading D.Zero	**Easy**	**Un**	**CO3**
3.	Wattmeter cannot be designed on the principle of A.Electrostatic instrument B.Thermocouple instrument C.Moving iron instrument D.Electrodynamic instrument	**Easy**	**Un**	**CO3**
4.	The readings of a dynamometer type wattmeter can be highly erratic at A.Low frequencies B.Fluctuating loads C.Low power factors D.High voltages	**Medium**	**Un**	**CO3**
5.	The pressure coil of a wattmeter should be connected on the supply side of the current coil when	**Medium**	**Un**	**CO3**

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C: 0

	A.Load impedance is high B.Load impedance is low C.Supply voltage is low D.None of the above			
6.	In a low power factor wattmeter the pressure coil is connected A.To the supply side of the current coil B.To the load side of the current coil C.In any of the two meters at connection D.None of the above	**Medium**	**Un**	**CO3**
7.	A dynamometer type wattmeter has A.Square law scale B.Non-linear scale C.Logarithmic scale D.Uniform scale	**Difficult**	**Un**	**CO3**
8.	Which of the following methods is used to shield a dynamometer type wattmeter against stray fields A.Meter components are made of non-magnetic materials B.Meter is housed in a soft iron case C.Neutral wire connection is provided D.Meter is earthed	**Difficult**	**Un**	**CO3**
9.	A wattmeter will be free from the effects of power factor and frequency variations in case A.Voltage coil resistance is zero B.Damping is not provided C.Pressure coil inductance is zero	**Difficult**	**Un**	**CO3**

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9. **Target** : **60%** **P: 0**
C: 0

	D.A capacitance is connected in parallel to pressure coil			
	Part B (Definition/Naming Questions) (2 marks each)			
1.	State the use of phantom loading	**Easy**	**Un**	**CO3**
2.	Name the methods used in Wattmeter calibration.	**Easy**	**Un**	**CO3**
3.	What are the types of energy meters?	**Medium**	**Un**	**CO3**
4.	Name the constructional parts of induction type energy meter.	**Medium**	**Un**	**CO3**
5.	Name the methods used for power measurement in three phase circuits.	**Difficult**	**Un**	**CO3**
6.	Define creeping.	**Difficult**	**Un**	**CO3**
	Part C (Short Questions) (3-4 marks each)			
1.	What are the constructional parts of dynamometer type wattmeter?	**Easy**	**Un**	**CO3**
2	Write down the deflecting torque equation in dynamometer type wattmeter.	**Easy**	**Un**	**CO3**
3.	State the disadvantages of Dynamometer type wattmeter.	**Easy**	**Un**	**CO3**
4.	Name the errors caused in Dynamometer type wattmeter	**Medium**	**Un**	**CO3**
5.	How the errors caused by pc inductance is compensated.	**Medium**	**Un**	**CO3**
6.	How the errors caused by methods of connection is compensated?	**Medium**		**CO3**
7.	Name the methods used for power measurement in three phase circuits.	**Difficult**		**CO3**
8.	What are the special features to be incorporated for LPF wattmeter?	**Difficult**		**CO3**
9.	Define Phantom loading	**Difficult**		**CO3**
	Part D (Explanation Based Questions) (5 marks each)			
1.	The household energy meter is A.An indicating instrument B.A recording instrument	**Easy**	**R**	**CO3**

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	C.An integrating instrument D.None of the above			
2.	The meter constant of single phase energy meter is expressed in terms of A.Revolutions/kWh B.kW/kWh C.Amps/kW D.Volts/kWh	**Easy**	**R**	**CO3**
3.	If voltage supply to the energy meter is more than the rated value, energy meter will run A.Slow B.Fast C.Either of the above D.None of the above	**Medium**	**R**	**CO3**
4.	Aluminium is selected as the material for rotating disc of energy meter because A.It is good conductor B.It is light C.It is indigenously available D.All of the above reasons	**Medium**	**R**	**CO3**
5.	Most common form A.C. meters met with in every day domestic and industrial installations are A.Mercury motor meters B.Commutator motor meters C.Induction type single phase energy meters D.All of the above	**Difficult**	**R**	**CO3**
6.	An electrodynamic meter can be used to measure A.A.C. voltages B.D.C. voltages C.Both (a) and (b) D.None of the above	**Difficult**	**R**	**CO3**
Part E (Questions Based on Reasoning) (5 marks each)				
1.	State the disadvantages of Dynamometer type wattmeter.	**Easy**		**CO3**

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2.	Explain the methods used for power measurement in three phase circuits.	**Easy**		**CO3**
3.	Explain the constructional parts of dynamometer type wattmeter?	**Medium**		**CO3**
4.	A single phase 230 V energy meter has a constant load current of 4.25 A passing through it for 5 hours at unity power factor. If the disc makes 1173 revolutions during this period, determine the energy meter constant in revolutions per KWh. If the power factor is reduced to 85 %, calculate the number of revolutions of the disc observed in the above time.	**Medium**	**An**	**CO3**
Part F (Application Based Questions) (5-10 marks each)				
1.	A 240 volt, 5 ampere, single phase energy meter has a constant of 1200 revolutions per kilo watt hour (KWh). When tested by applying 240 volts, the meter took 99.8 seconds to complete 40 revolutions. Find the percentage error. Is it running fast or slow ?	**Easy**	**An**	**CO3**
2.	The meter constant of a 240 volt, 30 ampere, single phase energy meter is1800 revolutions per KWh. When tested at half load, rated voltage and 0.8 power factor, the meter is found to make 100 revolutions in 70 seconds. Determine the percentage error at half load.	**Easy**	**An**	**CO3**
3.	The meter constant of an energy meter is1200 revolutions per KWh. It is found to make 20 revolutions in 80 seconds. Determine the load on the meter.	**Medium**	**An**	**CO3**
4.	A single phase, 50 A, 230 V energy meter on full load test makes 61 revolutions in 37 seconds. If the normal disc speed is 520 revolutions per KWh, determine the percentage error as a percentage of true speed. Is the situation beneficial to the consumer ? Reason out.	**Medium**	**An**	**CO3**
5.	Determine the registration error of an AC energy meter tested for a period of 20 minutes at half load yielding the test results as follows : Supply voltage = 220 V Load current = 20 A Power Factor = Unity Initial Reading = 197.85 and Final Reading = 198.55.	**Difficult**	**An**	**CO3**

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7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

6.	For a 20 A, 230 V energy meter, the number of revolutions per KWh is 480. If upon test at full load, the disc makes 40 revolutions in 66 seconds, determine the error in the following as a percentage of metered values : (i)speed (ii)time taken (iii)power consumed and (iv)energy consumed. Comment on the results.	**Difficult**	**An**	**CO3**
Part G (Short Notes) (5 marks each)				
1.	Write short note on single phase energy meter.	**Easy**	**R**	**CO3**
2.	Write short note on three phase energy meters.	**Easy**	**R**	**CO3**
3.	Write a short note on Wattmeter.	**Easy**	**R**	**CO3**

Unit IV

Part A (Multiple Choice Questions) (1 mark each)				
1.	D.C. bridges are used for _____. A.measurement of resistance B.measurement of capacitance C.measurement of current D. measurement of inductance	**Easy**	**R**	**CO4**
2.	Commonly used D.C. bridges are _____. • A.Schering and Anderson • B.Maxwell inductance and capacitance • C.DeSauty and Wagner • D.Wheatstone and Kelvin	**Easy**	**R**	**CO4**

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course** **: Electrical and Electronics Measurement** **L: 3**
8. **Program** **: B.Tech** **T: 0**
9. **Target** **: 60%** **P: 0**
C: 0

3.	Wheatstone bridge is a _____. • A.a.c. bridge • B.d.c. bridge • C.high voltage bridge • D.power dissipation bridge	**Easy**	**R**	**CO4**
4.	Wheatstone bridge is a _____. ● A.a.c. bridge ● B.d.c. bridge ● C.high voltage bridge ● D.power dissipation bridge	**Medium**	**R**	**CO4**
5.	Thermal compensation can be provided in a Wheatstone bridge by _____. ● A.using more than one resistive sensor ● B.making use of a heat sink ● C.using cooling fans ● D.immersing the circuit into a liquid	**Medium**	**R**	**CO4**
6.	How many resistances are used in a Wheatstone bridge? • A.3 • B.4 • C.5 • D.6	**Medium**	**R**	**CO4**
7.	Thermal compensation can be provided in a Wheatstone bridge by _____.	**Difficult**	**R**	**CO4**

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

	• A.using more than one resistive sensor • B.making use of a heat sink • C.using cooling fans • D.immersing the circuit into a liquid			
8.	Thermal compensation can be provided in a Wheatstone bridge by _____. • A.using more than one resistive sensor • B.making use of a heat sink • C.using cooling fans D.immersing the circuit into a liquid	**Difficult**	**R**	**CO4**
9.		**Difficult**		
	Part B (Definition/Naming Questions) (2 marks each)			
1.	Define standardization	**Easy**	**R**	**CO4**
2.	Classify resistance	**Easy**	**R**	**CO4**
3.	What is the range of medium resistance?	**Medium**	**R**	**CO4**
4.	Name the methods used for low resistance measurement.	**Medium**	**R**	**CO4**
5.	Name the methods used for medium resistance measurement.	**Difficult**	**R**	**CO4**
6.	Where high resistance m/s is required?	**Difficult**	**R**	**CO4**
	Part C (Short Questions) (3-4 marks each)			
1.	State the advantages of Wheatstone bridge method.	**Easy**	**R**	**CO4**
2	State the advantages of Kelvin double bridge method.	**Easy**	**R**	**CO4**

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course** : **Electrical and Electronics Measurement** **L: 3**
8. **Program** : **B.Tech** **T: 0**
9. **Target** : **60%** **P: 0**
C: 0

3.	What are the constructional features of doctor ohmmeter?	**Easy**	**R**	**CO4**
4.	Define megger.	**Medium**	**R**	**CO4**
5.	Name the parts of megger.	**Medium**	**R**	**CO4**
6.	What is the range of low resistance?	**Medium**	**R**	**CO4**
7.	What is the range of medium resistance?	**Difficult**	**R**	**CO4**
8.	What ranges of resistance can be measured by using doctor ohmmeter.	**Difficult**	**R**	**CO4**
9.	How resistance is measured in direct deflection method.	**Difficult**	**R**	**CO4**
Part D (Explanation Based Questions) (5 marks each)				

Unit V

Part A (Multiple Choice Questions) (1 mark each)				
1.	**AC bridges are used for the measurement of** A. Resistances B. Resistances and Inductances C. Inductances and capacitances D. Resistances, inductances and capacitances	**Easy**	**R**	**CO5**
2.	**The commonly used detectors in ac bridges is/are** A. Head phones B. Vibration galvanometers C. Tuned amplifiers, head phones D. Head phones, tuned amplifiers, vibration galvanometers	**Easy**	**R**	**CO5**
3.	**The vibration galvanometers are sensitive to power for frequency range of** A. 200 Hz and below B. 200 Hz to about 4 kHz C. 4 kHz and above D. Any frequency	**Easy**	**R**	**CO5**

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

4.	**The Ac Bridge used for the measurement of inductance is/are** A. Maxwell's inductance bridge B. Hay's bridge C. Anderson's bridge, Owen's bridge D. All of these	**Medium**	**R**	**CO5**
5.	**Under balanced condition, the current flowing through the detector is equal to** A. 1 A B. 0 A C. Sum of the currents flowing in the adjacent arms D. Difference between the current flowing in the adjacent arms	**Medium**	**R**	**CO5**
6.	**In Maxwell's Inductance-Capacitance bridge, the frequency ω** A. Is directly proportional to the inductance in the balanced equation B. Is inversely proportional to the capacitance in the balanced equation C. Is directly proportional to the product of inductance and capacitance D. Does not appear in the balanced equations	**Medium**	**R**	**CO5**
7.	**The Maxwell's Inductance-Capacitance bridge is not suitable for the measurement inductance of coil if the Q factor is** A. Less than 1 B. Between 1 to 10 C. More than 10 D. Both (a) and (c)	**Difficult**	**R**	**CO5**
8.	**The Q meter works on the principle of** A. Series resonance B. Parallel resonance	**Difficult**	**R**	**CO5**

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course** : **Electrical and Electronics Measurement** **L: 3**
8. **Program** : **B.Tech** **T: 0**
9. **Target** : **60%** **P: 0**
C: 0

	C. Both (a) and (b) D. Neither series resonance nor parallel resonance			
9.	**The Hay's bridge is suitable for the measurement of inductances of coils with Q factor** A. More than 10 B. Less than 1 C. More than 1 D. Less than 10	**Difficult**	**R**	**CO5**
	Part B (Definition/Naming Questions) (2 marks each)			
1.	State the balance equation used in bridge methods. (	**Easy**	**Un**	**CO5**
2.	State the advantages of price's guard wire method.	**Easy**	**Un**	**CO5**
3.	How the earth resistance is measured.	**Medium**	**Un**	**CO5**
4.	State the balance equation used in ac bridges.	**Medium**	**Un**	**CO5**
5.	Name the bridge circuits used for the m/s of self inductance.	**Difficult**	**Un**	**CO5**
6.	Name the bridge circuits used for the m/s of capacitance.	**Difficult**	**Un**	**CO5**
	Part C (Short Questions) (3-4 marks each)			
1.	Name and explain the bridge circuits used for the m/s of mutual inductance	**Easy**	**Un**	**CO5**
2	Which type of detector is used in ac bridges?why?	**Easy**	**Un**	**CO5**
3.	Name the ac sources used in ac bridges.	**Easy**	**Un**	**CO5**
4.	Name the sources of errors in ac bridge m/s.	**Medium**	**Un**	**CO5**
5.	State the advantages of Maxwell-wein bridge.	**Medium**	**Un**	**CO5**
6.	State the use of Wein bridge	**Medium**	**Un**	**CO5**
7.	What is the use of Campbell bridge?	**Difficult**	**Un**	**CO5**
8.	What is meant by induct meter?	**Difficult**	**Un**	**CO5**

Year: 2
Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
C: 0

9.	Define Q-factor of the coil.	**Difficult**	**Un**	**CO5**
Part D (Explanation Based Questions) (5 marks each)				
1.	Derive the bridge balance condition for the Maxwell bridge and Schering bridge.	**Easy**	**Un**	**CO5**
2.	Explain how the inductance is measured in terms of known capacitance using Maxwell's bridge	**Easy**	**Un**	**CO5**
3.	Explain the working of Schering bridge	**Medium**	**Un**	**CO5**
4.	Which bridge is used to measure frequency and explain the measurement procedure?	**Medium**	**Un**	**CO5**
5.	With neat diagram explain in detail about Hay bridge	**Difficult**	**Un**	**CO5**
6.	Explain about the Anderson bridge	**Difficult**	**Un**	**CO5**
Part G (Short Notes) (5 marks each)				
1.	Write short not on Anderson bridge	**Easy**	**Un**	**CO5**
2.	Write short not on Maxwell's bridge	**Easy**	**Un**	**CO5**
3.	Write short not on Schering bridge	**Easy**	**Un**	**CO5**
4.	Write short not on Hay bridge	**Medium**	**Un**	**CO5**
5.	Derive the bridge balance condition for the Schering bridge.	**Medium**	**Un**	**CO5**

Unit VI

Part A (Multiple Choice Questions) (1 mark each)				
1.	Ramp type DVM uses _____ a) a linear ramp technique b) a non-linear ramp technique c) an exponential ramp technique d) an asymptotic ramp technique	**Easy**	**Un**	**CO6**
2.	Linear ramp technique is based on _____ a) voltage measurement b) time measurement	**Easy**	**Un**	**CO6**

Year: 2
Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course** : **Electrical and Electronics Measurement** **L: 3**
8. **Program** : **B.Tech** **T: 0**
9. **Target** : **60%** **P: 0**
C: 0

	c) current measurement d) resistance measurement			
3.	Time is measured using _____ a) clock b) logic gates c) counter d) flip-flops	**Easy**	**Un**	**CO6**
4.	Which is the main device used in the linear ramp technique? a) exponential ramp b) asymptotic ramp c) non-linear ramp d) linear ramp	**Medium**	**Un**	**CO6**
5.	Resolution depends on _____ a) frequency b) resistance c) voltage d) current	**Medium**	**Un**	**CO6**
6.	How is input voltage measured? a) by using a voltmeter b) by counting the pulses c) by using a multimeter d) by using a transformer	**Medium**	**Un**	**CO6**
7.	Which determines the rate of measurement cycles? a) oscillator b) amplifier c) mutivibrator d) oscilloscope	**Difficult**	**Un**	**CO6**
8.	What is the typical value of the multivibrator? a) 10 cycles/second b) 0.2 cycles/second c) 50 cycles/second d) 5 cycles/second	**Difficult**	**Un**	**CO6**
9.	Slider movement depends on _____	**Difficult**	**Un**	**CO6**

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
C: 0

	A : current magnitude B : resistance magnitude C : voltage magnitude D : power magnitude			
	Part B (Definition/Naming Questions) (2 marks each)			
1.	What is CRO?	**Easy**	**Un**	**CO6**
2.	What is DSO?	**Easy**	**Un**	**CO6**
3.	What is DVM?	**Medium**	**Un**	**CO6**
4.	What are the advantages of electronic instruments	**Medium**	**Un**	**CO6**
	Part C (Short Questions) (3-4 marks each)			
1.	Mention the essentials of electronic instruments	**Easy**	**Un**	**CO6**
2	Write the advantages of electronic instruments	**Easy**	**Un**	**CO6**
3.	What is Integrating type DVM?	**Easy**	**Un**	**CO6**
4.	What is the significance of the name of the method dual slope method?	**Medium**	**Un**	**CO6**
5.	Explain the principle of operation dual slope DVM.	**Medium**	**Un**	**CO6**

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
   C: 0

Lecture Notes

MEASURING INSTRUMENTS

https://adamasuniversity.instructure.com/courses/729/modules

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
   C: 0

Evaluation Sheet – Mid Semester

Roll Number	Registration Number	Name of the Student	Marks (20)

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
   C: 0

Planning for Remedial Classes – Mid Semester

Sl. No.	Name of Student	Roll No.	Reg. No.	Mid Sem Marks	Remedial Classes Held							Class test on the basis of Remedial Classes	End Sem Marks	Improvement (Y/N)
					Date									
					Venue									

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

					Time									
1.														
2.														

Signature of HOD/ Dean **Signature of Faculty**

Date: **Date:**

COURSE END SURVEY

INDIRECT ASSESSMENT

Sample format for Indirect Assessment of Course outcomes:

NAME:
ROLL NO.:
REG. NO..:
COURSE:
PROGRAM:

Please rate the following aspects of course outcomes of

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

Use the scale 1-5 (Poor – Excellent)

Course Outcomes	Statement	1	2	3	4	5
CO1						
CO2						
CO3						
CO4						
CO5						

INDIRECT ASSESSMENT CONSOLIDATION

ADAMAS UNIVERSITY, KOLKATA **SCHOOL OF** **DEPARTMENT OF** **CO Indirect Assessment**		
Programme: **Academic Year:2020-21** **Batch: 2020-22**		
Course Code & Name:		
Course Outcome	**Students Feed Back (5)**	**Attainment (100)**
CO1		

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

CO2		
CO3		
CO4		
CO5		
etc.		
Signature of HOD/Dean **Date:**		**Signature of Faculty** **Date:**

Evaluation Sheet (End Semester)

Roll Number	Registration Number	Name of the Student	Marks (50)

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
   C: 0

Signature of HOD/Dean **Signature of Faculty**

Date: **Date:**

Planning for Remedial Classes – End Semester

Sl. No.	Name of Student	Roll No.	Reg. No.	End Sem Marks	Remedial Classes Held	Class test on the basis of	Supple Exam Marks	Improvement (Y/N)

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
C: 0

												Remedial Classes		
					Date									
					Venue									
					Time									
1.														
2.														

Signature of HOD/ Dean — Signature of Faculty

Date — Date

Consolidated Mark Statement

Roll Number	Registration Number	Name of the Student	Total Marks			
			Mid Semester (20)	Internal Assessment (30)	End Semester (50)	Total (100)

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**
   C: 0

Signature of Dean/HOD **Signature of Faculty**

Date: **Date:**

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
   C: 0

CO ATTAINMENT – GAP ANALYSIS & REMEDIAL MEASURES

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF
DEPARTMENT OF
CO ATTAINMENT - GAP ANALYSIS & REMEDIAL MEASURES

Batch :	2020-22		Academic Year: 2020-21
Course Code & Name		Name of the Coordinator	Year & Semester
			I & I

CO	Direct Assessment	Indirect Assessment	CO Attainment	Target	CO Attainment Gaps	Action for Bridge the Gap	Target Modification
CO1							
CO2							
CO3							
CO4							
CO5							

Signature of HOD/Dean — **Signature of Faculty**

Date: — **Date:**

Year: 2

Semester: III

6. Name of the Faculty: Ms. Sunam Saha — Course Code: EEE11002
7. Course : Electrical and Electronics Measurement — L: 3
8. Program : B.Tech — T: 0
9. Target : 60% — P: 0
   C: 0

CO-PO ATTAINMENT

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF
DEPARTMENT OF
CO-PO ATTAINMENT

Programme :	Year & Sem: I & I	Academic Year: 2020-21	Batch:2020-22

Course Code	Course Name	CO-PO	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
		Relationship															
		Mapping Value															
		Attainment															

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

PO ATTAINMENT OF THE COURSE

Signature of HOD/Dean

Date:

Signature of Faculty

Date:

Year: 2

Semester: III

6. **Name of the Faculty: Ms. Sunam Saha** **Course Code: EEE11002**
7. **Course : Electrical and Electronics Measurement** **L: 3**
8. **Program : B.Tech** **T: 0**
9. **Target : 60%** **P: 0**

C: 0

INSTRUCTIONS FOR FACULTY

Instructions for Faculty

- Faculty should keep track of the students with low attendance and counsel them regularly.
- Course coordinator will arrange to communicate the short attendance (as per University policy) cases to the students and their parents monthly.
- Topics covered in each class should be recorded in the table of RECORD OF CLASS TEACHING (Suggested Format).
- Internal assessment marks should be communicated to the students twice in a semester.
- The file will be audited by respective Academic Monitoring and Review Committee (AMRC) members for theory as well as for lab as per AMRC schedule.
- The faculty is required to maintain these files for a period of at least three years.
- This register should be handed over to the head of department, whenever the faculty member goes on long leave or leaves the Colleges/University.
- For labs, continuous evaluation format (break-up given in the guidelines for result preparation in the same file) should be followed.
- Department should monitor the actual execution of the components of continuous lab evaluation regularly.
- Instructor should maintain record of experiments conducted by the students in the lab weekly.
- Instructor should promote students for self-study and to make concept diary, due weightage in the internal should be given under faculty assessment for the same.
- Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.
- **Submission Targets of Course Contents:**
  - **S. No. 1 to 8 : Before Starting the Course**
  - **S. No. 9 & 10 : After Mid Semester Examination**
  - **S. No. 11 to 18 : Immediately After End Semester Examination**
  - **S. No. 19 to 22 : After Declaration of Result of the Course**