Board of Studies

Meeting held on

22-12-2021

Proceedings

Electrical Engineering Department

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute, Affiliated to RGPV, Bhopal)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal, MP)

Electrical Engineering Department

Date: 22-12-2021

Minutes of Meeting Board of Studies

The Board of Studies (BoS) meeting of Electrical Engineering department was held Online on 22th December 2021 at 3:00 pm onwards. Following external members were invited in addition to the faculty members of the department:

1. **Dr. A.K. Sharma**, Principal, JEC Jabalpur **(VC, RGPV nominee)**
2. **Dr. Mukhtiar Singh**, Professor, Electrical Engineering Department, DTU Delhi **(Subject Expert)**
3. **Dr. D.K. Chaturvedi**, Professor, Electrical Engineering Department, DEI Agra, **(Subject Expert)**
4. **Er. R.K Mahapatra**, AGM, BHEL, Jhansi **(Industry Expert)**
5. **Er. Dileep Dixit**, DGM, NTPC, Delhi, **(Alumnus)**

Above mentioned External experts and the following Internal members attended the meeting:

1. **Dr. Laxmi Srivastava,** Professor & Head
2. **Dr. Manjaree Pandit,** Professor & Dean Academics
3. **Dr. A.K. Wadhwani,** Professor
4. **Dr. Sulochana Wadhwani,** Professor
5. **Prof. Ashis Patra,** Associate Professor
6. **Dr. Shishir Dixit,** Associate Professor
7. **Prof. Rakesh Narvey**, Assistant Professor
8. **Dr. Himmat Singh**, Assistant Professor
9. **Dr. Vijay Bhuria**, Assistant Professor
10. **Prof. Kuldeep K. Swarnkar**, Assistant Professor
11. **Prof. Praveen Bansal**, Assistant Professor
12. **Prof. Vishal Chaudhary**, Assistant Professor
13. **Dr. Vikram**, Assistant Professor
14. **Dr. Ankit Tiwari,** Assistant Professor
15. **Prof. Saurabh K. Rajput**, Assistant Professor
16. **Prof. Bhavna Rathore**, Assistant Professor
17. **Prof. Nipun Gupta**, Assistant Professor
18. **Prof. Rahul Sagwal**, Assistant Professor
19. **Prof. Manoj Kumar**, Assistant Professor &
20. **Dr. Hemlata Shakya**, Assistant Professor

In addition, following student member were also present:

1. **Ikshita Trivedi**, B Tech III Year &
2. **Aryan Sharma**, B Tech III Year

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To Agenda-wise summary of the BoS meeting is as follows:

Item EE0	To confirm the minutes of last BoS meeting held. **The minutes of the last BoS held on 2nd June ,2021 were confirmed. The BoS Minutes were presented & approved in Academic Council Meeting held on 28th June ,2021.**
Item EE 1	To propose the **scheme structure of VIII Semester** with the provision of Two Departmental Electives and one Open Category (OC)Course, **to be offered in online mode** with credit transfer for the batch admitted in 2018-19. **The scheme structure of VIII Semester with the provision of two Departmental Electives and one Open Category (OC) Course, to be offered in online mode with credit transfer for the batch admitted in 2018-19 is discussed and finalized. The scheme structure is annexed as ANNEXURE -1.**
Item EE 2	To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in ***online mode under Departmental Elective (DE) category,*** for credit transfer in the ***VIII Semester*** under the flexible curriculum (*Batch admitted in 2018-19)* **The list of the course under DE-5 & DE-6 categories to be offered in online mode is finalized and is given below. This time two MITS MOOCS are in the list.**

DE-5 *(SWAYAM/NPTEL/MOOC)	
130851	Introduction to Internet of Things
130855	Power System Dynamics, Control and Monitoring

DE-6 *(SWAYAM/NPTEL/MOOC)	
130861	Introduction to Soft Computing
130862	Non-conventional energy Resources

Code	Course Name	Offered by	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
130851	Introduction to Internet of things	IITKGP	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof. Bhavna Rathore
130855	Power System Dynamics, Control and Monitoring	IITKGP	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Dr. Himmat Singh
130861	Introduction to Soft Computing	IITM	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Dr. Ankit Tiwari
130862	Non-Conventional energy Resources	IITM	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Nikhil Paliwal

Item EE3	To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, to be offered in ***online mode from*** SWAYAM/NPTEL/MITS MOOCs/ other MOOC Platforms) ***under Open Category (OC)*** Courses, for credit transfer in the ***VIII Semester under*** the flexible curriculum (*Batch admitted in 2018-19)* **The courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, offered in *online mode under Open Category (OC)* Courses, for credit transfer in the *VIII Semester under* the flexible curriculum were discussed and finalized as per the following details:**

OC-4* SWAYAM/NPTEL/MITS MOOCs (For students of other branches)	
900607	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems
900312	Non-Conventional Energy Resources

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Code	Course Name	Offered By	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
900607	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems	IITG	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof. Vishal Chaudhary
900312	Non-conventional energy Resources	IITM	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Nikhil Paliwal

Item EE 4

To propose the course and syllabi of MITS *MOOC* Course along with the Course Outcomes for credit transfer in the *VIII Semester* under the flexible curriculum *(Batch admitted in 2018-19)*

1. **Recoding of the Course on Introduction to Robotics is complete for 4 weeks. The remaining is under progress at MITS MOOC Centre. The syllables along with Course Outcome are annexed at ANNEXURE -2.**
2. **Recoding of the Course on Nature Inspired Intelligent Computational Techniques in under progress at MITS MOOC Centre. The syllables along with Course Outcome are annexed at ANNEXURE -2.**

Item EE 5

To propose the list of "Additional Courses" which can be opted for getting an

(i) Honours (for students of the host department)

(ii) Minor Specialization (for students of other departments)

*[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the **VI semester** (for the batch admitted in 2019-20) and for **VIII semester students** (for the batch admitted in 2018-19)]*

(i) The courses for Honors (for students of the host department, VI & VIII Semester) available on SWAYAM/NPTEL/MOOC based Platforms were identified and are listed below:

B. Tech. VI Semester (Honors)

Code	Course Name	Offered By	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
EE0620H3	Machine Learning, ML	KTH, RIT, Sweden	8 Weeks	February 21, 2022	April 15, 2022	April 24, 2022	Dr Ankit Tiwari
EE0620H4	An Introduction to Artificial Intelligence	IITD	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof Nipun Gupta
EE0622H1	Computer Networks and Internet Protocol	IITKGP	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof Rahul Sagwal

B. Tech. VIII Semester (Honors)

Code	Course Name	Offered By	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
EE0620H3	Machine Learning, ML	KTH, RIT, Sweden	8 Weeks	Februay 21, 2022	April 15, 2022	April 24, 2022	Dr Ankit Tiwari
EE0620H4	An Introduction to Artificial Intelligence	IITD	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof Nipun Gupta
EE0822H1	Linear Dynamical Systems	IIT Mandi	8 Weeks	January 24, 2022	March 18, 2022	March 27, 2022	Prof A Patra

(ii) Minor Specialization (for students of other departments)

It was discussed & finalized to offer the pool of domain specialization, available on https://nptel.ac.in/noc/Domain/discipline.html . Two domain were finalized to be offered namely (i) Power Systems and Power Electronics and (ii) Control and Instrumentation, for the students of the other departments.

B. Tech. VI Semester (Minor Specialization)

(For students of other departments)

https://nptel.ac.in/noc/Domain/discipline.html

Domain	Course code	Course Name	Offered By	Duration of the	Start date	End date	Exam date	Name of the

				course				Mentor faculty
Track A: Power Systems and Power Electronics Track B: Control and Instrumentation	EE0622M1	Network Analysis	IIT Kharagpur	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof Vishal Chaudhary
	EE0622M2	Control engineering	IIT Madras	12 weeks	January 24, 2022	April 15, 2022	April 23, 2022	Dr. Vikram
Track A: Power Systems and Power Electronics	EE0622M3	Power System Engineering	IIT Kharagpur	12 weeks	January 24, 2022	April 15, 2022	April 24, 2022	Dr. Himmat Singh
	EE0622M4	Operation and Planning of Power Distribution System	IIT Guwahati	12 weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Bhavna Rathore
Track B: Control and Instrumentation	EE0622M5	Principles of Signals and Systems	IIT Kanpur	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Rahul Sagwal
	EE0622M6	Microprocessors and Microcontrollers	IIT Kharagpur	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof.Kuldeep Kumar Swarnkar

B. Tech. VIII Semester (Minor Specialization)

Course code	Course Name	Offered By	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
EE0622M1	Network Analysis	IIT Kharagpur	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof Vishal Chaudhary
EE0822M1	Analog Circuits	IIT Bombay	12 Weeks	January 24, 2022	March 28, 2022	March 27, 2022	Prof Manoj Kumar
EE0822M2	Microprocessors and Microcontrollers	IIT Kharagpur	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof.Kuldeep Kumar Swarnkar
EE0822M3	Operation and Planning of Power Distribution System	IIT Guwahati	12 weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Bhavna Rathore

Item EE 6

To review and finalize the syllabi for all ***Departmental Core (DC) Courses*** of ***VI Semester (for batches admitted in 2019-20)*** under the flexible curriculum along with their COs

Following is the list of Departmental Core (DC) courses proposed for VI Semester (Batch admitted in 2019-20). The Syllabus and course outcomes are annexed at ANNEXURE -3.

Departmental Core (DC)		
S. No	**Course Name**	**Course code**
1	Switchgear & Protection	130601
2	Electrical Engineering Materials	130602

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Item EE 7

To review and finalize the courses & syllabi to be offered ***(for batches admitted in 2019-20)*** under ***Departmental Elective (DE) Courses*** in the ***VI Semester***

Following is the list of Departmental Elective (DE) courses to be offered in conventional mode for VI Semester (Batch admitted in 2019-20).

DE-1		
S. No	**Course Name**	**Course code**
1	Computer Aided Power System Analysis	130611
2	Industrial Automation	130612
3	Transducers & Sensors	130613

The Syllabus and course outcomes are annexed at ANNEXURE -4.

Item EE 8

To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for batches admitted in 2019-20)*** in online mode under ***Departmental Elective (DE) Courses*** with credit transfer, in the ***VI Semester***

Following is the list of Departmental Elective (DE) courses to be offered from SWAYAM/NPTEL/MOOC Platforms for VI Semester (Batch admitted in 2019-20).

DE-2		
S. No	**Course Name**	**Course code**
1	**Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems**	**130656**
2	**Non-conventional energy Resources**	**130657**

Code	Name of the course	Duration of the course	Dates		Examination date	Mentor
			Start Date	End date		Name of the Mentor faculty
130656	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof. Vishal Chaudhary
130657	Non-conventional energy Resources	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Nikhil Paliwal

Item EE 9

To review and finalize the courses & syllabi to be offered ***(for batches admitted in 2019-20)*** under the ***Open Category (OC) Courses*** (in traditional mode) for ***VI semester*** students of other departments along with their COs

Following is the list of Open Category (OC) courses proposed for VI Semester (Batch admitted in 2019-20), for students of other branches. The syllabus with CO are annexed at ANNEXURE -5.

S. No	Course Name	Course code
1	Energy Conservation & Management	900103
2	Biomedical Instrumentation	900115

Item EE10

To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in VI semester ***(for batches admitted in 2019-20)***

Switchgear & Protection Lab- 130601

List of Experiments

1. To plot the characteristics & analyze the performance of under voltage relay

	2. To plot the characteristics & analyze the performance of microprocessor based over voltage relay 3. To plot the characteristics & analyze the performance of electromechanical over current relay 4. To plot the characteristics of percentage biased differential relay (Static) at different biasing 5. To plot the characteristics of percentage biased differential relay (Electro-mechanical) at different biasing 6. To test the over current relay using the relay test bench 7. To operate Motor protection simulation panel 8. To operate Feeder protection simulation panel 9. To simulate distance relay and plot the characteristic by using MATLAB 10. To simulate IDMT relay and plot the characteristic using MATLAB
Item EE11	To review and finalize the scheme and syllabi of **B. Tech.** ***IV Semester (for batches admitted in 2020-21)*** under the flexible curriculum along with their COs **Scheme & Syllabi (along with the Course Outcomes) of IV semester of the B. Tech (EE, EE-IoT) students of 2020-21 admitted batch according to the revised structure is included in ANNEXURE -6 (scheme and syllabi of B. Tech.** ***IV Semester,*** **EE) & ANNEXURE -7 (scheme and syllabi of B. Tech.** ***IV Semester,*** **EE(IoT)**
Item EE12	To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in IV ***(for batch admitted in 2020-21).*** **The Experiment list/ Lab manual for Laboratory Courses to be offered in IV (B Tech EE & B Tech EE-IoT) is discussed and finalized as annexed at ANNEXURE -8**
Item EE13	To review and finalize the suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory courses to be offered in Jan - June 2022 semester during IV Semester ***(for the batch admitted in 2020-21)***. **The Skill based mini-project' in various Laboratory Courses to be offered in IV (B Tech EE & B Tech EE-IoT) is discussed and finalized as annexed at ANNEXURE -9.**
Item EE14	To ratify the ***Scheme & Syllabi, list of experiments and skill based mini projects of First semester*** **of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS, CSD) (started from 2021-22 Session)** *{Applicable for the concerned departments}* ***N/A***
Item EE15	To ratify the ***Scheme & Syllabi, list of experiments and skill based mini projects of First Semester*** **B. Tech. programmes [admitted batch 2021-22 Session] (if any)** **As per the instructions from the competent authority, the shifting of Engineering Physics from II semester is swapped with the subject Basic Computer Engineering of I semester. The modified scheme is annexed at ANNEXURE -10.**
Item EE16	To prepare and recommend the ***Scheme & Syllabi (along with the Course Outcomes) of II semester*** **of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS, CSD) (started from 2021-22 Session)** *{Applicable for the concerned departments}* ***N/A***
Item EE17	To prepare and recommend the list of experiments and skill based mini projects of ***II semester*** **of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS, CSD) (started from 2021-22 Session)** *{Applicable for the concerned departments}* ***N/A***
Item EE18	To review and finalize the ***Scheme & Syllabi (along with the Course Outcomes) of II semester*** **B. Tech. programmes (batch admitted 2021-22 Session)** **The Scheme** ***& Syllabi (along with the Course Outcomes) of II semester*** **B. Tech. programmes (batch admitted 2021-22 Session) is reviewed and is annexed at ANNEXURE -11**

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Item EE19	To review and finalize the *list of experiments and skill based mini projects of II semester* **B. Tech. programmes (batch admitted 2021-22 Session)** **The list of experiments and skill based mini projects of II semester B. Tech. programmes (batch admitted 2021-22 Session) was reviewed & finalized. ANNEXURE -12**
Item EE20	To propose the course **"Economics Entrepreneurship & Management"** and its syllabi along with the Course Outcomes (COs) for the V Semester B.Tech. (Batch admitted 2020-21 onwards). ***{to be proposed and recommended by Management Department}*** *N/A*
Item EE21	To revise and recommend the course **"Energy, Environment, Ecology & Society"** and its syllabi along with the Course Outcomes (COs) for the III Semester B.Tech. (Batch admitted 2021-22 onwards). **{inclusion of contents related to "Sustainability" is to be done}** ***{to be proposed and recommended*** by the ***Civil Engineering Department}*** *N/A*
Item EE22	To propose a new course: **Universal Human Values & Professional Ethics (HVPE)** & its syllabi along with the Course Outcomes (COs), as Mandatory Course (MC) for the batch admitted in 2020-21onwards **{A portion on 'gender sensitization' also to be included in the syllabus of this course}*{to be proposed and recommended* by *Humanities Department}*** *N/A*
Item EE23	To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for (i) I year April–September 2021 Semester (ii) January-June 2021 Session for II to IV year students **The CO attainment for each course were computed by the respective faculty. The summary of CO attained/ not attained is given below:** **Total No of courses** | **Total No of COs** | **No of COs not attained** | **Percentage of Cos not attained** 16 | 91 | 5 | 5.5% **The gap in attainment, if any, were identified and the corrective actions to be taken were proposed by the subject faculty. The CO attainment level of the subject in the above duration are ANNEXURE -13.**
Item EE24	To review curricula feedback from various stakeholders, its analysis and impact {Stakeholder feedback analysis must also contain an action taken report (ATR) and the details/data of the stakeholder who have responded through GOOGLE form (such as Name, organization, mail id, phone no if available) must also be shared along with the feedback for the alumni/employer.} **The Feedback on curriculum is taken from the Stakeholder (students, faculty, Alumni and Employer in online mode using Moodle & google form. The analysis is carried out in the scale of 1-5. Few suggestions were received from the alumni & employer. Some of them are already are already in place. On the basis of the feedback from students, the contents of the subject Computer Aided Power System Analysis, are restructured. The feedback analysis is annexed at ANNEXURE -14.**
Item EE25	To review Course Outcomes (COs) feedback of various courses, its analysis and impact. **The CO feedback on various courses was taken from the students as a part of indirect assessment. The subject faculty reviewed and analyzed the feedback. The actions to be taken to improve t ANNEXURE -15**
Item EE 26	Any other matter: ME ISD II Semester **List of DE 2, OC 2 & Self Learning Seminar run through MPTEL/MOOC for ME (ISD) II Semester is annexed at ANNEXURE -16.**
	In the meeting, the following has been suggested by the external members: 1. In subject Switchgear & Protection the following contents should be included:

- PLC based protection system
- IEC 61850 protocol for SCADA
- Practical on numerical relay, if possible

2. In the subject Electrical Engineering Materials, nanomaterial should also be included.
3. It was suggested that there should be a subject in VIII Semester (Final Year) on Safety & Industrial Quality standards like ISO Quality System, Project management
4. The Introduction of Renewable Energy Lab in IV Semester is highly appreciated.
5. The Introduction of Python Programming Lab in IV Semester is highly appreciated.
6. The efforts of Institute to develop MOOCs are appreciated.

Dr. L. Srivastava	Dr. M. Pandit	Dr. A.K. Wadhwani	Dr. S. Wadhwani	Prof. Ashish Patra
Dr. Shishir Dixit	Prof. Rakesh Narvey	Dr. Himmat Singh	Dr. Vijay Bhuria	Prof. Kuldeep Swarnkar
Prof. Praveen Bansal	Prof. Vishal Chaudhary	Dr. Vikram	Dr. Ankit Tiwari	Prof. Saurabh K Rajput
Prof. Bhavna Rathore	Prof. Nipun Gupta	Prof. Rahul Sagwal	Prof. Manoj Kumar	Dr Hemlata Shakya

Detail of Annexure

Annexure	Item	Details	Page No.
1	Item EE 1	To propose the **scheme structure of VIII Semester** with the provision of Two Departmental Electives and one Open Category (OC)Course**, to be offered in online mode** with credit transfer for the batch admitted in 2018-19.	11
2	Item EE 4	To propose the course and syllabi of MITS MOOC Course along with the Course Outcomes for credit transfer in the VIII Semester under the flexible curriculum (Batch admitted in 2018-19)	13-14
3	Item EE 6	To review and finalize the syllabi for all **Departmental Core (DC) Courses** of **VI Semester (for batches admitted in 2019-20)** under the flexible curriculum along with their COs	16-20
4	Item EE 7	To review and finalize the courses & syllabi to be offered **(for batches admitted in 2019-20)** under **Departmental Elective (DE) Courses** in the **VI Semester**	22-29
5	Item EE 9	To review and finalize the courses & syllabi to be offered **(for batches admitted in 2019-20)** under the **Open Category (OC) Courses** (in traditional mode) for **VI semester** students of other departments along with their Cos	31-32
6	Item EE 11	To review and finalize the scheme and syllabi of **B. Tech. IV Semester Electrical Engineering (for batches admitted in 2020-21)** under the flexible curriculum along with their COs	34-39
7	Item EE 11	To review and finalize the scheme and syllabi of **B. Tech. IV Semester EE-IoT** (for batches admitted in 2020-21) under the flexible curriculum along with their COs	41-44
8	Item EE 12	To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in IV **(for batch admitted in 2020-21).**	46-49
9	Item EE 13	To review and finalize the suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory courses to be offered in Jan - June 2022 semester during IV Semester **(for the batch admitted in 2020-21).**	51-52
10	Item EE 15	To ratify the Scheme & Syllabi, list of experiments and skill based mini projects of First Semester B. Tech. programmes [admitted batch 2021-22 Session] (if any)	54-55
11	Item EE 18	To review and finalize the **Scheme & Syllabi (along with the Course Outcomes) of II semester B. Tech. programmes (batch admitted 2021-22 Session)**	57-66
12	Item EE 19	To review and finalize the **list of experiments and skill based mini projects of II semester B. Tech. programmes (batch admitted 2021-22 Session)**	68-73
13	Item EE 23	To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for (i) I year April–September 2021 Semester (ii) January-June 2021 Session for II to IV year students	75-78
14	Item EE 24	To review curricula feedback from various stakeholders, its analysis and impact	80-83
15	Item EE 25	To review Course Outcomes (COs) feedback of various courses, its analysis and impact.	85
16	Item EE 26	Any other matter: ME ISD II Semester **List of DE 2, OC 2 & Self Learning Seminar run through MPTEL/MOOC annexed at ANNEXURE -16**	87

Annexure-1

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Department of Electrical Engineering

Scheme of Examination

B.Tech. VIII Semester (Electrical Engineering)

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted					MOOC		Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Term Work							
								Lab Work & Sessional	Assignment	Exam		L	T	P	
1.	130851, 130855	DE	DE* (DE-5)	-	-	-	-	-	25	75	100	2	1	-	3
2.	130861, 130862,	DE	DE* (DE-6)	-	-	-	-	-	25	75	100	2	1	-	3
3.	900607, 900312	OC	OC* (OC-4)	-	-	-	-	-	25	75	100	2	-	-	2
4.	130801	DLC	Internship/ Project	-	-	-	250	150	-	-	400	-	-	6	3
5.	130802	-	Professional Development#	-	-	-	-	50	-	-	50	-	-	2	1
			Total	-	-	-	250	200	75	225	750	6	2	8	12
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of (i) Honours in parent discipline or (ii) Honours with Minor Specialization in engineering discipline other than the parent discipline.												

*All of these courses will run through SWAYAM/ NPTEL/ MOOC

#Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG program (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs & technical events)

DE-5 *(SWAYAM/NPTEL/ MOOC)		DE-6 *(SWAYAM/NPTEL/ MOOC)		OC-4**(SWAYAM/NPTEL/ MOOC) (For students of other branches)	
130851	Introduction to Internet of Things	130861	Introduction to Soft Computing	900607	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems
130855	Power System Dynamics, Control and Monitoring	130862	Non-conventional Energy Resources	900312	Non-Conventional Energy Resources

Annexure-2

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Department of Electrical Engineering

MITS MOOC-1

Introduction to Robotics :130856

(MOOC being developed by Dr. Vikram)

Type of Course: UG
Course Duration:08 weeks

Course Outline:

This course is an introductory course for students from various disciplines to get the basic understanding of robotics and its components.

Course Plan:

Week 1: Introduction to Robotics- History, Growth; Robot applications, Laws of Robotics

Week 2: Robot Mechanisms; Kinematics- Coordinate Transformations, DH parameters

Week 3: Forward Kinematics: Kinematic equations, Jacobian matrix.

Week 4: Inverse Kinematics: Kinematic equations, Jacobian inverse technique

Week 5: Jacobians, Singularity, Lagrangian Euler Dynamics

Week 6: Actuators (Electrical)- DC motors, BLDC Servo Motors

Week 7: Sensors, Sensor Integration

Week 8: Basic Control System, Feedback control

Course Outcomes:

After the successful completion of the course the students will be able to:

1. Explain the fundamentals of robotics and its components
2. Describe the Kinematics of robotics
3. Describe the Dynamics of robotics.
4. Design the control of robotic joints.
5. Explain sensors and actuators in robotics

Recommended Books:

1. Robert J Schilling, Fundamentals of Robotics, Prentice Hall India, 2003
2. John J Craig, Introduction to Robotics, Prentice Hall International, 2005.
3. Richard David Klafter, Robotics Engineering.

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Department of Electrical Engineering

MITS MOOC-2

Nature Inspired Intelligent Computational Techniques: 130863/900

(Course to be offered in VIII Semester Open Category (MOOC to be developed by Dr. M. Pandit)

Type of Course: UG/PG

Course Duration: 08 weeks

Course Outline:

This course is an introductory course for students from various disciplines to get the basic understanding of Nature Inspired Intelligent Computational Techniques

Course Plan:

Week 1: Introduction to soft computing, artificial and biological neural network, Characteristics of Artificial Neural Network (ANN), concepts and classification, single and multilayer perceptron model, application areas, steps for practical application.

Week 2: Classification of learning algorithms, supervised, unsupervised, reinforcement and competitive learning. Training and testing phases, comparison and examples.

Week 3: Introduction to fuzzy sets and operations, fuzzy relations, membership functions, fuzzification & defuzzification, examples

Week 4: Fuzzy rule based systems, fuzzy decision making and inference system (FIS), Mamdani and Takagi-Sugeno fuzzy methods, fuzzy controller

Week 5: Evolutionary versus traditional optimization methods, Classification of optimization problems, local and global optimization. Genetic algorithm (GA) concepts and working principle

Week 6: Construction of fitness function, reproduction, crossover and mutation operators in binary coded and real coded Gas, Swarm Intelligence, popular swarm intelligence algorithms and their analogy with nature

Week 7: Particle Swarm Optimization (PSO), and artificial bee colony (ABC) algorithm, population update mechanism of the above nature inspired evolutionary optimization techniques, Determination of mean and standard deviation of population, Introduction to hybrid evolutionary techniques

Week 8: Selection of suitable algorithm for different problems, pseudocode/coding steps of Particle Swarm Optimization and Differential evolution with examples, Comparison of PSO, GA, DE with traditional solvers, need for statistical analysis of results, convergence/stopping criterion exploration and exploitation, development of hybrid algorithms

After completion of the course the student will be able to

- **CO1** **Define** the optimization problem, paradigms of soft computing, neural network models, fuzzy logic operators
- **CO2** **Classify** optimization algorithms and the fuzzy and evolutionary modeling methods mentioned above
- **CO3** **Apply** the neural, fuzzy and evolutionary techniques for solving simple, complex and Constrained /unconstrained optimization problems
- **CO4** **Analyze** the operations and algorithms used for solving practical optimization problems using classical and evolutionary algorithms
- **CO5** **Select** the most appropriate model for solving real-world optimization problems
- **CO6** **Develop** models using neural network, fuzzy logic, genetic algorithm, particle swarm optimization and traditional optimization algorithms

Reference Books: -

1. P.D. Wasserman: Neural Computing Theory and Practice, Van Nostrand Reinhold, New York, 1989.
2. B. Yegnanarayana: Artificial Neural Networks, PHI Learning Pvt. Ltd., 14-Jan-2009
3. Fu Limin: Neural Networks in Computer Intelligence, Tata McGraw-Hill Education, 01-Apr-2003
4. S.N. Sivanandam, S. Sumathi and S.N. Deepa: Introduction to Neural Networks using Matlab 6.0, Tata McGraw-Hill, 2006
5. S. Rajasekaran and G.A. Vijayalakshmi Pai: Neural Networks, Fuzzy Logic and Genetic Algorithms, Synthesis and applications, PHI Learning Pvt. Ltd.,2003
6. N.P. Padhy: Artificial Intelligence and Intelligent Systems, Pearson, 2005
7. S.N. Sivanandam, S. Sumathi and S.N. Deepa: Introduction to Fuzzy Logic using Matlab, Springer nature, 2007
8. K. Deb: Optimization for Engineering Design: Algorithms and Examples, PHI, Private limited, 1995
9. K. Deb: Multiobjective Optimization using Evolutionary Algorithms, John Wiley and Sons, 2003
10. by S.N Sivanandanam and S. N.Deepa, Principles of Soft Computing, Second Edition, Wiley India, 2011
11. Fuzzy Sets & Fuzzy logic (Theory & Applications) By G.J.Klir and Boyuan, PHI-2001

Annexure-3

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Scheme of Examination

B.Tech. VI Semester (Electrical Engineering)

S. No	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOC						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional	Assignment	Exam		L	T	P	
1.	130601	DC	Switchgear & Protection	70	20	10	30	20	-	-	150	2	1	2	4
2.	130602	DC	Electrical Engineering Materials	70	20	10	-	-	-	-	100	4	-	-	4
3.	130611/130612/130613 (Any One)	DE	DE-1	70	20	10	-	-	-	-	100	4	-	-	4
4.	130656/130657 (Any One NPTEL course)	DE	DE*-2	-	-	-	-	-	25	75	100	4	-	-	4
5.	(From Another department)	OC	OC-1	70	20	10	-	-	-	-	100	2	1	-	3
6.	100007	MC	Disaster Management	70	20	10	-	-	-	-	100	3	-	-	3
7.	130603	DLC	Minor Project-II	-	-	-	50	50	-	-	100	-	-	4	2
			Total	**350**	**100**	**50**	**80**	**70**	25	75	**750**	**19**	**2**	**6**	**24**
Summer Internship-III (On Job Training) for Four weeks' duration: Evaluation in VII Semester															
Additional Courses for obtaining Honours/ Honours with Minor Specialization by desirous students				Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization											

*This course run through SWAYAM/NPTEL/ MOOC platform

DE-1			DE-2 (SWAYAM/NPTEL/ MOOC platform)		Open Category (OC-1) [for other department]	
130611	Computer Aided Power System Analysis		130656	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems	900103	Energy Conservation & Management
130612	Industrial Automation		130657	Non-conventional energy Resources	900115	Biomedical Instrumentation
130613	Transducers & Sensors					

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Switchgear and Protection: 130601

Course Objectives:

- To familiarize the students with the learn standard terms and definitions
- To expose the student to the need for protection and various protective devices, their construction, operating principle, torque equation, characteristics and field of application for different types of equipment to identify reasons for mal operation and their remedies

Unit I. Arc Interruption: Arc properties, Formation and extinction of arc, Restrikingand recovery voltage RRRV, different methods and control devices for arc extinction, Current chopping, Interruption of capacitive currents, Resistance switching. Type and classification of circuit breakers. Oil circuit breaker.

Unit II. Air blast and SF6 circuit breakers: Vacuum circuit breakers, duties and rating Maintenance and testing of OCB 's. Isolators, HRC fuse. Protective Relays: introduction, Definition of terms associated with protective relaying. Construction and characteristics of electromagnetic relays.

Unit III. Elements of static relays: Comparator, induction, distances and differential relays, microprocessor based relays. Modern trends in power system protection, Auto reclosure, under and over frequency relays and their applications. Digital Protection. Numerical protection Introduction, block diagram of numerical relay, numerical over current protection.

Unit IV. Protection schemes: Protection of generators and transformers, percentage differential relay, Buchholz relay, different protections provided for generator and transformer, transmission line protection using over current relays, distance relays and carrier current protection, protection of motors and bus bars.

Unit V. Protection against Over Voltages: Power System transients, over voltage in transmission lines, fault clearance and lightning and switching surges, ground wire, lightning arrestors, basic impulse insulation level(BIL), insulation coordination, grounding of P.S. current limiting reactors, their uses and location protection against traveling waves.

Recommended Books:

1. Switchgear protection and power systems by Sunil S. Rao, Khanna publication, 13th edition, 2008.
2. Power system protection & Switchgear by Badriram, TMH publication, 2nd edition, 2011.
3. Switchgear and protection by Ravindranath and Chander, Newage publication, 2nd edition, 2012
4. Switchgear and protection by Deshpande , TMH Publication, 2004
5. Digital Protection by L.P. Singh New Age Publication, 2nd edition, 1997.

Course Outcomes:

After completing this course, the students will be able to:

CO 1. Explain the concepts, theories and features associated with protective relays and circuit breakers

CO 2. Classify relays and circuit breakers based on criteria such as construction, type of supply, working principle, actuating quantities

CO 3. Select relays and circuit breakers for specific equipments and applications

CO 4. Design protection schemes for generators, motors, transformers and transmission lines

CO 5. Analyze the behavior and performance of relays under different loading levels and faults

CO 6. Select the protective devices and their locations for protecting power systems against over voltages.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Switch Gear & Protection Lab- 130601

List of Experiments

1. To plot the characteristics & analyze the performance of under voltage relay
2. To plot the characteristics & analyze the performance of microprocessor based over voltage relay
3. To plot the characteristics & analyze the performance of electromechanical over current relay
4. To plot the characteristics of percentage biased differential relay (Static) at different biasing
5. To plot the characteristics of percentage biased differential relay (Electro-mechanical) at different biasing
6. To test the over current relay using the relay test bench
7. To operate Motor protection simulation panel
8. To operate Feeder protection simulation panel
9. To simulate distance relay and plot the characteristic by using MATLAB
10. To simulate IDMT relay and plot the characteristic using MATLAB

Course Outcomes:

After completing the lab course the students will be able to: -

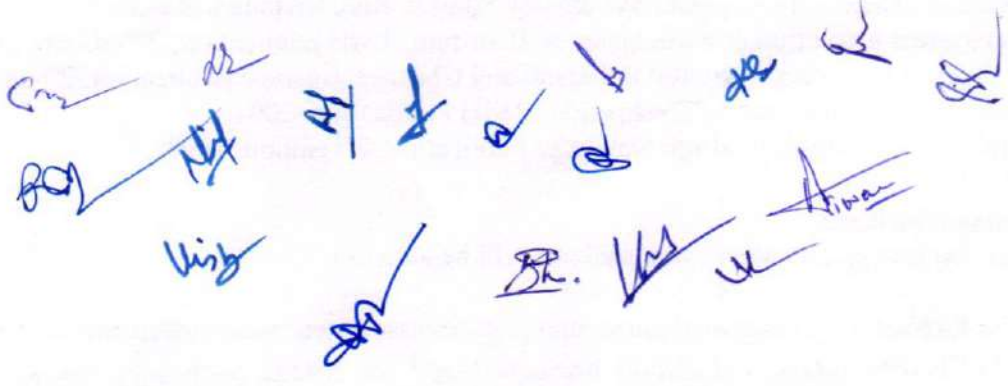
CO 1. **Operate** the Over/Under voltage & over current relays and observe the performance for different settings

CO 2. **Analyze** the effect of time and current settings on the operating characteristics of an Inverse Definite Minimum Time (IDMT) relay

CO 3. **Validate** the characteristics of percentage biased differential relay for different bias settings

CO 4. **Prepare** an organized written report.

CO 5. **Develop** the ability to work is team and learns professional ethics.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Electrical Engineering Materials: 130602

Course Objective: The Objective is to familiarize the students with different types of materials and their use in the field of Electrical Engineering.

Unit I. Conducting Materials: The conductivity of metals and alloys, Generals properties, Classification of conducting materials, Low resistivity and high resistivity materials, their properties and applications, Electrical and mechanical properties and applications of Cu, Al, Steel, Brass, Bronze, ACSR conductor , AAAC conductor , Tungsten, Molybdenum, Platinum, mercury, lead, manganin, alloys for application in resistances, lamps and electric furnaces, soldering materials, metals and Alloys for fuses, contact materials and their applications, Graphite materials, its properties and application, superconductivity and its applications.

Unit II. Semiconductor Materials: Classification of materials based on atomic structure, conductors, insulators and semiconductors, Electron energy and energy band theory, Excitation of atoms, Semiconductor materials, Intrinsic semiconductors, Extrinsic semiconductor, N type materials, P type materials, minority and majority carriers. Formation of PN junction by alloying, Merits of semiconductor materials for use in electrical Engg, Factors affecting semiconductors, application of semiconductor materials, Hall effect with mathematical treatment.

Unit III. Magnetic Materials: Different terms associated with magnetic materials. Classification of magnetic materials, Diamagnetic, Paramagnetic and ferromagnetic materials, Curie point, Magneto striction, electromagnet and its uses, Magnetization curve, Hysteresis and eddy current loss, Soft and hard magnetic materials, their properties and applications, alloying silicon to steel, its advantage and disadvantages, requirements of magnetic materials for use in Electrical machines, Grain oriented sheet steel, Magnetic anisotropy, Spontaneous magnetization.

Unit IV. Dielectric materials: Behaviour of dielectrics in static and alternating fields, effect of a dielectric on the behaviour of a capacitor , polarization, Dielectric constant of mono atomic gases, ionic polarization, Dipolar polarization, internal fields in solids and liquids, Polaris ability catastrophe, Frequency dependence of electronic polarization, permittivity, ionic polarization, dielectric losses, significance of the loss tangent dipolar relaxation, frequency and temperature dependence of the dielectric constant of polar dielectric, Ferro electricity, piezoelectricity.

Unit V. Insulating materials: General electrical, mechanical, thermal and chemical properties of insulating materials, classification of insulating materials on the basis of temperature rise. Gaseous insulating materials properties and application of nitrogen, liquid insulating materials, their main features, Transformer oil, testing the dielectric strength of transformer oil, Fibrous insulating materials, insulating textiles, impregnated fibrous insulating materials, Insulating resins, Classification of synthetic resins (Plastics), thermosetting and thermoplastic resins, adhesives, varnishes and other insulating materials such as mica, ceramic, Bakelite, Ebonite glass, PVC, Rubber.

Recommended Books:

1. A text book of Electrical Engineering materials by P.L. Kapoor, Khanna Publication
2. Electrical Engineering materials by A.J. Dekker , PHI
3. An introduction to Electrical Engineering materials by C.L. Indulkar,S. Thiravengadam, S. Chand & Co.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Electrical Engineering Materials: 130602

Course Outcomes:

After completing this course the student will be able to:

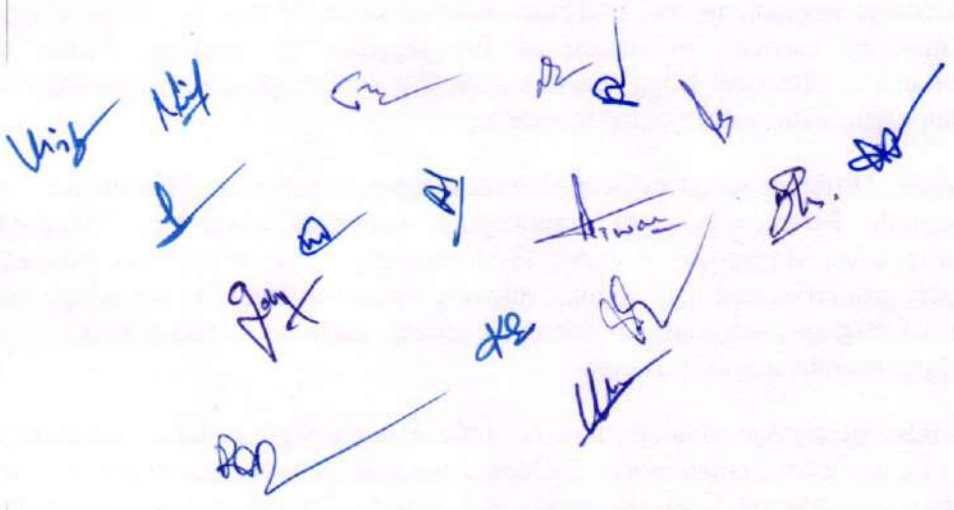
CO 1. Describe properties and applications of conducting materials

CO 2. Explain behavior of semiconductor materials, their classification and applications.

CO 3. Explain application of magnetic materials, different terms, classification, hysteresis and eddy current losses.

CO 4. Explain dielectric materials, their behavior in different fields, polarization and dielectric losses

CO 5. Select appropriate material depending upon specific requirement



Annexure-4

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Computer Aided Power System Analysis :130611 (New)

w.e.f. January 2022

Course Objectives:

- To familiarize the students with the engineering and economic aspects of planning, operation & control of power generation and transmission systems.
- To provide the basic understanding of Artificial Neural Networks and their applications in power system.

Unit I: Unit Commitment and Economic Dispatch: Introduction to unit commitment, statement of unit commitment problem, priority list method, forward dynamic programming, formulation of economic dispatch problem, input-output cost characterization, incremental cost curve, coordination equations with and without loss, solution by direct method and lambda iteration method.

Unit II: Active and Reactive Power Control: Turbine and speed-governors, Droop control laws, real power balance and its effect on system frequency, Concept of reactive power and its effect on voltage; Generation control loops, Load frequency control, AGC, tie-line bias control, AGC in isolated and interconnected power systems, AGC with economic dispatch, Static VAR systems and their application in power system.

Unit III: Flexible AC Transmission System: Emergence of FACTS, FACTS control considerations, FACTS controllers-Series, Shunt, Series-Shunt, Principe and operation of shunt compensator, SVC, TCS, STATCOM etc, Principles and operation of static series compensator-TCSC and TSSC, SSSC etc., UPFC-principles and operation

Unit IV: Power System Security: An over view of Power System security, Functions of Operations Control Centre: System monitoring (Normal, Alert, Emergency, Extremis states of a Power System), Contingency Analysis, Security constrained Optimal Power Flow, Factors affecting power system security, Linear sensitivity factors, Application of AC/DC power flow methods, Contingency selection.

Unit V: Applications of Artificial Neural Networks in Power System: Introduction to Artificial neural network (ANN), Types of artificial neural networks, Feed-forward and Feedback ANNs, training and testing of ANNs, Training set generation, ANN applications to power system problems: load forecasting, fault detection, economic load dispatch and voltage security & stability etc.

Recommended Books:

1. Modern Power System Analysis by I.J. Nagrath and D.P. Kothari, Tata McGraw-Hill, 4th ed. 2011.
2. Power System Stability and Control by P. Kundur, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Electric Energy Systems theory –An introduction by Olle. I. Elgerd, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2nd ed. 2004.
4. FACTS Controllers in Power Transmission and Distribution, K. R. Padiyar, New Age International Publications, 1st Edition, 2009
5. Power Generation, Operation and Control by Allen. J. Wood and Bruce F. Wollenberg, John Wiley & Sons, Inc., 2006.
6. Power System Analysis Operation and Control by Abhijit Chakrabarti and SunitaHalder, PHI learning Pvt. Ltd., New Delhi, 3rd ed. 2010.
7. Neural computing Theory and Practice by P.D. Wasserman, Coriolis Group, 1989.

8. Introduction to neural networks using Matlab 6.0 by S.N. Sivanandam, S. Sumathi and S.N. Deepa, Tata McGraw Hill Education Pvt. Ltd., New Delhi 2006.

Course Outcomes

After the completion of this course, students will be able to:

CO1 **Explain** unit commitment and different methods for Solving UC problem

CO2 **Apply** direct method and lambda iteration method for solving economic dispatch problem

CO3 **Discuss** the concept of active and reactive power, control of active power and reactive power through FACTs

CO4 **Solve** the AGC problem in isolated and interconnected power systems

CO5 **Describe** Operations Control Centre functions, System monitoring and Contingency Analysis.

CO6 **Describe** various types of ANN and their applications to power system.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Computer Aided Power System Analysis :130611 (Old)

Course Objectives:

- To familiarize the students with the engineering and economic aspects of planning, operation & control of power generation and transmission systems.
- To provide the basic understanding of Artificial Neural Networks and their applications in power system.

Unit I: Unit Commitment and Economic Dispatch: Introduction to unit commitment, statement of unit commitment problem, priority list method, forward dynamic programming, formulation of economic dispatch problem, input-output cost characterization, incremental cost curve, coordination equations with and without loss, solution by direct method and lambda iteration method.

Unit II: Reactive Power Control: Concept of reactive power, control of active power and reactive power - active power and frequency control, flow of reactive power, real power balance and its effect on system frequency; Static VAR systems and their application.

Unit III: Automatic Generation Control (AGC): Frequency dependence of loads, Turbine and speed-governors, Droop control and power sharing, Generation control loops, Load frequency control, AGC, tie-line bias control, AGC in isolated and interconnected power systems, AGC with economic dispatch.

Unit IV: Power System Security: An overview of Power System security, Functions of Operations Control Centre: System monitoring (Normal, Alert, Emergency, Extremis states of a Power System), Contingency Analysis, Security constrained Optimal Power Flow, Factors affecting power system security, Linear sensitivity factors, Application of AC/DC power flow methods, Contingency selection.

Unit V: Applications of Artificial Neural Networks in Power System: Introduction to Artificial neural network (ANN), Types of artificial neural networks, Feed-forward and Feedback ANNs, training and testing of ANNs, Training set generation, ANN applications to power system problems: load forecasting, fault detection, economic load dispatch and voltage security & stability etc.

Recommended Books:

1. Modern Power System Analysis by I.J. Nagrath and D.P. Kothari, Tata McGraw-Hill, 4th ed. 2011.
2. Power System Stability and Control by P. Kundur, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Electric Energy Systems theory –An introduction by Olle. I. Elgerd, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2nd ed. 2004.
4. Power Generation, Operation and Control by Allen. J. Wood and Bruce F. Wollenberg, John Wiley & Sons, Inc., 2006.
5. Power System Analysis Operation and Control by Abhijit Chakrabarti and SunitaHalder, PHI learning Pvt. Ltd., New Delhi, 3rd ed. 2010.
6. Neural computing Theory and Practice by P.D. Wasserman, Coriolis Group, 1989.
7. Introduction to neural networks using Matlab 6.0 by S.N. Sivanandam, S. Sumathi and S.N. Deepa, Tata McGraw Hill Education Pvt. Ltd., New Delhi 2006.

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Department of Electrical Engineering

Computer Aided Power System Analysis (130611)

Course Outcomes

After the completion of this course, students will be able to:

CO1	**Explain** unit commitment and different methods for Solving UC problem
CO2	**Apply** direct method and lambda iteration method for solving economic dispatch problem
CO3	**Discuss** the concept of reactive power, control of active power and reactive power and SVC
CO4	**Solve** the AGC problem in isolated and interconnected power systems
CO5	**Describe** Operations Control Centre functions, System monitoring and Contingency Analysis.
CO6	**Describe** various types of ANN and their applications to power system.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Industrial Automation (130612)

Course Objective:

- To familiarize the students with the Industrial aspects of automation, planning and model making
- To provide the understanding of the control of a different PLCs and their applications in various low ,medium and high power drives
- To expose the students to understand various sensors, transducers and data acquisition systems and IoT

Pre-requisite: Basics of Power Electronics, digital electronics and Electrical Drives

Unit I: Introduction: Overview of industry environment, Different type of switches & their operation, Architecture of industrial automation system, Relay and contactor logic, AC and DC relays and their role for load control. Review of starters: Power and Auxiliary contactors and their usage for load control. Overview of standards (BIS, ISO) & star and delta starters and their rating.

Unit II:Sensors: Temperature& speed Measurement, Humidity,Pressure, Force and Torque Sensors, Motion Sensing(speed sensor), proximity sensor, Signal Conditioning, Data Acquisition Systems,Characteristics of Sensors and control logic, control using potential free output sensors, linear potentiometer timer hardware architecture, Controlling industrial system using timers and counters (case study)

Unit III:Industrial Drives: AC & DC Drive basics, Electrical specifications and hardware architecture .AC drive and AC motor specification matching (sizing of drive),Load characteristics and its types, Servo Drives Stepper motor drive and VFD(Variable frequency drives) drives.AC drive power wiring and Interfacing input and output signals. Energy Savings with Variable Speed & multi motor Drives. Braking motoring and regenerative operation of drives Selection of power, motor and signal cables for AC drive application. Heat management of Drives, Drives protection

Unit IV: Programmable Logic Controllers: Programmable controllers, Programmable logic controllers, Analog/Digital input and output modules, PLC programming, Ladder diagram, Sequential flow chart, PLC Communication and networking, PLC selection, , Advantage of using PLC for Industrial automation, Application of PLC to process control industries.Different types of Network Communication Protocol, DH-485, Ethernet, Device Net, Control Net, Modbus, Profibus Proprietary Protocol, open Protocol.

Unit V: Automatic Control: Introduction to P-I-D Control, manual and auto PID Control Tuning, Feed forward Control Ratio Control, Time Delay Systems and Inverse Response Systems, PWM control in drives.

Recommended Books:

1. Lingefeng Wang, Kay Chen Tan,"Modern Industrial Automation and Software Design" John Wiley & Sons Inc.
2. K. L.S. Sharma, "Overview of Industrial Process Automation", Elsevier
3. KokKiong"Drives and Control for Industrial Automation", Springer
4. John Webb, "Programmable Logic Controllers Principles & Applications", PHI
5. John G. Webster,"The Measurement, Instrumentation and Sensors Handbook", CRC Press.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Industrial Automation (130612)

Course Outcomes:

After completing the course, the students will be able to:

CO1 **Analyse** architecture of industrial automation system
CO2 **Select** appropriate sensors
CO3 **Acquire** PLC knowledge
CO4 **Acquire** the knowledge of PID control technique
CO5 **Develop** small application using PLC & transducer,
CO6 **Compare** AC and DC drives for particular applications.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Transducers & Sensors (130613)

Course Objective:

- To make students familiar with the constructions and working principle of different types of sensors and transducers.
- To make students aware about the measuring instruments and the methods of measurement and the use of different transducers.

Unit I: Mechanical and Electromechanical transducer & sensor:

Principle of sensing & transduction, classification, Resistive (Potentiometric type): Strain gauge:. Inductive Transducer: Reluctance change type, Mutual inductance change type, transformer action type, Magnetostrictive type, LVDT: Proximity sensor

Unit II: Capacitive transducers & sensors:

Variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth, type and cylindrical type, variable dielectric constant type, Stretched diaphragm type: microphone, Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, force & stress sensing, ultrasonic sensors.

Unit III: Thermal transducers & sensors:

Solid, liquid, gas &vapour, Resistance change type: RTD materials, tip sensitive & stem sensitive type, ThermisterThermoemf sensor: types,Junction semiconductor type IC and PTAT type. Radiation sensors: types, characteristics and comparison. Pyroelectric type.

Unit IV: Magnetic transducers & sensor:

Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive cell types, Geiger counters, Scintillation detectors, Introduction to smart sensors

Unit V: Smart Sensors:

Architecture of Smart Sensors: Features, Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography, Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel Selection of Sensors for Practical Applications, Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor

Recommended Books:

1. Sensor & transducers, D. Patranabis, 2nd edition, PHI
2. Instrument transducers, H.K.P. Neubert, Oxford University press.
3. Measurement systems: application & design, E.A.Doebelin, Mc Graw Hill
4. Electronics and Electrical Measurements & Instrumentation, J.B.Gupta, S.K.Kataria& Sons.
5. A Course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney Dhanpat Rai & Co.
6. Transducers and Instrumentation by D.V.S. Murty.

Course Outcomes:

After completing the course, the students will be able to:

CO1 **Describe** the converting principle of a physical parameter into an electrical quantity
CO2 **Classify** transducers for measurement of temperature, strain, motion, position and light
CO3 **Choose** proper sensor to make sensitive measurements of physical parameters like displacement, force, pressure, temperature, acceleration etc.
CO4 **Predict** correctly the expected performance of various sensors
CO5 **Identify** different type of sensors used in real life applications and paraphrase their importance

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Annexure-5

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Energy Conservation &Management: 900103

Course Objectives:

To familiarize the students to the concepts of Energy Audit, various terminology, rules and regulations, policy, energy economics, energy tariff, analysis techniques and energy conservation.

Unit I: Energy Scenario: Classification of Energy, Indian energy scenario, energy needs of growing economy, long term energy scenario, energy conservation and its importance, Energy conservation Act 2001 and its features, Schemes of Bureau of Energy Efficiency (BEE) including Designated consumers, Electricity Acts, National action plan on climate change.

Unit II: Energy Sources & conservation: Conventional &Non-Conventional sources of energy, Renewable &non-renewable source of energy, Various methods of energy Conservation, Generation of Electrical Energy using non-conventional Sources.

Unit III: Energy Audit: Introduction, Energy Audit- Need, Scope, Methodology, Types of Energy Audit, Energy Flow Diagram, Baseline data for energy audit, Instruments for energy auditing. Sankey Diagram, Questionnaire for energy audit, Preparations & presentations of energy audit reports, Functions of Energy Auditor

Unit IV: Energy Management: Definition and objective of energy management, General Principles of energy Management, Energy Management Approach, Energy supply side Management, Management of energy distribution, Functions of energy management team.

Unit V: Energy Economics: Introduction, Parameters for energy economics, Energy Tariff, Economic Analysis Technique- Simple payback period, Discounted Cash Flow Method or Time Audited Technique (Net present value NPV, Present value index method PI, Internal rate of return Method IRR), Return on Investment (ROI).

Recommended Books:

1. Energy Management by W. R. Murphy, G. A. Mckay, Butterworth, 2nd ed., 2009.
2. Energy Management Principles by C.B. Smith, Pergamon Press, 2nd ed., 2015.
3. Electrical Energy Conservation & Utilization by S.C. Tripati, McGraw Hill Edu. India, 1st ed., 1980.
4. Non-Conventional Energy Resources by N. K. Bansal, Laxmi Publication, 1st ed., 2014.
5. Energy Management Hand book by W.C. Turner, John Wikey& Sons, 6th ed., 2006.
6. Energy Conservation guide book by Pattrick, Prentice Hall, 1st ed. 1993.

Course Outcomes:

After the completion of the course, the students will be able to –

- **CO1** **Explain** the basic concepts of Energy Audit & its various terminologies, rules and regulations, policy and how to write reports.
- **CO2** **Discuss** the conventional and non-conventional energy technologies
- **CO3** **Describe** different energy auditing methods and the implementation procedures
- **CO4** **Identify** present scenario of energy utilization, management and corresponding ACT of regulatory commission
- **CO5** **Apply** energy tariff and power factor improvements to achieve energy efficient systems.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Biomedical Instrumentation: 900115

Course Objectives: To introduce students to the basic biomedical engineering technology and different biological signals, their acquisition, measurements and related constraints.

Unit I: Introduction to Biomedical Electrodes & Transducers: Development of biomedical instrumentation, Man-Instrument System, Problems Encountered in Measuring a Living System, transducers for biomedical applications; origin of biopotential and its propagation, sources of bioelectric potentials, electrocardiogram, electro encephalogram, electromyogram and other bioelectric potentials. Biopotential Electrodes, the nervous system, Instrumentation for sensory measurements.

Unit II: Cardiovascular System & Measurement: The Cardiovascular system, ECG lead configuration, ECG recording, (Einthoven Triangle) Mechanical & electrical Activity of the Heart, electrocardiography, measurement of blood pressure, blood flow and cardiac output, plethysmography, heart sounds, pacemakers and defibrillators.

Unit III: Measurements in the Respiratory System: Respiratory Mechanism, measurements of gas volume, flow rate, carbon dioxide and oxygen concentration in exhaled air, respiration controller, spirometer, respiratory therapy equipments, inhalators, ventilators & respirations, humidifiers, nebulizers &Aspirators.

Unit IV: Patient Care, Monitoring and Safety: Elements of intensive care, Monitoring, Hospital System & components, Electrical safety of patients & medical equipment, physiological effects of electric current, shock hazards from equipments, Patient care and monitoring: elements of intensive care unit, safety measures.

Unit V: Noninvasive Diagnostic Instrumentation : Ultrasonic Waves and Ultrasonic Vibrations , Propagation, Acoustic Intensity, Applications, Super Imposition, Potential Health Hazard,Measurement of Velocity, Ultrasonic Scanning techniques for bone fracture detection, Applications, Comparison between X-rays and ultrasonic scanning, Applications, Ultrasonic Cleaning, digital radiography Medical Imaging equipments Method.

Recommended books:

1. Biomedical Instrumentation and Measurement by Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 2nd ed., 1980.
2. Biomedical Instrumentation: Technology and Applications by Raghbir Singh, McGraw-Hill Education, 1st ed., 2004.
3. Medical Instrumentation for Health Care by Leslie Cromwell, Prentice Hall, 1sted, 1976.
4. Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation by Robert B. Northrop, CRC Press, 2nd ed., 2012.
5. Introduction to Bioinstrumentation: With Biological, Environmental, and Medical Application by Clifford D. Ferris, 2nd ed., 1978.
6. Clinical Neurophysiology, U K Mishra, Elsevier.

Course Outcomes:

After completing this course, the students will be able to:

CO 1. Describe the origin of bio potentials and the role of bio potential electrodes & transducers

CO 2. Analyze common biomedical signals and distinguish characteristic features;

CO 3. Describe the physical and medical principles used as a basis for biomedical Instrumentation

CO 4. Explain measurement principles for blood flow, pressure and volume and respiratory variables

CO 5. Identify the patient safety issues related to biomedical instrumentation

CO 6. Explain the different ultrasonic scanning & medical imaging systems

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Annexure-6

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Scheme of Examination

B.Tech. (Electrical Engineering) IV Semester

For batches admitted in academic session 2020 – 2021 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project							
				End Term Evaluation	$Proficiency in subject /course												
1.	100013	BSC	Engineering Mathematics –III	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	130411	DC	Digital Electronics & Microprocessor	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
3.	130412	DC	Electrical Machines-I	50	10	20	20	60	20	20	200	2	1	2	4	Offline	PP
4.	130413	DC	Power System-I	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
5.	100004	MC	Cyber Security	50	10	20	20	-	-	-	100	2	1	-	3	Online	MCQ
6.	130414	DLC	Programming with Python	-	-	-	-	60	40	-	100	-	-	2	1	Offline	SO
7.	130415	DLC	Renewable Energy Lab	-	-	-	-	60	40	-	100	-	-	2	1	Offline	SO
8.	200xxx	CLC	Novel Engaging Course	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				250	50	100	100	290	120	40	950	11	5	10	21		
Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester																	
9.		MAC	Biology for Engineers	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Digital Electronics & Microprocessor: 130411

Course Objectives:

- To introduce the fundamental concepts and techniques associated with the digital logic, circuit design and microprocessor.
- To minimize the logical expressions using Boolean postulates, Karnaugh method, and Quine-McCluskey method.
- To Familiarize with the digital integrated circuits and 8085 microprocessor.
- To design various combinational and sequential circuits.

Unit- I

Number System, Binary Codes and Boolean Algebra: Basics of number system. Excess-3, Gray, Cyclic and ASCII codes, Binary Arithmetic, Signed and unsigned representation, 1's and 2's compliment representation. Logic gates, Laws of Boolean algebra, Logic diagrams, Universal gates,

Unit- II

Boolean minimization and Combinational Logic Circuits: Minterms and Maxterms, sum-of -product (SOP) form, product of sum (POS) form and Karnaugh mapping, Quine-McCluskey method of minimization, Simplification by Boolean theorems, Encoders, Decoders, Multiplexers, Demultiplexer, Code Convectors, Parity Checker Generator, Arithmetic Circuit like Adder etc.

Unit- III

Sequential circuits: SR, JK, T, D and Master-Slave Flip-Flops - operation, transition and excitation tables, timing diagrams, Design of counters - Ripple counters, Ring counters, Modulo N counters, Shift registers, Universal registers, Semi-conductor memories, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Unit- IV

Digital Integrated Circuits: Diode as switch, Bipolar transistor as switch, FET as switch, Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS.

Unit- V

Intel 8085 Microprocessor: Introduction to 8-bit 8085 microprocessor, Architecture of 8085 microprocessors, Pin Configuration, instruction set and Addressing modes, General application program.

Recommended Books:

1. Digital Systems by Tocci, Tata Mograw Hills Publishing company
2. Digital Computer and Electronics by Malvino, brown, TMH Publishing company
3. Digital Design by Morris Mano, Pearson Education
4. Digital computer Fundamentals by T.C. Bratee, 6th Edn. McGraw Hill.
5. An Introduction to Digital Computer Design by V. Rajaraman, and Radhakrishnan, 3rd Edn.. PH1.
6. Digital Principles and Applications by A.P. Malvino and B.P. Leach 4th Edn McGraw Hill.
7. Microprocessor & Interfacing by D.V. Hall, McGraw Hill International Edition.
8. Microprocessor Architecture, Programming and Applications by Gaonkar, Wiley Eastern Ltd.
9. Introduction to Microprocessors by A.P. Mathur, McGraw Hill International Edition.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Digital Electronics & Microprocessor: 130411

Course Outcomes

CO 1. Explain the concept of different Number systems, logic family and Microprocessor.

CO 2. Design the logic expressions using logic gates after simplifying the expression using Boolean laws, K-map and Quine-McCluskey method.

CO 3. Design different types of combinational logic circuits using basic and universal gates.

CO 4. Explain the concepts of sequential circuits and basic memory devices.

CO 5. Describe the working of logic families such (RTL, TTL, ECL, and C-MOS).

CO 6. Describe an 8-bit microprocessor architecture & explain the concepts of memory and I/O interfacing with microprocessor.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Electrical Machines-I: 130412

Course Objectives:

To develop basic concepts of AC and DC machines, their constructional details and working principles and to familiarize the students with the practical applications and operational issues of transformer, induction motor and DC machines.

Unit- I Basic Concepts of Rotating Electrical Machines: Physical concepts of torque production. Electromagnetic and reluctance torque, Constructional features of rotating machines i.e. DC machine. Induction machine and synchronous machine.EMF generation in dc and ac machines, MMF production on a distributed winding, Production of rotating magnetic field. AC & DC windings short pitching and distribution of winding. Fractional slot winding. Winding factors & harmonic elimination, Ratings and loss dissipation.

Unit- II D.C. Machines I: Construction of DC Machines, Armature winding, EMF and torque equations, Armature reaction, Commutation, Interpoles and compensating windings, Performance characteristics of DC generators.

Unit- III D.C. Machines II: Performance characteristics of DC motors, Starting of DC motors; 3point and 4 point starters, Speed control of DC motors; Field control, Armature control and Voltage control (Ward Lenonard method); Efficiency and Testing of D.C. machines (Hopkinson's and Swinburn's Test).

Unit- IV Single Phase Transformer: Phasor diagram, Efficiency and voltage regulation, All day efficiency. Testing of Transformers-O.C. and S.C. tests, Sumpner's test, and Polarity test. Auto Transformer- Single phase and three phase auto transformers, Volt-amp relation, Efficiency, Merits &demerits and applications.

Unit- V Three Phase Induction Motor I: Review of constructional details. Principle of operation, Slip. Production of torque, Steady state analysis. Phasor diagram, equivalent circuit. Power flow diagram and Torque speed characteristics. Starting methods

Recommended Books:

1. Electric Machines by D.P. Kothari & I.J. Nagrath, Tata McGraw Hill
2. Electric Machines by Ashfaq Hussain, Dhanpat Rai & Company
3. Electric Machinery by A.E Fitzerald, Kingsley and S.D. Umans, McGraw Hill.
4. Electrical Machinery by P.S. Bimbhra, Khanna Publisher
5. Generalized Theory of Electrical Machines by P.S. Bimbhra, Khanna Publishers
6. Alternating Current Machines by M.G.Say, Pitman & Sons

Course Outcomes:

After completing this course the student will be able to:

CO 1. **Explain** the principles and construction of different AC and DC machines.

CO 2. **Discuss** the fundamental control practices such as starting, reversing, braking, plugging etc. associated with AC and DC machines.

CO 3. **Analyze**the performance of AC and DC machines.

CO 4. **Develop** the equivalent circuits and compute the induced emf, torque, efficiency, losses etc.

CO 5. **Describe**various tests conducted for evaluating the performance of AC and DC machines.

CO 6. **Evaluate** the performance of machines under different operating conditions.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Power System -I:130413

Course objectives

- To Familiarize the students with conventional and Non-Conventional energy sources and their use in electrical power generation.
- To expose the students with Transmission and distribution system, line parameters, performance of transmission lines, power plant economics and different types of tariffs.

Unit 1:

Energy Resources and Electrical Power Generation: Introduction to Conventional and non-conventional energy resources; National and International energy trends; Global warming and greenhouse effects. Generation of electrical power, overview of conventional power generation: Hydro, Thermal, Nuclear and Gas Power; Renewable energy generation.

Unit 2:

Transmission and Distribution Systems: Introduction, electrical supply system, comparison of AC and DC systems : conductor volume etc., overhead versus underground systems, choice of working voltages for transmission and distribution, transmission and distribution systems, Overhead line insulators, types of insulators pin, suspension and strain insulators, insulator materials, insulator string; Calculation of voltage distribution and string efficiency, methods of equalizing voltages, use of guard rings. Corona.

Unit 3:

Line Parameters: Types of conductor, Inductance of a conductor due to internal flux, Inductance of a single phase & three phase transmission line, Self & mutual G.M.D., Inductance of three phase symmetrical and unsymmetrical spaced lines, transposed lines. Bundle conductors, skin effect, capacitance of single & three phase transmission line, effect of earth and charging current, transmission line communication and line interference.

Unit 4:

Performance of Overhead Transmission Line: Single line diagram of power system, ABCD constant and equivalent circuits of short, medium and long transmission line, regulation and efficiency of short, medium, transmission line, Ferranti effect, surge impedance loading. Long transmission line, Generalized circuit equation relation between generalized circuit constant for simple network

Unit-5

Power plants Economics and Tariff: Size and number of generating units. Effect of load factor on cost of generation, Load curves, Maximum demand, Load factor, diversity factor, Plant capacity and plant use factor, type of tariffs and economics of power factor improvements.

Recommended Books:

1. Electric Power Generation, Transmission and Distribution by S.N. Singh, Prentice Hall of India, 2nd Edition.
2. Power system Analysis by A. Husain A, CBS Pub & Distributor.
3. Power System Analysis by B.R. Gupta B.R, S Chand & Co.
4. Electrical Power by S.L. Uppal, Khanna Publishers Limited, New Delhi.
5. Electrical Power Systems by C.L.Wadhwa, New Age International Publishers Ltd., New Delhi

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Department of Electrical Engineering

Power System -I:130413

Course Outcomes

After the completion of this course, students will be able to:

CO1 **Describe** the general structure and supply systems used in power systems

CO2 **Develop** the knowledge of generation of electricity based on conventional and nonconventional energy sources

CO 3 **Evaluate** the string efficiency, corona losses etc.

CO4 **Determine** the transmission line parameters

CO5 **Analyze** the performance of overhead transmission line

CO 6 **Describe** the concept of power plant economics, types of tariffs and power factor economics

Annexure-7

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Scheme of Examination

B.Tech. IV Semester (Internet of Things)

For batches admitted in academic session 2020 – 2021onwa

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam
				Theory Slot				Practical Slot									
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project		L	T	P			
				End Term Evaluation	$Proficiency in subject /course												
1.	220401	DC	Data Base Management System	50	10	20	20	60	20	20	200	3	-	2	4	Blended	MCQ
2.	220402	DC	Computer Networks & Protocols	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP
4.	220403	DC	Power Electronics	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
5.	220404	DC	Microprocessor & Embedded Systems	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP
6.	220405	MC	Network and Web Security	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
7.	220406	DLC	Programming with Python	-	-	-	-	60	40	-	100	-	-	2	1	Offline	SO
8.	200XXX	CLC	Novel Engaging Course	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				250	50	100	100	240	80	40	850	14	3	8	21	-	-
9.		MAC	Indian Constitution & Traditional Knowledge	50	10	20	20	-	-	-	100	-	-	-	Grade		

Electrical _22/12/2021

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Microprocessors & Embedded Systems: 220404

Course Objective:

- To provide fundamental operating concepts of microprocessors and microcontrollers.
- This course aims to provide students with a solid theoretical basis as well as comprehensive professional understanding of Arduino and Raspberry Pi.

Unit I. Microprocessors: 8085-architecture, operation, pin configuration and functions, bus organization, control signal generation for external operations-fetch, IO/M, read/write, machine cycles and bus timings. Addressing mode, instruction set, Overview/concept of peripheral interfacing devices-8251, 8253, 8255 and 8279.

Unit II. Microcontrollers: 8051-architecture, operation, pin configuration and functions, memory organization, register, I/O ports, addressing modes, instruction sets, instruction classification. Assembly language programming, Interrupts in 8051. Timer/Counter programming for time delay generation and waveform generation. Interfacing with ADC, DAC, LEDs and seven segment display.

Unit III. Arduino: Introduction to the Arduino, creating an Arduino programming Environment, Arduino IDE, creating an Arduino program, Arduino Libraries, Analog and Digital Interfacing, Adding Interrupts, communicating with devices and sensors.

Unit IV. Raspberry Pi: Introduction to the Raspberry Pi, basic functionality of the Raspberry Pi board and its processor, setting and configuring the board, programming on Raspberry Pi, python programming environment, python expressions, general purpose IO pins, Protocol pins, RPi,GPIO library, communicating with devices and sensors.

Unit V. IoT application using Arduino and Raspberry Pi: Arduino- Playing tones and a melody, alphanumeric LCD display, speed and direction control, temperature and humidity sensor interfacing. Raspberry Pi -controlling LED, interfacing an LED and Switch, Interfacing a Light Sensor (LDR), camera interfacing etc.

Recommended Books:

1. "8085 Microprocessors Architecture Application and Programming", Ramesh S. Goankar, Penram International, 5th Edition.
2. "The 8051 Microcontroller", Kenneth J. Ayala, Cangage learning, 3rd Edition.
3. "Arduino Cookbook", Michael Margolis, O'Reilly Media, Inc., 1st Edition.
4. "Arduino for beginners: Essential Skills Every Maker Needs", John Baichtal, Person Education, Inc., 1st Edition.
5. "Raspberry Pi User Guide", Eben Upton and Gareth Halfacree, August 2016, 4th Edition, John Wiley & Sons.
6. "Programming with Raspberry Pi: Getting Started with Python", Simon Monk, January 2012, McGraw Hill Professional.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Microprocessors & Embedded Systems: 220404

Course Outcomes:

After the completion of the course, the student will be able to –

CO 1. Distinguish various types of processor architectures.
CO 2. Describe architecture, memory organization of 8085 and 8051.
CO 3. Create sketches, libraries and Arduino development environment.
CO 4. Design Raspberry Pi hardware and implement program.
CO 5. Develop interfacing between different sensors and Arduino / Raspberry Pi.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Power Electronics :220402

Course Objective:

- To introduce the students, the basic theory of power semiconductor devices and passive components.
- their practical application in power electronics and to familiarize the operation principle of AC-DC, DC-DC, DC-AC conversion circuits and their applications.
- To provide the basis for further study of power electronics circuits and systems.

Unit I. Power Semiconductor Devices: Application of power electronics, Power diodes, Power Transistors, Power MOSFET, IGBT, Thyristors, TRIAC and GTO. MCT, Firing circuits and protection, Design of snubber circuit, Static Switches. Diodes circuits.

Unit II. Controlled Rectifiers: Principle of phase controlled converter operation, Single phase half wave, full wave and semi converters, Power factor improvement, Symmetrical angle control. Dual converters.

Unit III. Chopper: Principles of single quadrant, Two quadrant, four quadrant chopper. Control strategies. Pulse width modulation. Frequency modulation. Thyristor commutation schemes, switched mode power supplies, buck-boost regulators.

Unit IV. AC voltage controller: Principle of Ac phase control, ON-OFF control, Single Phase bidirectional control with resistive and inductive loads, Power Supplies,

Unit V. Inverter circuits: Principle of operation of voltage source inverter. Single phase and three phase inverters. Voltage control using PWM technique, Current source inverters, Inverter applications

Recommended Books:

1. Power Electronics by P.S. Bimbhra, Khanna Publishers, 9th ed., 2017
2. Power Electronics: Circuits, Devices & Applications by MH Rashid, Pearson, 12th ed. 2018
3. Power Electronics by Cyril W.Lander , McGraw-Hill; 8thedition,1987
4. Power Electronics Principles and Applications by JosephVidyathil, TMH,2020
5. Bose, B.K., Handbook of Power Electronics, IEEE Publications.

Course Outcomes:

After completing this course the student will be able to:

CO1: Name power electronics devices (i.e. Diode SCR, BJT, MOSFET and IGBT. etc) and explain their static/ dynamic characteristics.

CO2: Ability to analyze the configuration of AC to DC converter, Dual converter, chopper, cyclo-converter

CO3: Classify converters and identify their applications.

CO4: Develop different model of different converters to calculate their performance parameter

CO5: Identify the problems/limitations of power electronics devices, converters and suggest solution

Annexure-8

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Digital Electronics & Microprocessor Lab: 130411

List of Experiments

1. Verification of truth tables of

(a) OR, AND, NOT gates (By using 7400-series)
(b) NAND & NOR gates.
(c) EX-NOR & EX-OR gates.

2. Verification of De-Morgan's Theorem using ICs.

3. Implementations of Multiplexer &Demultiplexer using logic gates (ICs) and verify truth table.

4. Implementations of Encoder & Decoder using logic gates (ICs) and verify truth table.

5. Implementations of Half Adder & Full Adder using logic gates (ICs) and verify truth table.

6. Implementations of Half Subtractor & Full Subtractor using logic gates (ICs) and verify truth table.

7. Implementation of Binary to Gray Code & Excess- 3 to BCD Converter using logic gates.

8. Operation and verifying truth tables of flip- flops- RS, D, and JK using ICs.

9. To perform addition & subtraction of two 8 bit numbers using 8085.

10. To perform the multiplication & division of two 8 bit numbers using 8085.

Course Outcomes:

On completion of this lab course the students will be able to:

CO 1. Develop skill to build, and troubleshoot digital circuits.
CO 2. Apply troubleshooting techniques to test digital circuits.
CO 3. Prepare and present an organized written engineering report on electronic testing of digital circuits.
CO 4. Develop the ability to work is team and learns professional ethics.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Electrical Machines-I Lab: 130412

LIST OF EXPERIMENTS

1. To Perform direct load test on single phase transformer
2. To perform parallel operation on two single phase transformers
3. To obtain magnetization characteristics of DC shunt generator
4. To obtain internal and external characteristics of DC shunt generator
5. To control the speed of DC shunt motor
6. To perform load test on DC shunt motor (Mechanically loaded)
7. To perform load test on DC series motor (Mechanically loaded)
8. To perform load test on DC compound motor (Electrically loaded)
9. To perform Hopkinson's test on two identical dc machines
10. To perform load test on induction motor
11. To obtain speed torque characteristics of 3 phase induction motor.
12. A virtual lab simulation of conventional electrical machines.

Course Outcomes:

At the end of the Laboratory work the students will be able to

CO 1. **Draw** characteristics of electric machine for a specific purpose, requirement.

CO 2. **Determine** the efficiency of any transformer, regulation of any transformer.

CO 3. **Conduct** Load sharing by two or more machines

CO 4. **Develop** the ability to work in team and learns professional ethics

CO 5. **Prepare** an organized written engineering report on electronic testing of digital circuits.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Programming with Python :130414/220406

List of Experiments

1. Introduction to Python programming
2. Write a program to create, concatenate and print a string and accessing substring from a given string
3. Write a program in Python for demonstration of list creation and its appending & removal
4. Write a program to demonstrate working with Tuples in python
5. Write a program to demonstrate working with Tuples in python
6. Write a code to create Functions in Python
7. Write a code to demonstrate the use of loops & conditions in Python
8. Write a code to take input from user & then to sort the numbers using Python
9. Write a python program to convert temperature units to and from degree Celsius to degree Fahrenheit
10. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order

Course Outcomes:

CO1: **Design & implement** basic Python programs

CO2: **Demonstrate** the use of loops & conditional statements in Python

CO3: **Define & demonstrate** the use of "list" & "dictionary" type of built-in data structure

CO4: **Design** a program to solve real world problem

CO5: **Prepare** technical report on experiments conducted in the lab

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

130415: Renewable Energy Lab

List of Experiments

1. To setup a Solar PV standalone system and calculate power in different branches of the system.
2. To set up a Solar PV Grid Connected system and calculate power in different branches of the system.
3. To set up a Solar PV Power plant with the help of a Hybrid inverter.
4. To set up a Wind Energy standalone system and calculate power in different branches of the system.
5. To set up a Solar PV- Wind Energy Hybrid standalone system and calculate power in different branches of the system.
6. Utilizing smart house as a load and analyzing load waveforms.
7. Utilizing Load analysis kit and understanding about loads connected in series.
8. Observing different weather parameters using weather station.
9. Comparing the different types of grid connected systems and analyzing their waveforms with the help of linear loads.
10. Comparing the different types of grid connected systems and analyzing their waveforms with the help of nonlinear loads.

Course Outcomes:

On the successful completion of the lab experiments students will be able to:

CO 1. **Develop** the understanding of renewable energy sources.

CO 2. **Investigate** the solar PV & wind energy operation and find their performance curves.

CO 3. **Examine** smart house & load analysis kit.

CO 4. **Develop** teamwork skills for working effectively in groups.

CO 5. **Prepare a technical** report on experiments conducted in the lab.

Annexure-9

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Electrical Engineering

Digital Electronics & Microprocessor Lab: 130411

Skill Based Mini Projects

1. Construct a 6x6x6 or a 7x7x7 LED cube that will be operated through multiplexing.
2. Implement a four-way intersection with an intelligent traffic regulation method using logic gates.
3. Construct a calculator to do addition and subtraction of binary numbers.
4. Design a parking counter, having a main entrance and the entire area should be split into at least 3 sections.
5. Design a vending machine with full display for cash as well as items dispensed.
6. Design a generator circuit that generates pulses of varying duty cycle depending on user selection.
7. Design a parking counter, having a main entrance and a main exit.
8. construct a 16-bit Pseudo Random Number Generator.

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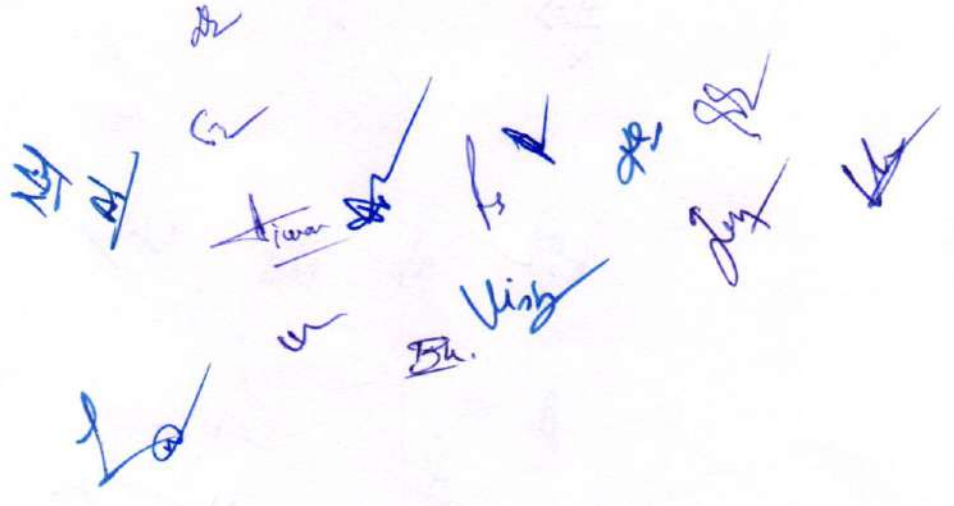
Department of Electrical Engineering

Electrical Machines-I Lab: 130412
Skill Based Mini Projects

1. Draw the LAP connected winding arrangement of DC Machines
2. Draw the WAVE connected winding arrangement of DC Machines
3. Draw the construction of DC Machines and also explain its parts
4. Draw the construction of Induction Machines and also explain its parts
5. Draw the phasor diagram of single-phase transformers in lagging, leading and unity power factor load
6. Draw the phasor diagram of 3-phase Induction motor in lagging, leading and unity power factor load
7. Draw the MMF diagram of DC Machines and also explain the effect of Armature reaction
8. How are torque are produced in DC and AC Machines. Discuss with suitable diagrams compare AC and DC Machines
9. Write applications of DC and AC machines in various domestic and Industrial applications



Annexure-10

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Scheme of Examination

B.Tech. (Electrical Engineering) I Semester

For batches admitted in academic session 2021 – 2022 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project		L	T	P			
				End Term Evaluation	$Proficiency in subject /course												
1.	100011	BSC	Engineering Mathematics –I	50	10	20	20	-	-	-	100	3	1	-	4	Offline (4/0)	PP
2.	100023	ESC	Basic Computer Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	A+O
3.	100014	ESC	Engineering Graphics	50	10	20	20	-	-	-	100	1	2	-	3	Blended (2/1)	A+O
4.	100015	HSMC	Energy, Environment, Ecology &Society	50	10	20	20	-	-	-	100	3	-	-	3	Online (0/3)	MCQ
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline (2/0)	A+O
7.	130112	DC	Mini Project	-	-	-	-	60	40	-	100	-	-	2	1	Offline (2/0)	A+O
Total				250	50	100	100	180	80	40	800	12	4	6	19		

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	A+O	
		Offline	Online						
4	3	6	3	3	7	6	3	3	19
20%	16%	32%	16%	16%	37%	31%	16%	16%	Credits %

Electrical _22/12/2021

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Scheme of Examination

B.Tech. I Semester (Internet of Things)

For batches admitted in academic session 2021 – 2022 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Exam	Mode of Teaching (Offline/Online)
				Theory Slot				Practical Slot									
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project		L	T	P			
				End Term Evaluation	$Proficiency in subject /course												
1.	220101	DC	Basics of Internet of Things (IoT)	50	10	20	20	-	-	-	100	4	-	-	4	MCQ	offline
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	PP	Blended (2/1)
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	MCQ	offline
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	PP	offline
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	MCQ	Online
Total				250	50	100	100	120	40	40	700	14	3	4	19	-	-
NSS/NCC					Qualifier												

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
11	03	01	02	02	08	-	11	--	19
57.89%	15.78%	5.2%	10.52%	10.52%	42.10%		57.89%		Credits %

Annexure-11

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Scheme of Examination

B.Tech. (Electrical Engineering) II Semester

For batches admitted in academic session 2021 – 2022 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project		L	T	P			
				End Term Evaluation	$Proficiency in subject /course												
1.	130211	DC	Engineering Materials	50	10	20	20	-	-	-	100	4	-	-	4	Online (0/4)	PP
2.	100020	ESC	Basic Civil Engineering &Mechanics	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
3.	100021	ESC	Basic Mechanical Engineering	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	MCQ
4.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
5.	100013	BSC	Engineering Physics	50	10	20	20	60	40	-	200	2	1	2	4	Blended (2/1)	MCQ
6.	130212	DC	Electrical Workshop	-	-	-	-	60	20	20	100	-	-	2	1	Offline (2/0)	A+O
Total				**250**	**50**	**100**	**100**	**180**	**60**	**60**	**800**	**14**	**2**	**6**	**19**		
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.																	

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
-	4	8	4	3	7	-	9	3	19
-	21%	42%	21%	16%	37%	-	47%	16%	Credits %

Electrical _22/12/2021

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Electrical Engineering

Scheme of Examination

B.Tech. II Semester (Internet of Things)

For batches admitted in academic session 2021 – 2022 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Exam	Mode of Teaching (Offline/Online)
				Theory Slot				Practical Slot				L	T	P			
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project							
				End Term Evaluation	$Proficiency in subject /course												
1.	220201	DC	Digital Electronics and Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	PP	Blended (2/1)
2.	220202	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	PP	offline
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	100	3	-	2	4	PP	offline
4.	230203 / 250203	DC	Object Oriented Programming and Methodology & programming with C++	50	10	20	20	60	20	20	100	3	-	2	4	SO	offline
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	200	3	-	-	3	PP	Blended (2/1)
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	SO	Offline
Total				250	50	100	100	240	80	80	900	14	1	8	19	-	-
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.																	
NSS/NCC				Qualifier													

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
09	--	4	02	4	14	--	---	05	19
47.36%		21.05%	10.52%	21.05%	73.68%			26.31%	Credits %

Basic Electrical & Electronics Engineering: 100022

Course Objectives:

- To impart the basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits and its terminology, the importance of transformers in transmission and distribution of electric power.
- To expose the students to the working of DC Machine, various electronic circuits and its importance.

Unit I - D.C. Circuits Analysis:
Voltage and Current Sources: Dependent and independent source, Source conversion, Kirchhoff's Law, Mesh and Nodal analysis. Network theorems: Superposition theorem, Thevenin's theorem & Norton's theorem and their applications.

Unit II –Single-phase AC Circuits:
Generation of sinusoidal AC voltage, definitions: Average value, R.M.S. value, Form factor and Peak factor of AC quantity, Concept of Phasor, analysis of R-L, R-C, R-L-C Series and Parallel circuit, Power and importance of Power factor.

Unit III- Magnetic Circuits:
Basic definitions, AC excitation in magnetic circuits, self-inductance and mutual inductance, Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Flux,MMF and their relation, analysis of magnetic circuits.

Unit IV- Single-phase Transformer &Rotating Electrical Machines:
Single phase transformer, Basic concepts, construction and working principal, Ideal Transformer and its phasor diagram at No Load, Voltage, current and impedance transformation, Equivalent circuits and its Phasor diagram, voltage regulation, losses and efficiency, testing of transformers, Construction & working principle of DC and AC machine.

Unit V - Digital Electronics, Devices & Circuits:
Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, Demorgan's theorem, Logic gates- symbolic representation and their truth table, Introduction to semiconductors, Diodes, V-I characteristic, Bipolar junction transistors and their working, Introduction to CB, CE & CC transistor configurations

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Electrical Engineering Department

Basic Electrical & Electronics Engineering: 100022

Recommended Books:

1. Basic Electrical and Electronics Engineering, Tata McGraw Hill - D.P. Kothari & I.J. Nagrath
2. Basic Electrical and Electronics Engineering, Tata McGraw Hill – V N Mittle& Arvind Mittal
3. Electrical Machinery- A.E. Fitzgerald, C. Kingsley and Umans - TMH
4. Principles of Electrical Engineering- Vincdent Del Toro- Prentice Hall.
5. Basic Electrical engineering -A,E. Fitzgerald, Higginbotham and Grabel -TMH
6. Integrated Electronics- Millmann&Halkias
7. Electronics Devices & circuits- Sanjeev Gupta, Dhanpat Rai Publication
8. Basic Electrical and Electronics Engineering, Tata McGraw Hill - D.C Kulshreshtha

Course Outcomes

After the completion of the course, the student will be able to –

CO 1. **Solve** DC& AC circuits by applying fundamental laws & theorems

CO 2. **Analyze** the response of linear electrical and magnetic circuits for given input

CO 3. **Explain** the working principle, construction, applications of rotating electrical machines

CO 4. **Explain** the working principle, constructional details, losses & applications of single phase transformer.

CO 5. **Select** the logic gates for various applications in digital electronic circuits.

CO 6. **Explain** characteristics of Diode and Transistor.

Digital Electronics and Logic Design: 220201

Course Objectives:

- To familiarize the students with the number representation and conversion between various representations in digital electronic circuits.
- To expose the students to the logical operations using combinational logiccircuits, sequential logiccircuits and the characteristics of memory and theirclassification.

Unit 1. Number System: Representation of Binary numbers, octal and hexadecimal numbers, complements, signed binary numbers, Binary codes, code conversion, floating point numbers and arithmetic and the conversion process. Subtraction using 1's and 2's complement, Excess 3, Gray code, Hamming Code.

Unit 2. Boolean Algebra and Logic Gates: Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms- SOP & POS. Logical operations, truth tables, logic gates, logic levels and pulse waveforms. Simplification of Boolean functions :The map method- the Karnaugh map, minimal SOP & POS, Don't care conditions, multiple output minimization, tabular method, , determination and selection of prime implicants.

Unit 3. Combinational Logic Circuits: Introduction: Design Procedure, adder, subtractor, Magnitude Comparator, Universal Gate, Encoders, Decoders, Multiplexers, Demultiplexer, Parity Checker Generator.

Unit 4. Sequential LogicCircuits: State tables and diagrams, Flip Flop and its various types -S-R, J-K, D and T Flip Flops, Excitation table, Triggering of FFs & Latches. Registers: - Shift – Registers, Ripple Counters, Synchronous Counters. RingCounters. Timing Sequences, DesignProcedure.

UNIT 5: Memory and Programmable Logic Device: Introduction to Digital Logic families (RTL, DTL, TTL, ECL, CMOS &Schottky logic) and their special characteristics: Fan Out, Fan in, power dissipation, figure of merit, Noise Margin; Circuits of Logic Families, RAM, ROM, A/D And D/A converters and their types.

Recommended Books:

1. Digital Design by Morris Mano, Pearson Education, 6th edition 2018
2. Logic Design Theory by NNBiswas,Prentice Hall India Learning Private Limited,1993
3. Digital Fundamental by TLFloyd, Pearson Education, 11th edition, 2017
4. Digital Electronics by R. P.Jain, McGraw Hill Education; 4 edition ,2009
5. Digital Logic Design by MansafAlam,PHI Learning Pvt. Ltd., 2015

Course Outcomes:

After the completion of this course students will be able to:

CO 1. **Perform** conversion among Different number systems and codes.

CO 2. **Simplify** the logic expressions using Boolean laws, map method and design them by

using logic gates.

CO 3. **Design** a given digital combinational circuits using basic gates for different applications.

CO 4. **Analyze** different types of flip-flops and design a sequential logic circuit .

CO 5. **Understand** basics of Logic family and converter like A/D and D/A.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Electrical Engineering Department

Sensor Technology: 220202

Course Objective: To familiarize the students with various types of sensors and the design of basic circuit building blocks.

Unit I. Principle of Sensing & Transduction: Sensor, actuator and transducer; Classification, Fundamentals and Characteristics of Sensors/Transducers, Resistive (potentiometric type), Strain gauge, Inductive sensor: common types- Reluctance change type, LVDT, Capacitive Sensors, Thermal Sensors, Magnetic Sensors, Proximity Sensor.

Unit II. Smart Sensor: Architecture of Smart Sensor: Features, Fabrication Of Sensor And Smart Sensor, Electrode Fabrication, Screen Printing, Photolithography, Electroplating Sensing Film Deposition, Physical And Chemical Vapor, Anodization, Sol-Gel, Selection Of Sensors For Practical Applications, Usefulness Of Silicon Technology In Smart Sensor And Future Scope Of Research In Smart Sensor.

UnitIII. MEMS, Intelligent and Network Sensors: Concept and methods of making MEMS devices, sensors and actuators; Concept and architecture of intelligent sensors; Concept and architecture of network sensors, Wireless sensor networks, sensor cloud, virtual sensor

UNIT IV: Sensor Networking: 7-Layer OSI model of communication system, device-level networks, introduction to protocols and technologies for wired and wireless LANs; Ethernet, RS-485 and Foundation Fieldbus protocols; Wi-Fi; Zigbee and Bluetooth protocols; Concept of adhoc networks; Smart Transducer Interface Standard IEEE 1451

Unit IV.Sensors in Different Application Areas: Neuro-sensors; Biosensors, Intelligent Instrumentation: Introduction meaning and advantages; Interfacing: Analog Signal conversion, Interface components: Amplification, waveform generators, voltage to frequency & frequency to voltage converter.

Recommended Books:

1. Measurement System Application and Design by Ernest O. Deobelin, Macgrawhill Publication,2000.
2. Intelligent Instrumentation Microprocessor Applications in Measurement and Control by George C.Barney,PHI,2002
3. Transducer and Instrumentation ByD.V.S Murty,PHI,2010
4. Sensors and Signal Conditioning,by Ramon P. A. And Webster J. G., John Wiley and Sons,2015
5. Wireless Sensor Networks, Feng Z. And Leonidas G.Elsevier, Eastern Limited. 2007
6. Intelligent Sensors, by Yamasaki H., Elsevier Eastern Limited. 1996.

Course Outcomes:

After completing this course, the student will be able to:

- **CO1. Explain** fundamentals of Sensors & Transducers .
- **CO2. Describe** smart sensor technology.
- **CO3. Design** the MEMS, Intelligent and network sensors.
- **CO4. Apply** protocols and technology for wired and wireless LANs, Ethernet.
- **CO5. Discuss** intelligent instrumentation techniques.

Engineering Materials:130211

Course Objectives:

The Objective is to familiarize the students with different types of Engineering materials and their use in the field of Electrical Engineering.

Unit I. Conducting Materials: The conductivity of metals and alloys, Generals properties, Classification of conducting materials, Low resistivity and high resistivity materials, their properties and applications, Electrical and mechanical properties and applications of Cu, Al, Steel, ACSR conductor, AAAC conductor, Tungsten, Molybdenum, Platinum, mercury, lead, manganin, metals and Alloys for fuses, superconductivity and its applications.

Unit II. Semiconductor Materials: Classification of materials based on atomic structure, conductors, insulators and semiconductors, Electron energy and energy band theory, Semiconductor materials, Intrinsic semiconductors, Extrinsic semiconductor, N type materials, P type materials, minority and majority carriers. Formation of PN junction by alloying, Merits of semiconductor materials for use in electrical Engg., Factors affecting semiconductors, application of semiconductor materials, Hall effect with mathematical treatment.

Unit III. Magnetic Materials: Different terms associated with magnetic materials. Classification of magnetic materials, Diamagnetic, Paramagnetic and ferromagnetic materials, Curie point, Magnetostriction, electromagnet and its uses, Magnetization curve, Hysteresis and eddy current loss, Soft and hard magnetic materials, their properties and applications, its advantage and disadvantages, requirements of magnetic materials for use in Electrical machines, Magnetic anisotropy, Spontaneous magnetization.

Unit IV. Dielectric materials: Behavior of dielectrics in static and alternating fields, polarization, Dielectric constant of mono atomic gases, ionic polarization, Dipolar polarization, internal fields in solids and liquids, Polaris ability, Frequency dependence of electronic polarization, permittivity, dielectric losses, significance of the loss tangent dipolar relaxation, Ferro electricity, piezoelectricity.

Unit V. Insulating materials: General electrical, mechanical, thermal and chemical properties of insulating materials, classification of insulating materials on the basis of temperature rise. Gaseous insulating materials properties and application of nitrogen, liquid insulating materials, their main features, Transformer oil, testing the dielectric strength of transformer oil.Ferrous metals and non ferrous metals.

Recommended Books:

1. 1.Science Of Engineering Materials By C.M.Srivastava&C.Srinivasan,New Age International Publisher,2010.

2. A Text Book Of Electrical Engineering Materials By P.L. Kapoor, Khanna Publication,2016
3. Electrical Engineering Materials By A.J. Dekker, PHI,2015
4. An Introduction To Electrical Engineering Materials By C.L. Indulkar, S. Thiravengadam, S. Chand & Co,2006

Course Outcomes

After completing this course, the student will be able to:

CO1: Describe the properties and applications of conducting materials.

CO2 : Explain behavior of semiconductor materials, their classification and applications.

CO3: Select appropriate Magnetic materials for given applications.

CO4 : Explain dielectric materials, their behavior in different fields, polarization and dielectric losses

CO5: Select appropriate insulating material depending upon specific requirement

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Annexure-12

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC AccreditedInstitute Affiliated to RGPV, Bhopal, MP)

Electrical Engineering Department

Basic Electrical & Electronics Engineering Lab (100022)

LIST OF EXPERIMENT

1. To verify Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine resistance & inductance of a choke coil.
4. To determine active & reactive power in a single phase A.C circuit.
5. To determine voltage ratio & current ratio of a single phase transformer.
6. To determine the polarity of a single phase transformer.
7. To perform open circuit & short circuit test on a single phase transformer.
8. To study multimeter& measure various electrical quantities
9. To study of constructional details of DC machine.
10. To determine the V-I characteristics of diode in forward bias & reverse bias condition.

Course Outcomes:

After the completion of the lab, the student will be able to -

CO 1. Verify circuit theorems.

CO 2. Perform tests on transformer for determination of losses, efficiency & polarity.

CO 3. Demonstrate the constructional features of electrical machines

CO 4. Acquire teamwork skills for working effectively in groups

CO 5. Prepare an organized technical report on experiments conducted in the laboratory.

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Electrical Engineering Department

Skill Based Mini Project

Basic Electrical & Electronics Engineering (100022)

1. Design a capacitor charging and discharging circuit.
2. Verification of Norton's Theorem.
3. Verification of Thevenin's Theorem.
4. Magnetic field behaviour in single phase coil due to DC and AC current.
5. Study the generation of rotating magnetic field produced due to two coils using AC current.
6. Determination of electricity bill for given average monthly consumption of household appliances.
7. Verification of logic gates using breadboard.
8. Design an impedance matching circuit using transformer.
9. Design of 5 Volt power supply.
10. Analysis of KVL using MATLAB Simulink
11. Analysis of KCL using MATLAB Simulink
12. Design and verifying a circuit for De Morgan's theorem using breadboard.
13. Realization of NOT gate via NAND gate using breadboard.
14. Realization of NOT gate via NOR gate using breadboard.
15. List out the various application and their typical rating of D.C machine.
16. Determination of equivalent circuit of a single-phase transformer and efficiency using MATLAB Simulink.
17. Study the usage of transformers for transmitting power from generating station to loads with typical rating.
18. Write a MATLAB code for number system conversion i.e. Binary to Decimal conversion.

19. Analysis of RL circuit using MATLAB Simulink.
20. Analysis of RC circuit using MATLAB Simulink.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Electrical Engineering Department

Sensor Technology - 220202

List of Experiments

1. Characterize the temperature sensor (RTD)
2. Simulate the performance of a bio-sensor
3. Measurement of level in a tank using capacitive type level probe
4. Characterize the LVDT
5. Design an orifice plate for a typical application
6. Simulate the performance of a chemical sensor
7. Characterize the strain gauge sensor
8. Characterize the temperature sensor (Thermocouple)
9. Study of LDR
10. Study of Photo Diodes & Photo Voltaic cells

Course Outcomes:

After completing this course, the student will be able to:

CO1: **Conduct** experiments and measurements in laboratory and on real components and sensors

CO2: **Interpret** the acquired data and measured results

CO3: **Demonstrate** team work and be able to independently present various professional materials.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Electrical Engineering Department

Sensor Technology - 220202

Skill Based Mini Project

1. Distance measurement by ultrasonic sensor
2. Displacement measurement using potentiometer
3. Development of pressure or force measurement mechanism using LVDT
4. Development of flow-level controller
5. Design a light circuit that glow on detecting any object
6. Alarm system for detection of over temperature in a rotating machine
7. Detection of any object using proximity sensor
8. Force or weight measurement using strain gauge
9. Design a signal conditioning circuit to amplify the output of thermocouple
10. Design a noise detector circuit

Theoretical

Identify the sensors and signal conditioning unit for following applications

11. Smart solar tracking system
12. Contactless liquid level controller
13. Speed checker to detect rash driving on vehicles
14. Optimum energy management system
15. Street lights that glow on detecting vehicle movement
16. Density based traffic signal system
17. Accident detection system & rescue system for ambulance
18. Contact less digital tachometer design
19. Auto metro train doors shuttling in between different stations
20. Automatic railway gate controlling
21. Automatic hand sanitizer dispenser
22. Home security system
23. Information system for weather report
24. Smart irrigation system
25. Smart water monitoring.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Electrical Engineering Department

Electrical Workshop: 130212

LIST OF EXPERIMENTS

1. To get familiarized with the testing bench
2. To identify and test different types of cables and connectors
3. To identify and use different types of Fuses, MCB, ELCB, MCCB, Insulators and relays with their ratings
4. To design basic electronic circuits using soldering and analyze their waveforms
5. To get familiarized with safety practices and maintenance techniques followed in Industries
6. To determine Realtime domestic and industrial electrical load
7. To understand and demonstrate process of electrical power generation, transmission and distribution in co-relation with real time power grid
8. To determine Lux for different applications as per illumination requirements (BEE Standards)
9. To measure phase and line parameters of a three phase AC circuit
10. To get familiarized with different types of earthing and earth resistance determination

Course Outcomes

After the completion of the course, the student will be able to –

- **CO 1.** **Identify** different types of electrical loads
- **CO 2.** **Apply** illumination standards and safety practices for various applications
- **CO 3.** **Select** cables, switches and protective devices for specific applications
- **CO 4.** **Develop** teamwork skills for working effectively in groups
- **CO 5.** **Prepare** the technical report on experiments conducted in the lab

Annexure-13

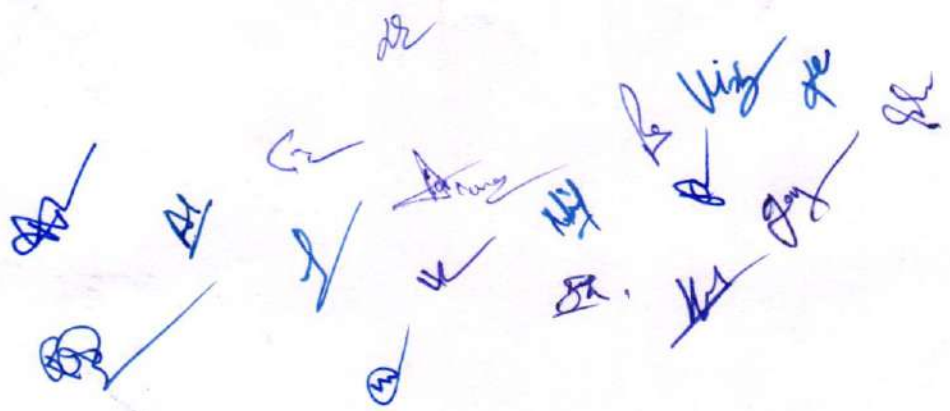
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC AccreditedInstitute Affiliated to RGPV, Bhopal, MP)

Electrical Engineering Department

(i) CO attainment levels for First Semester 'April - September 2021'

CO Attainment Level								
Subject Name & Code	**Faculty/ Subject Expert**	**Course Outcome**	**Direct Attainment**	**Indirect Attainment**	**Total Attainment**	**Target Attainment**	**Gap in Attainment**	**Status**
100022- BEEE Branch: Electrical Engineering	Prof. Vishal Chaudhary	CO1	2.93	2.85	2.91	2.50	-0.41	Achieved
		CO2	3.00	2.70	2.94	2.50	-0.44	Achieved
		CO3	2.65	2.65	2.65	2.50	-0.15	Achieved
		CO4	2.77	2.50	2.72	2.50	-0.22	Achieved
		CO5	2.93	2.75	2.89	2.50	-0.39	Achieved
		CO6	2.77	2.70	2.76	2.50	-0.26	Achieved
100022- BEEE Branch: Mech Engg	Prof. Nipun Gupta	CO1	2.89	2.82	2.88	2.50	-0.38	Achieved
		CO2	2.87	2.72	2.84	2.50	-0.34	Achieved
		CO3	2.63	2.60	2.62	2.50	-0.12	Achieved
		CO4	2.73	2.47	2.68	2.50	-0.18	Achieved
		CO5	2.88	2.70	2.84	2.50	-0.34	Achieved
		CO6	2.77	2.72	2.76	2.50	-0.26	Achieved
100022- BEEE Branch: Civil Engineering	Prof. Kuldeep Swarnkar	CO1	2.91	2.70	2.87	2.50	-0.37	Achieved
		CO2	2.88	2.65	2.83	2.50	-0.33	Achieved
		CO3	2.67	2.82	2.70	2.50	-0.20	Achieved
		CO4	2.87	2.72	2.84	2.50	-0.34	Achieved
		CO5	2.87	2.40	2.78	2.50	-0.28	Achieved
		CO6	2.70	2.60	2.68	2.50	-0.18	Achieved
100022- BEEE Branch: Auto Engg	Prof. Saurabh Kumar Rajput	CO1	2.90	2.75	2.87	2.50	-0.37	Achieved
		CO2	3.00	2.60	2.92	2.50	-0.42	Achieved
		CO3	2.60	2.55	2.59	2.50	-0.09	Achieved
		CO4	2.70	2.40	2.64	2.50	-0.14	Achieved
		CO5	2.90	2.60	2.84	2.50	-0.34	Achieved
		CO6	2.70	2.60	2.68	2.50	-0.18	Achieved



(ii) CO attainment levels for Jan-June 2021 semester

CO Attainment Level								
Subject Name & Code	**Faculty/ Subject Expert**	**Course Outcome**	**Direct Attainment**	**Indirect Attainment**	**Total Attainment**	**Target Attainment**	**Gap in Attainment**	**Status**
130401- Digital Electronics & Microprocessor	Dr. Vikram	CO1	2.8	2.64	2.77	2.40	-0.37	Achieved
		CO2	2.7	2.40	2.64	2.30	-0.34	Achieved
		CO3	2.7	2.64	2.68	2.4	-0.28	Achieved
		CO4	2.9	2.40	2.80	2.4	-0.40	Achieved
		CO5	2.9	2.40	2.80	2.3	-0.50	Achieved
130402- Electrical Machines-I	Prof. Nipun Gupta	CO1	2.8	2.64	2.77	2.4	-0.37	Achieved
		CO2	2.6	2.55	2.59	2.4	-0.19	Achieved
		CO3	2.7	2.64	2.68	2.4	-0.28	Achieved
		CO4	2.7	2.35	2.63	2.4	-0.23	Achieved
		CO5	2.8	2.40	2.72	2.4	-0.32	Achieved
130403- Control System	Dr. P. Dohare	CO1	2.9	2.30	2.78	2.3	-0.48	Achieved
		CO2	2.7	2.40	2.64	2.3	-0.34	Achieved
		CO3	2.3	2.30	2.30	2.3	0.0	Achieved
		CO4	2.9	2.40	2.80	2.4	-0.40	Achieved
		CO5	2.9	2.40	2.80	2.3	-0.50	Achieved
		CO6	2.25	2.50	2.30	2.3	0.0	Achieved
130404- Power System-I	Dr. S. Dixit	CO1	2.90	2.71	2.66	2.60	-0.06	Achieved
		CO2	2.90	2.23	2.77	2.40	-0.37	Achieved
		CO3	2.71	2.57	2.72	2.70	-0.02	Achieved
		CO4	2.37	2.54	2.34	2.50	0.16	Not achieved
		CO5	2.7	2.64	2.68	2.4	-0.28	Achieved
		CO6	2.7	2.35	2.63	2.4	-0.23	Achieved
130611- Computer Aided Power System Analysis	Dr. H. Singh	CO1	2.90	2.71	2.66	2.60	-0.06	Achieved
		CO2	2.71	2.57	2.62	2.70	0.08	Not achieved
		CO3	2.8	2.54	2.85	2.5	-0.35	Achieved
		CO4	2.5	2.63	2.53	2.4	-0.13	Achieved
		CO5	2.7	2.51	2.66	2.4	-0.26	Achieved
		CO6	2.71	2.57	2.62	2.70	0.08	Not achieved
130612 Industrial Automation	Prof. Manoj Kumar	CO1	2.90	2.71	2.66	2.60	-0.06	Achieved
		CO2	2.90	2.23	2.77	2.40	-0.37	Achieved
		CO3	2.8	2.54	2.85	2.5	-0.35	Achieved
		CO4	2.9	2.23	2.77	2.5	-0.27	Achieved
		CO5	2.80	2.30	2.70	2.50	-0.20	Achieved
		CO6	2.6	2.55	2.59	2.7	0.11	Not achieved
130613 Solar PV System : Design & Economics	Prof. S. K. Rajput	CO1	2.7	2.65	2.69	2.4	-0.29	Achieved
		CO2	2.8	2.71	2.78	2.4	-0.38	Achieved
		CO3	2.5	2.63	2.53	2.4	-0.13	Achieved
		CO4	2.7	2.51	2.66	2.4	-0.26	Achieved
		CO5	2.6	2.57	2.59	2.4	-0.19	Achieved
		CO6	2.4	2.67	2.45	2.4	-0.05	Achieved

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Electrical Engineering Department

900103 Energy conservation and Management	Dr. Hemlata Shakya	CO1	2.8	2.54	2.85	2.5	-0.35	Achieved
		CO2	2.9	2.23	2.77	2.5	-0.27	Achieved
		CO3	2.9	2.30	2.76	2.5	-0.26	Achieved
		CO4	3	2.52	2.90	2.5	-0.40	Achieved
		CO5	2.7	2.54	2.75	2.5	-0.25	Achieved
900115 Biomedical Instrumentation (OC Subject)	Dr. A. K. Wadhwani	CO1	3	2.57	2.91	2.5	-0.41	Achieved
		CO2	2.8	2.56	2.75	2.5	-0.25	Achieved
		CO3	3	2.51	2.90	2.5	-0.40	Achieved
		CO4	2.7	2.55	2.67	2.5	-0.17	Achieved
		CO5	2.7	2.80	2.72	2.5	-0.22	Achieved
100007 Disaster management	Prof. Ashis Patra	CO1	2.7	2.57	2.75	2.5	-0.25	Achieved
		CO2	2.7	2.56	2.67	2.5	-0.17	Achieved
		CO3	2.3	2.51	2.34	2.5	0.16	Not achieved
		CO4	2.6	2.55	2.59	2.5	-0.09	Achieved
		CO5	2.5	2.80	2.56	2.5	-0.06	Achieved
130601- Switchgear & Protection	Prof. Shweta Kumari	CO1	2.80	2.11	2.66	2.50	-0.17	Achieved
		CO2	2.90	2.23	2.77	2.50	-0.27	Achieved
		CO3	2.71	2.27	2.62	2.50	-0.12	Achieved
		CO4	2.7	2.30	2.62	2.3	-0.32	Achieved
		CO5	2.80	2.30	2.70	2.50	-0.2	Achieved
		CO6	2.6	2.55	2.59	2.5	-0.09	Achieved
130602- Electrical Engineering Materials	Prof. A. Kumari	CO1	2.6	2.30	2.54	2.3	-0.24	Achieved
		CO2	2.8	2.52	2.74	2.3	-0.44	Achieved
		CO3	2.7	2.30	2.62	2.3	-0.32	Achieved
		CO4	2.6	2.80	2.64	2.3	-0.34	Achieved
		CO5	2.4	2.35	2.39	2.3	-0.09	Achieved
		CO6	2.8	2.60	2.76	2.3	-0.46	Achieved

Total No of courses	Total No of COs	No of COs not attained	Percentage of Cos not attained
16	91	5	5.5%

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Electrical Engineering Department

Action taken by the faculty

130404- Power System-I by Dr. S. Dixit

- More assignment & tutorial classes are to be conducted.
- Additional regular classes to be conducted.
- Practical exposer through industrial visit, problem solving are to be included to creating interest.

130611- Computer Aided Power System Analysis by Dr. H. Singh

- More questions through assignments.
- More interaction with the students.
- Extra time will be given on this topic.

130612- Industrial Automation by Prof. Manoj Kumar

- Additional classes to be conducted.
- Practical exposer through problem solving is to be included.

100007- Disaster management by Prof. Ashis Patra

- More questions through assignments
- Additional classes to be conducted
- Extra Assignment and Quizzes

Annexure-14

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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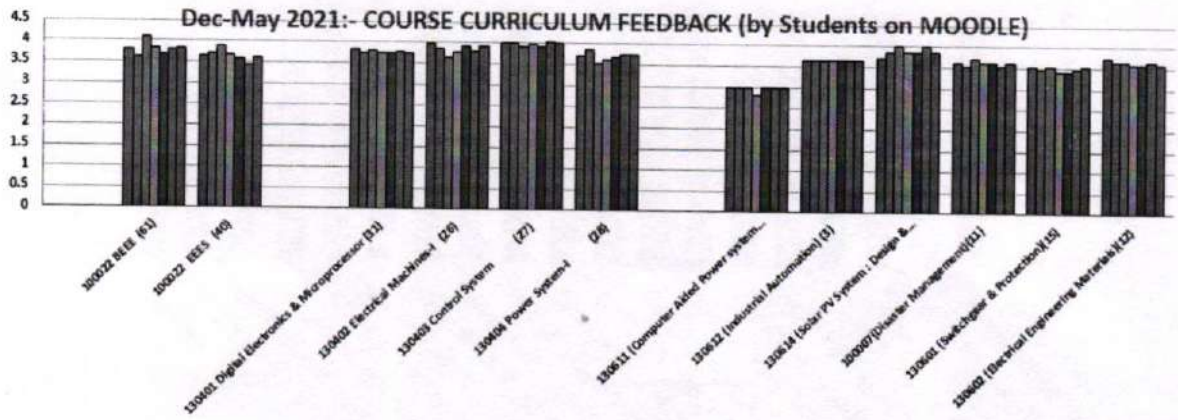
Electrical Engineering Department

1. Dec-May 2021: - COURSE CURRICULUM FEEDBACK (by Students on MOODLE)
Based on the

Parameter(Average Grading)	1 .The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs	AVERAGE	Comment
Subject Name									
100022 BEEE (61)	3.79	3.62	4.1	3.82	3.68	3.79	3.82	3.80	good
100022 EEES (40)	3.65	3.7	3.9	3.675	3.575	3.45	3.625	3.65	good
130401 Digital Electronics & Microprocessor (31)	3.84	3.74	3.81	3.74	3.74	3.77	3.74	3.77	good
130402 Electrical Machines-I (26)	3.96	3.85	3.65	3.77	3.92	3.81	3.92	3.84	good
130403 Control System (27)	4.00	4.00	3.93	3.96	3.93	4.04	4.00	3.98	good
130404 Power System-I (28)	3.71	3.86	3.54	3.61	3.68	3.75	3.75	3.70	good
130611 (Computer Aided Power system Analysis) (5)	3.00	3.00	3.00	2.80	3.00	3.00	3.00	2.97	good
130612 (Industrial Automation) (3)	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	good
130614 (Solar PV System : Design & Economics)(7)	3.71	3.85	4.00	3.85	3.85	4.00	3.85	3.87	good
100007(Disaster Management)(11)	3.63	3.54	3.72	3.63	3.63	3.54	3.63	3.62	good
130601 (Switchgear & Protection)(15)	3.53	3.46	3.53	3.40	3.40	3.46	3.53	3.47	good
130602 (Electrical Engineering Materials)(12)	3.75	3.66	3.66	3.58	3.58	3.66	3.58	3.64	good



Action Taken:

Based on the above feedback, the syllabus of the subject Computer Aided Power System Analysis, Code, 130611 was reviewed. The committee has recommended some modification and restructureing of the course.

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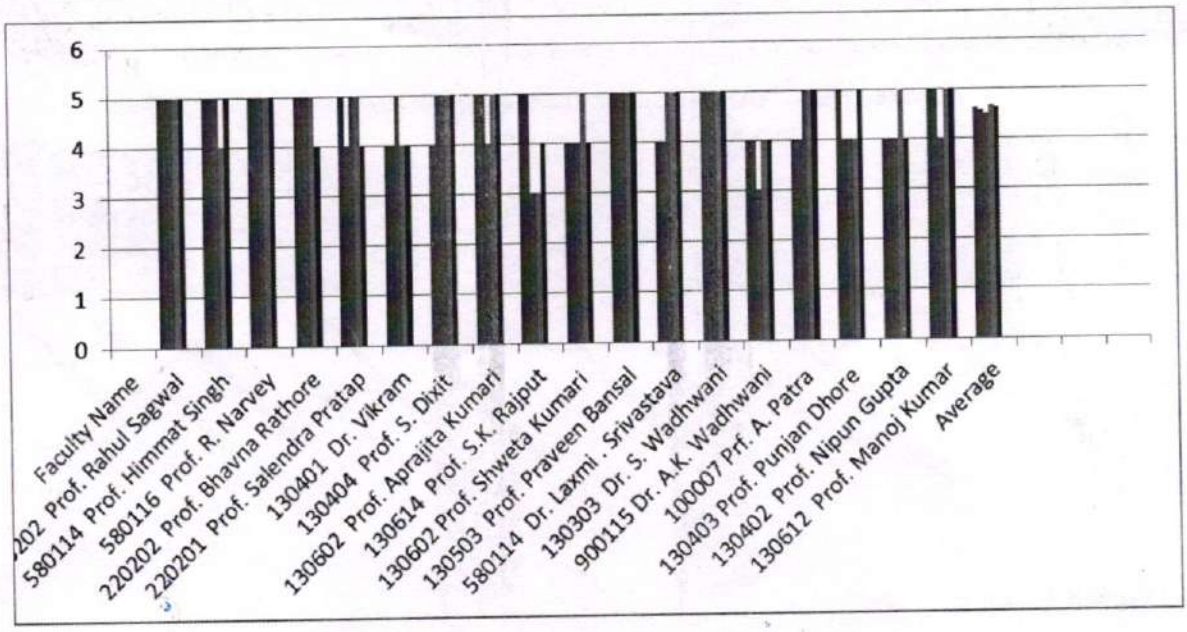
Electrical Engineering Department

2. Jan-MAY 2021: - EE COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

Parameter(Average Grading)	1. The availability of books & E-learning material in the institute is good. (Please	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes	5. The curriculum is capable of inculcating life-long learning abilities in	6. The environment of department/institute is conducive for innovative teaching and research. (Please comment)	7. The institute supports you in your initiatives for updating your knowledge/skills and in achieving career growth.	8.The institute provides basic infrastructural facilities required for teaching learning. (Please	9.You get academic freedom to implement your ideas and conduct your courses without	10. In general you are satisfied with your work environment and institute culture..(Please comment)
Faculty Name										
220202 Prof. Rahul Sagwal	5	5	5	5	5	Yes	Yes	Yes	Yes	Yes
580114 Prof. Himmat Singh	5	5	5	4	5	yes	Yes	yes	Very Good	Very Good
580116 Prof. R. Narvey	5	5	5	5	5	yes	supportive	yes	yes	yes
220202 Prof. Bhavna Rathore	5	5	5	5	4	yes	yes	yes	yes	yes
220201 Prof. Salendra Pratap	5	4	5	5	4	Yes	Yes	Yes	Yes	Yes
130401 Dr. Vikram	4	4	5	4	4	yes	supportive	Best infrastruct	No interference	Good
130404 Prof. S. Dixit	4	5	5	5	5	Yes	Yes	Yes	Yes	Yes
130602 Prof. Aprajita Kumari	5	5	4	5	5	Good	Yes	yes	Yes	yes
130614 Prof. S.K. Rajput	5	5	3	3	4	Good	Yes	yes	Good	yes
130602 Prof. Shweta Kumari	4	4	4	5	4	Yes	yes	yes	yes	yes
130503 Prof. Praveen Bansal	5	5	5	5	5	Very good	supportive	yes	yes	Good
580114 Dr. Laxmi . Srivastava	4	4	5	5	5	Very good	Yes	Yes	Yes	Good
130303 Dr. S. Wadhwani	5	5	5	5	5	yes	yes	yes	Good	yes
900115 Dr. A.K. Wadhwani	4	4	3	4	4	Yes	Yes	Yes	Yes	Good
100007 Prf. A. Patra	4	4	5	5	5	Very good	supportive	Yes	Yes	Yes
130403 Prof. Punjan Dhore	5	4	4	4	5	Yes	Yes	Yes	Good	Yes
130402 Prof. Nipun Gupta	4	4	4	5	4	Yes	yes	yes	yes	yes
130612 Prof. Manoj Kumar	5	5	4	5	5	Yes	Good	yes	yes	yes
Average	4.61	4.56	4.5	4.67	4.61					
	Very Good	Very Good	Very Good	Very Good	Very Good					



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Electrical Engineering Department

3. Alumni Feedback on Course Curriculum

Responses	Institute has adequate laboratories and equipment for practical exposure to students	The education imparted at MITS is useful and relevant in your career and present job	Have you obtained sufficient technical knowledge (both in theory and practical) at MITS	Overall are you satisfied with the Faculty, Staff and Administration during Program	The course and curriculum at MITS caters to the recent trends and developments in the field. (If no, please give below suggestions for improvement)	The syllabi were useful for meeting your higher studies/career goals. (If no, please suggest from your experience, what changes are required)	In your opinion, the course/ contents is up to date and no portion needs to be removed. (If no, please suggest courses/content which is obsolete and needs to be deleted)	The courses and contents are updated and no new course needs to be added right now. (If no, please suggest content/new courses which need to be added)
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Strongly Agree	12	14	14	4	18	18	14	15
Agree	19	19	18	17	17	17	16	17
Neutral	11	7	9	18	4	9	13	9
Disagree	6	5	4	9	6	3	2	4
Strongly Disagree		3	3		3	1	2	3
Feedback Indicator	**3.77**	**3.75**	**3.75**	**3.33**	**3.85**	**4.00**	**3.81**	**3.77**

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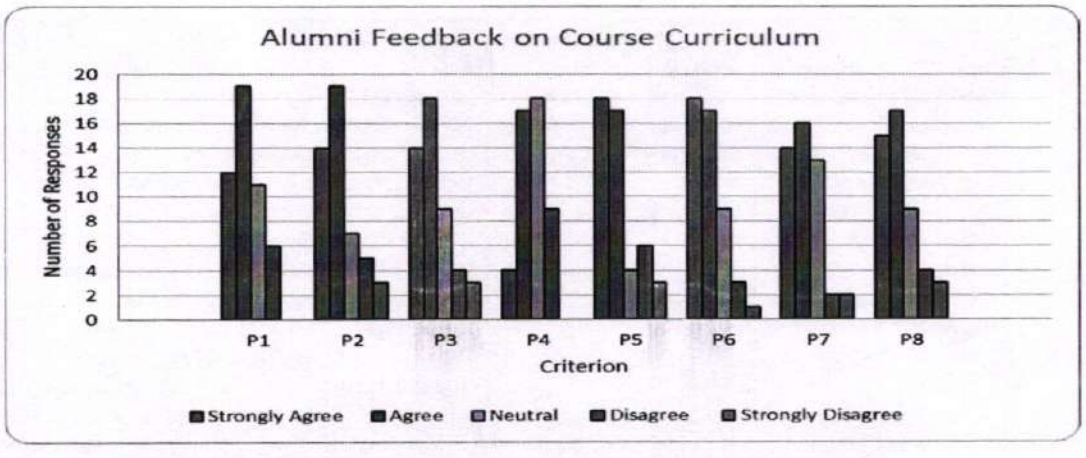
Electrical Engineering Department



P1 Institute has adequate laboratories and equipment for practical exposure to students

P2 The education imparted at MITS is useful and relevant in your career and present job

P3 Have you obtained sufficient technical knowledge (both in theory and practical) at MITS

P4 Overall are you satisfied with the Faculty, Staff and Administration during Program

P5 The course and curriculum at MITS caters to the recent trends and developments in the field.(If no, please give below suggestions for improvement)

P6 The syllabi were useful for meeting your higher studies/career goals.(If no, please suggest from your experience, what changes are required)

P7 In your opinion, the course / contents is up to date and no portion needs to be removed.(If no, please suggest courses/content which is obsolete and needs to be deleted)

P8 The courses and contents are updated and no new course needs to be added right now.(If no, please suggest content/new courses which need to be added)

Annexure-15

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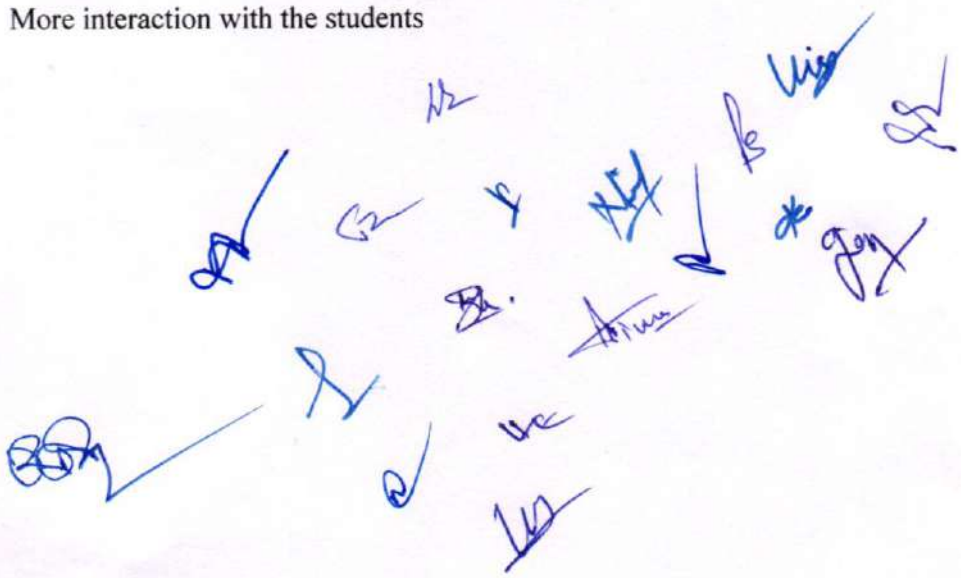
Electrical Engineering Department

Action Taken Report Based on CO attainment Feedback

- More assignment & tutorial classes should be conducted
- To support the CO, more numerical questions should be solved in tutorial classes
- Animations and videos are planned to demonstrate clear understanding
- If necessary, additional classes to be conducted
- More questions through assignments
- Provide various numerical problems through tutorial sheet
- More tutorials including algebra application to signals
- More tutorial including conceptual numerical problems through tutorial sheet should be given.
- Practical exposer through industrial visit, problem solving should be included to creating interest
- More numerical and tutorials are planned in the class
- Numerical on Circuit design problems and limitation
- Provide more numerical problems and assignments to the students
- Extra time will be given on this topic
- Variety of assignments and MCQs
- Animated video lectures may be demonstrated
- More interaction with the students



Annexure-16

M.E.(ISD) Semester – II DE-2

Code	Course Name	Offered by	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
	Introduction to Soft Computing	IITM	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Dr. Ankit Tiwari
	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems	IITG	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof. Vishal Chaudhary

Note: Credit for opting a particular NPTEL course will be given only once throughout the tenure of M.E. program

M.E.(ISD) Semester – II OC-2

Code	Course Name	Offered by	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
	Non-conventional energy Resources	IITM	12 Weeks	January 24, 2022	April 15, 2022	April 24, 2022	Prof. Vishal Chaudhary
	Introduction to Internet of things	IITKGP	12 Weeks	January 24, 2022	April 15, 2022	April 23, 2022	Prof. Bhavna Rathore

Note: Credit for opting a particular NPTEL course will be given only once throughout the tenure of M.E. program

M.E.(ISD) Semester – II Self Learning / Presentation

Code	Course Name	Offered by	Duration of the course	Start date	End date	Exam date	Name of the Mentor faculty
	Electric Vehicles – Part 1	IITD	4 Weeks	February 21, 2022	March 18, 2022	April 24, 2022	Prof Rakesh Narvey
	Recent Advances in Transmission Insulators	IISc	4 Weeks	January 24, 2022	February 18, 2022	March 27, 2022	Prof Rakesh Narvey