Government College of Engineering, Karad

PROPOSED SCHEME OF INSTRUCTION

Programme: Honors and Multidisciplinary Minor (Industrial Engineering)

(Major: Semester – IV)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							FA	SA	TOTAL
1	EEHO-3401	Programmable Logic Controllers (PLC)	03	--	03	03	20	30	50
2	EEHO-3402	Competency Lab-I	--	02	02	01	--	50	50
		Total	**03**	**02**	**05**	**04**	**20**	**80**	**100**

(Major: Semester – V)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							FA	SA	TOTAL
1	EEHO-3501	Industrial networking and communication/IOT	03	--	03	03	20	30	50
2	EEHO-3502	Competency Lab-II	--	02	02	01	--	50	50
		Total	**03**	**02**	**05**	**04**	**20**	**80**	**100**

(Major: Semester – VI)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							FA	SA	TOTAL
1	EEHO-3601	Human Maxchine Interface (HMI)	03	--	03	03	20	30	50
2	EEHO-3602	Competency Lab-III	--	02	02	01	--	50	50
		Total	**03**	**02**	**05**	**04**	**20**	**80**	**100**

(Major: Semester – VII)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							PBE-I	PBE-II	TOTAL
1	EEHO-3701	Professional Training & Mini-Project-I	--	06	06	03	50	50	100
		Total	**00**	**06**	**06**	**03**	**50**	**50**	**100**

(Major: Semester – VIII)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							PBE-I	PBE-II	TOTAL
1	EEHO-3802	Major Capstone Project (Design & Development)	--	6	06	03	50	50	100
		Total	**--**	**06**	**06**	**03**	50	50	100

L- Lecture P-Practical

FA- Formative Assessment SA - Summative Assessment (For Laboratory End Semester performance)

PBE-I– Project-based Examination (For Laboratory Mid Semester Performance)

PBE- II Project-based Examination (For Laboratory End Semester Performance)

PROGRESSIVE TOTAL CREDEES: 18

Guidelines:- Students will take up 5-6 addEEtional course in the same Engineering/ Technology discipline of 18 credEE distributed over semester III –VIII. These 18 credEEs will be over and above the 176 credEEs prescribed for four year multidisciplinary bachelor's degree in Engg/Tech Program.

Government College of Engineering, Karad

PROPOSED SCHEME OF INSTRUCTION

Programme: Honors with Research and Multidisciplinary Minor

(Major: Semester – VII)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							PBE-I	PBE-II	TOTAL
1	EEHR-3701	Research Project Phase -I	--	18	18	09	100	100	200
		Total	**--**	**18**	**18**	**09**	**100**	**100**	**200**

(Major: Semester – VIII)

Sr. No.	Course Code	Course TEEle	L	P	Contact Hrs/Wk	Course CredEEs	EXAM SCHEME		
							PBE-I	PBE-II	TOTAL
1	EEHR-3802	Research Project Phase -II	--	18	18	09	100	100	200
		Total	**--**	**18**	**18**	**09**	**100**	**100**	**200**

L- Lecture P-Practical

FA- Formative Assessment SA - Summative Assessment (For Laboratory End Semester performance)

PBE-I– Project-based Examination (For Laboratory Mid Semester Performance)

PBE- II Project-based Examination (For Laboratory End Semester Performance)

PROGRESSIVE TOTAL CREDEES: 18

Guidelines:- Students will work on research project for 18 credEEs in the semester VII –VIII in the respective Major Engineering/Tecnology discipline. These 18 credEEs will be over and above the 176 credits prescribed for four year multidisciplinary bachelor's degree in Engg/Tech Program.

Government College of Engineering, Karad

PROPOSED SCHEME OF INSTRUCTION

Programme: Double Minors (Multidisciplinary and Specialization Minors)

(Major: Semester – III)

Sr. No.	Course Code	Course Title	L	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME		
							FA	SA	TOTAL
1	EEDO-0301	DC Machines and Transformers	02	--	02	02	50	50	100
		Total	**02**	**--**	**02**	**02**	**50**	**50**	**100**

(Major: Semester – IV)

Sr. No.	Course Code	Course Title	L	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME		
							FA	SA	TOTAL
1	EEDO-0401	AC Machines	02	--	02	02	50	50	100
		Total	**02**	**--**	**02**	**02**	**50**	**50**	**100**

(Major: Semester – V)

Sr. No.	Course Code	Course Title	L	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME		
							FA	SA	TOTAL
1	EEDO-0501	Basics of Power System	03	--	03	03	50	50	100
2	EEDO -0502	Elecrical Machine Lab	--	02	02	01	50	-	50
		Total	**03**	**02**	**05**	**04**	**100**	**50**	**150**

(Major: Semester – VI)

Sr. No.	Course Code	Course Title	L	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME		
							FA	SA	TOTAL
1	EEDO-0601	Electrical Drives	02	--	02	02	50	50	100
		Total	**02**	**--**	**02**	**02**	**50**	**50**	**100**

(Major: Semester – VII)

Sr. No.	Course Code	Course Title	L	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME		
							FA	SA	TOTAL
1	EEDO-0701	- Switchgear and Protection	02	--	02	02	50	50	100
		Total	**02**	**--**	**02**	**02**	**50**	**50**	**100**

(Major: Semester – VIII)

Sr. No.	Course Code	Course Title	L	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME		
							PBE-I	PBE-II	TOTAL
1	EEDO -0801	Energy Management and Audit	02	--	02	02	50	50	100
2	EEDO-0802	Major Capstone Project (Design & Development)	--	08	08	04	50	50	100
		Total	**--**	**08**	**10**	**06**	100	100	200

L- Lecture P-Practical

FA- Formative Assessment SA - Summative Assessment (For Laboratory End Semester performance)

PBE-I– Project-based Examination (For Laboratory Mid Semester Performance)

PBE- II Project-based Examination (For Laboratory End Semester Performance)

PROGRESSIVE TOTAL CREDITS: 18

Guidelines:- Students will take up 5-6 addittional courses in another Engineering/ Technology/ Emerging Area of Specialization of 18 credit distributed over semester III –VIII. These 18 credits will be over and above the 176 credits prescribed for four year multidisciplinary bachelor's degree in Engg/Tech Program.

Government College of Engineering, Karad

Programme: Honors and Multidisciplinary Minor (Industrial Engineering)

EEHO3401: Programmable Logic Controllers (PLC)

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		FA	20
Tutorials	00 Hrs/week		SA	30
Total Credits	03		Total	50

Prerequisite : semiconductor physics

Course Outcomes (CO): Students will be able to

CO1	Operate PLC and use PLC memory
CO2	Use Boolean algebra to simplify designs.
CO3	Use Ladder Logic Function and advance function for PLC programming.
CO4	Select PLCs for relevant applications

	Course Contents	CO	Hours
Unit 1	**PLC Overview:** principle of operation of PLC, difference- PLC and computer controlled systems, hardware components of PLC, block diagram of PLC.	**CO1**	**(04)**
Unit 2	**PLC Memory and Logical Sensor:** types of memories available for PLC, various data files: User Bits Memory, Timer Counter Memory, PLC Status Bits, User Function Control Memory, Integer Memory, Floating Point Memory, Use addresses for locations in memory, Switches, TTL, Sinking and sourcing.	**CO1, CO2**	**(08)**
Unit 3	**Boolean Logic Design:** logic design for a given application, designs with Boolean algebra. Boolean algebra: Rules of Boolean Algebra, Logic Design for a given application Common Logic Forms: Complex gate forms, Multiplexer.	**CO2, CO3**	**(07)**
Unit 4	**Timers, Counter , Latch Concept:** counter as per requirement latch in ladder logic, counter as per requirement latch in ladder logic, Timers: On-delay timer, Off- delay timer, Retentive timer. Counters: Up-Counters, Down- Counter, Up-Down Counter. Master Control Relay.	**CO2, CO3**	**(08)**
Unit 5	**Ladder Logic Function and Advance Function:** Data handling Function: Move Function, Mathematical Function, Conversion Function, Logic Function: Comparison of Value, Boolean Function. List Function: Shift registers, Stacks, Sequencer Program Control: Branching and looping.	**CO2, CO3**	**(08)**
Unit 6	**Selecting PLC:** Analog Input – Output Module. Discrete Input – Output Module. PLC selection criteria. PLC specifications	**CO4**	**(04)**

Text Books

1.	"Programmable Logic Controller",5th Edition, John W. Webb and Ronald A. Reis, PHI Learning, New Delhi
2.	"Programming Language Concept", Peter sestoft, Springer
3.	"Automating Manufacturing System", Hugh Jack, Mc. Graw Hill, New Delhi

Reference Books

1.	"Programmable Logic Controllers",5th Edition, W. Bolton, Newnes

Useful Links

1.	https://nptel.ac.in/courses/108105088 by Prof.Alokkanti Deb. IIT Kharagpur

Government College of Engineering, Karad					
Programme: Honors and Multidisciplinary Minor (Industrial Engineering)					
EEHO3402: Competency Lab-1					
Laboratory Scheme:			**Examination Scheme:**		
Practical	02 Hrs/week		SA	50	
Total Credits	01				
Prerequisite : Digital Electronics					
Course Outcomes (CO): Students will be able to					
CO1	Examine the function of bit logic and program control instruction				
CO2	Identify the different types of the TIMER and COUNTER				
CO3	Develop ladder programming for given statement.				
CO4	Design a ladder and interface with hardware to operate different application.				

Course Contents		**CO**
Implementation of following concepts		
Experiment 1	Exposure to programming examines the function of Bit Logic Instructions	**CO1**
Experiment 2	Explore programming examines of the Program Control Instructions.	**CO1**
Experiment 3	Test and Identify different types of TIMER and COUNTER	**CO2**
Experiment 4	Develop ladder programming for a given statement - To on the bulb1 after 5sec of switch1 on. Turn the bulb2 on after the 5 sec of bulb1 on and test.	**CO2**
Experiment 5	Develop ladder programming for a given statement - To watch the on time of switch if total time excludes the limit, turn the bulb off and test. (Retentive Timer)	**CO2**
Experiment 6	Develop ladder programming for a given statement -To count a car and give signal for empty space and test.	**CO2**
Experiment 7	Develop ladder programming for a given statement - To on or off the motor via one switch and test.	**CO2**
Experiment 8	Develop ladder programming for a given statement -To operate four bulbs in series and test.	**CO2**
Experiment 9	Develop ladder programming for a given statement – To operate three floor elevators and test.	**CO3**
Experiment 10	Design a ladder to operate bottler filling plan and test	**CO4**
List of Submission:		
	Minimum number of Experiments: 08	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	-	-	1	-	1	1	-	-	-	-	-	-	-
CO 2	1	2	-	1	-	1	1	-	-	-	-	-	1	-
CO 3	-	1	3	2	1	1	-	-	-	-	-	-	2	-
CO 4	-	1	2	3	-	1	1	-	-	-	-	-	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

Programme: Double Minors (Multidisciplinary and Specialization Minors)

EEDO-0301: DC Machines and Transformer(Double Minor - 01)

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		MSE	20
Tutorials	00 Hrs/week		ISE	20
Total Credits	02		ESE	60
			Duration of ESE	02 Hrs 30 Min

Prerequisite: Basic of Electrical engineering

Course Outcomes (CO): Students will be able to

CO1	Acquire knowledge about constructional details of DC generator
CO2	Understand the concept of DC Motor
CO3	Acquire knowledge about constructional details of single-phase transformer
CO4	Understand the concept of different type transformers

	Course Contents	CO	Hours
Unit 1	**DC generator:** Constructional details of dc machines - armature winding- single layer winding, double layer winding- lap and wave principle of operation, EMF equation, excitation, armature reaction demagnetizing and cross magnetizing ampere turn, compensating windings, interpoles, commutation, voltage build up and load characteristics, parallel operation. Power flow diagram	**CO1**	**(10)**
Unit 2	**DC Motor:** Types**,** back emf, generation of torque, torque equation, performance characteristics, Starting of dc motors- starters 3-point and 4-point starters (principle only). Speed control of dc motors - field control, armature control. Braking of dc motors. Power flow diagram – losses and efficiency, applications	**CO2**	**(08)**
Unit 3	**Single phase Transformer**: working principle, types of Transformer, construction, EMF equation, Phasor diagrams, Voltage regulation of a Transformer, Losses in a transformer, Efficiency of a Transformer, Condition for maximum efficiency, All day efficiency, Application	**CO3**	**(07)**
Unit 4	**Three–phase Transformer**: Advantages of three phase Transformer, Principle of operation, Construction of three phase transformers, three–phase transformer connections, Rating of Transformers, Potential transformer, Current transformer, Autotransformer: Autotransformer Working, Advantages of Autotransformer over Two winding Transformer, application	**CO4**	**(09)**

Text Books

1. Kothari D.P, Nagrath I.J., “Electric Machines”, TMH Publications, 4th Edition
2. Dr. Bimbhra P.S., “Electric Machinery”, Khanna Publisher, Fifth Edition
3. B. L. Theraja, “Electrical Technology” Vol II,S.Chand Publications.

Reference Books

1. Deshpande M. V., “Electrical Machines”, Prentice Hall India, New Delhi
2. Irving L Koskow, “Electric Machinery and transformer”, 2nd Edition, Prentice Hall Indi

Useful Links

1. NPTEL :: Electrical Engineering - Electrical Machines -I by IIT Kharagpur
2. https://nptel.ac.in/courses/108102146 by Prof.G.Bhuvaneshwari. IIT Delhi

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	-	3	-	2	-	-	-	-	-	-	-	-	2
CO 2	-	3	1	-	-	-	-	-	-	-	-	-	1	-
CO 3	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO 4	-	1	2	-	-	-	-	-	-	-	-	-	2	-

1: Slight(Low) 2: Moderate(Medium) 3: Substantial(High)

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	10
Understand	5	5	20
Apply	5	5	10
Analyse	5	5	20
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad

Programme: Double Minors (Multidisciplinary and Specialization Minors)

EEDO-0401: AC Machines(Double Minor - 02)

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		MSE	20
Tutorials	00 Hrs/week		ISE	20
Total Credits	02		ESE	60
			Duration of ESE	02 Hrs 30 Min

Prerequisite: Basic of Electrical engineering

Course Outcomes (CO): Students will be able to

CO1	Utilize the concept of AC machines and their industrial applications
CO2	Analyse the equivalent circuit of machines in different application
CO3	Acquire knowledge about constructional details of single-phase Induction motor
CO4	Evaluate the performance analyses of different AC machines

	Course Contents	CO	Hours
Unit 1	**Three phase Induction Motor** Construction & types of 3 ph. Induction motors, torque equation, starting torque, running torque, condition of maximum torque ,torque slip characteristics, Need of starters for 3 phase Induction motors, types of starters, Speed control methods from stator side (Stator voltage control ,Stator Frequency control, Pole changing) & rotor side (rotor resistance control), Applications of 3 ph. Induction motors.	**CO1**	**(10)**
Unit 2	**Equivalent circuit analysis of three phase induction motor** Losses & efficiency of 3 phase induction motor, power flow diagram with numerical treatment, No load & blocked rotor test, equivalent circuit of 3 phase induction motor, Phasor diagram of 3 phase induction motor, performance of 3 phase induction motor using circle diagram, Cogging & crawling of 3 phase induction motor.	**CO2**	**(08)**
Unit 3	**Single Phase Induction Motor** Construction, Working and types of single phase induction motors (Split phase, capacitor start/run, shaded pole motors), Double field revolving theory, Characteristics & Applications.	**CO3**	**(07)**
Unit 4	**Synchronous motor** Synchronous motor, starting methods, Phasor Diagram, Effect of excitation on power factor and armature current, V and inverted V Curves, Operation of Synchronous motor as Synchronous Condenser, Applications of three phase synchronous motor. Permanent Magnet Machines, Principle, operation and applications of Brushless motors	**CO4**	**(09)**

Text Books

1. "Electrical Machines", S. K. Bhattacharya, 3rd edition, Tata Mc-Graw-Hill publication.
2. "Electrical Machines", I. J. Nagrath, D. P. Kothari, 4th edition, Tata McGraw Hill publication

Reference Books

1. "Electric Machinery", A. E. Fitzgerald, Mc-Graw Hill publications
2. "Theory of AC machines", A. S. Langsdorf, Mc-Graw Hill publications.
3. "Design of Brushless Permanent Magnet motors,"J. R. Hendershot and T. J. E. Miller, Magna Physics Publishing and Clarendon press. 1994edition.

Useful Links

1. www.nptel.iitm.ac.in (Video Courses on Electrical Machines by Prof. S K Bhattacharya, IIT Kharagapur)

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	-	3	-	2	-	-	-	-	-	-	-	-	2
CO 2	-	3	1	-	-	-	-	-	-	-	-	-	1	-
CO 3	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO 4	-	1	2	-	-	-	-	-	-	-	-	-	2	-

1: Slight(Low) 2: Moderate(Medium) 3: Substantial(High)

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	10
Understand	5	5	20
Apply	5	5	10
Analyse	5	5	20
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60