Jabalpur Engineering College, Jabalpur

(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme) with Provision for Internship
Bachelor of Technology (B.Tech.) VIII Semester (Electrical Engineering)

w.e.f. July 2024

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical			L	T	P	
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work					
1	EE801M	PEC-III	Professional Elective Course-III	70	20	10	-	-	100	3	1	-	4
2	EE802M	OEC-IV	Open Elective Course-IV	70	20	10	-	-	100	3	1	-	4
3	EE803M	PI	Major Project / Internship	-	-	-	150	100	250	-	-	16	8
			Total	140	40	20	150	100	450	6	2	16	16

Note: 1. Departmental BOS will decide list of three optional subjects for PEC III as well as for OEC IV.

Professional Elective Course-III		
S.No.	Subject Code	Subject Name
1	EE801M A	Process Control
2	EE801M B	SCADA System & Applications
3	EE801M C	Renewable & Non Conventional Energy Sources

Open Elective Course-IV		
S.No.	Subject Code	Subject Name
1	EE802M A	Digital Image Processing
2	EE802M B	Power Quality
3	EE802M C	Computer Networks

Note: 2. Students going for internship would have to opt MOOC/NPTEL subjects decided / listed by the HOD / Coordinator.

Professional Elective Course-III		
S.No.	Subject Code	Subject Name
1	EE801M D	NPTEL-1
2	EE801M E	NPTEL-2
3	EE801M F	NPTEL-3

Open Elective Course-IV		
S.No.	Subject Code	Subject Name
1	EE802M D	NPTEL-4
2	EE802M E	NPTEL-5
3	EE802M F	NPTEL-6

Note: 3. For Major Project / Internship, evaluation is based on work done, quality of report, presentation and performance in viva-voce through department project supervisor / Industry Project Coordinator.

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

PEC: Professional Elective Course, OEC: Open Elective Course, PI: Project and Internship

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Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Total Credits
		Theory			Practical		Total Marks				
		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	
EE801M A	Process Control	70	20	10	-	-	100	3	1	-	4

PROCESS CONTROL

Module-I
Special characteristics of process systems large time constants, interaction, multistaging, pure lag; control loops for simple systems and their Dynamics & stability.

Module-II
Generation of control action in electronic and pneumatic controllers. Control valves, valve positioners, relief and safety valves, relays, volume boosters, pneumatic transmitters for process variable. Tuning of controllers - Zeigler Nichols and other techniques.

Module-III
Different control techniques and interaction of process parameters e.g. feed forward, cascade, ratio, override controls Batch continuous process controls. Feed forward Control schemes.

Module-IV
Various process schemes / unit operations and their control schemes e.g. distillation columns, absorbers, heat exchangers, furnaces, reactors, mineral processing industries, etc. Use of control schemes for process optimization.

Module-V
Advanced control strategies with case studies. Use of DDC and PLC. Introduction to supervisory control. Conversion of existing control schemes in operating plants, data loggers.

Text Books:
1. Dale R.Patrick, Stephen W.Fardo, "Industrial Process Control Systems", Second Edition.
2. F.G.Shinskey, "Process Control Systems", McGraw Hill ,Third Edition.

Reference Book:
1. Carlos A. Smith C.A. & A.B. Corripio, "Principle & Practiced Automatic Process Control", Third Edition.

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Course Code : EE801M A
Course Category : PEC
Course Name : Process Control

After completion of this course student will be able to-

CO1: Identify different process dynamics in process industries and their control schemes.

CO2: Analyze and Design different types of mechanical, optical sensor and actuators.

CO3: Differentiate process controller's their stability and tuning.

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Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total Marks				
		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	
EE801M B	SCADA System & Applications	70	20	10	-	-	100	3	1	-	4

SCADA SYSTEM & APPLICATIONS

Module-I
Introduction to SCADA and PLC: SCADA: Data acquisition system, evaluation of SCADA, communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Ladder diagram, Functional Block diagram, Applications, Interfacing of PLC with SCADA.

Module-II
SCADA system components: Schemes, Remote Terminal Unit, Intelligent Electronic Devices, Communication Network, SCADA server.

Module-III
SCADA Architecture-Various SCADA Architectures, advantages and disadvantages of each system, single unified standard architecture IEC 61850 SCADA / HMI Systems.

Module-IV
SCADA Communication-Various industrial communication technologies- wired and wireless methods and fibre optics, open standard communication protocols.

Module-V
Operation and control of interconnected power system-Automatic substation control, SCADA configuration, Energy management system, system operating states, system security, state estimation. Unit
VI: SCADA applications Utility applications, transmission and distribution sector operation, monitoring analysis and improvement. Industries oil gas and water. Case studies, implementation, simulation exercises.

Text Book:
1. Stuart A Boyer, "SCADA supervisory control and data acquisition", First Edition.

Reference Book:
1. Gordan Clark, Deem Reynders, "Practical Modem SCADA Protocols", First Edition.

Course Code : **EE801M B**
Course Category: **PEC**
Course Name : **SCADA System & Applications**

After completion of this course student will be able to-

CO1: Understanding of Supervisory control & Data acquisition.

CO2: Design of SCADA systems with establishment of communication protocols.

CO3: Application of the SCADA to utilities for their operation & control.

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		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	
EE801M C	Renewable & Non-Conventional Energy Sources	70	20	10	-	-	100	3	1	-	4

RENEWABLE & NON-CONVENTIONAL ENERGY SOURCES

Module-I

Renewable Energy Systems Energy Sources, Comparison of Conventional and non-conventional, renewable and non-renewable sources. Statistics of world resources and data on different sources globally and in Indian context, Significance of renewable sources and their exploitation, Energy planning, Energy efficiency and management.

Module-II

Wind Energy System Wind Energy, Wind Mills, and Grid connected systems. System configuration, working principles, limitations, Effects of wind speed and grid conditions, Grid independent systems - wind-battery, wind diesel, wind hydro biomass etc. wind operated pumps, controller for energy balance .Small Hydro System Grid connected system, system configuration, working principles, limitations. Effect of hydro potential and grid condition, Synchronous versus Induction Generator for standalone systems, Use of electronic load controllers and self-excited induction generators Wave Energy System: System configuration: grid connected and hybrid systems.
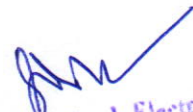
Module-III

Solar Radiation Extra-terrestrial solar radiation, terrestrial solar radiation, Solar thermal conversion, Solar Photo tonic System Solar cell, Solar cell materials, efficiency, Characteristics of PV panels under varying insulation. PV operated lighting and water pumps, characteristics of motors and pumps connected to PV panels.

Biomass Energy System: System configuration, Biomass engine driven generators, feeding loads in stand-alone or hybrid modes, Biomass energy and their characteristics.

Module-IV

Energy from oceans Ocean temperature difference, Principles of OTEC, plant operations,

Geothermal Energy Electric Energy from gaseous cells, Magneto-hydro generated energy, Non-hazardous energy from nuclear wastes, Possibilities of other modern non-conventional energy sources.

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Module-V

Electric Energy Conservation Energy efficient motors and other equipment, Energy saving in Power Electronic controlled drives. Electricity saving in pumps, air-conditioning, power plants, process industries, illumination etc., Methods of Energy Audit

Measurements systems; efficiency measurements energy regulation, typical case studies, various measuring devices analog and digital, use of thyristors.

Text Books:

1. John Twidell & Toney Weir, "Renewable Energy Resources", E & F N Spon, Third Edition.
2. El-Wakil, "Power Plant Technology", McGraw Hill, First Edition.
3. Rai G D, "Non-conventional Energy Resources", Khanna Publication, Third Edition.

Reference Books:

1. F Howard E. Jordan, "Energy-Efficient Electric Motor & their Application", Plenum Press, New York, USA, Second Edition.
2. Anna Mani, "Wind Energy Resource Survey", Allied Publishers Ltd., New Delhi, Second Edition.

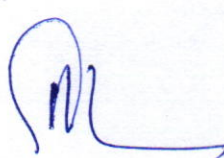|		
Course Code	:	**EE801M C**
Course Category	:	**PEC**
Course Name	:	**Renewable & Non-Conventional Energy Sources**

After completion of this course student will be able to-

CO1: Understand the need of energy conversion and the various methods of energy storage.

CO2: Explain the field applications of renewable energy sources.

CO3: Illustrate the concepts of Direct Energy Conversion systems & their applications.

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		Theory			Practical		Total Marks				
		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	
EE802M A	Digital Image Processing	70	20	10	-	-	100	3	1	-	4

DIGITAL IMAGE PROCESSING

Module -I

Digital Image Fundamentals: Steps in Digital Image Processing – Components – Elements of Visual Perception–Image Sensing and Acquisition–Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT.

Module-II

Image Enhancement: Spatial Domain: Gray level transformations – Histogram processing , Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters , Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.
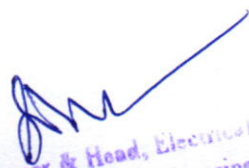
Module-III

Image Restoration: Image Restoration ,degradation model, Properties, Noise models , Mean Filters, Order Statistics , Adaptive filters , Band reject Filters, Band pass Filters , Notch Filters , Optimum Notch Filtering , Inverse Filtering , Wiener filtering.

Module-IV

Image Segmentation: Edge detection, Edge linking via Hough transform , Thresholding , Region based segmentation , Region growing , Region splitting and merging , Morphological processing, erosion and dilation, Segmentation by morphological watersheds , basic concepts,Dam construction, Watershed segmentation algorithm.

Module-V

Image Compression and Recognition: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors, Topological feature, Texture, Patterns and Pattern classes, Recognition based on matching.

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Text books:
1. R.C.Gonzalez and Richard E Woods, "Digital Image Processing", Pearson Education, Fourth edition.
2. Anil.K.Jain, "Fundamentals of Digital Image Processing" Pearson Education, First Edition.

Reference Book:
1. B.Chanda and D. Dutta Majumdar, "Digital Image Processing and Analysis", PHI India, Second Edition.

Course Code : EE802M A
Course Category : OEC
Course Name : Digital Image Processing

After successful completion of the course, students will be able to-

CO-1: Understand the basics of digital image processing. (Blooms cognitive level 1, 2)

CO-2: Operate on images using the techniques of smoothing, sharpening and enhancement. (Blooms cognitive level 3)

CO-3: Implement and Analyze the Images using various algorithms. (Blooms Cognitive level 3,4)

CO-4: Design adaptive algorithm suitable for image restoration, segmentation, compression, recognition etc. (Blooms cognitive level 6)

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		Theory			Practical		Total Marks				
		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	
EE802M B	Power Quality	70	20	10	-	-	100	3	1	-	4

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POWER QUALITY

Module-I

Introduction power quality: voltage quality, power quality evaluation Procedure, term anddefinition, general classes of power quality problem, causes & effect of power quality disturbance.

Module-II

Voltage sags and interruption: sources of sags and interruption, estimating voltage sagperformance, fundamental principles of protection monitoring sags.

Module-III

Transients over voltages: sources of transients over voltages, principles of over voltage protection, utility capacitor switching transients, fundamentals of harmonicsand harmonics distortion, harmonic sources from commercial load and from industrial loads.

Module-IV

Applied harmonics: harmonics distortion evaluations, principles for controlling harmonics,studies devices for controlling harmonic distortion, filters, and passive input filter standards of harmonics

Module-V

Electromagnetic compatibility, constant frequency control, constant tolerance band control,variable tolerance band control, discontinuous current control

Text Books:

1. Roger C. Duggan, Mark F. McGranaghan, Surya Santoso, "Electrical Power System Quality", Third edition.
2. Jos Arrillaga, "Power System Harmonics",Wiley, Second Edition.

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Reference Books:

1. Derek A. Paice, "Power Electronics Converter Harmonics", First Edition.
2. Angelo Baggini, "Handbook of Power Quality", Wiley, Third Edition.

Course Code	:	**EE802M B**
Course Category:		**OEC**
Course Name	:	**Power Quality**

At the end of this course students will be able to:

CO-1: Understand the major power quality problems.

CO-2: Understand and analyze harmonics in power systems.

CO-3: Use equipment that is required to measure the quality of power.

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		End Sem	Mid-Sem Exam	Quiz/ Assignment	End Sem	Lab work		L	T	P	
EE802M C	Computer Networks	70	20	10	-	-	100	3	1	-	4

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COMPUTER NETWORKS

Module-I

Introduction: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay. THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

Module-II

The Data Link Layer: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer in the internet. **The Medium Access Sublayer**: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth

Module-III

The Network Layer: Network layer design issues, routing algorithms, Congestion control algorithms, Internet working, the network layer in the internet (IPv4 and IPv6), Quality of Service.

Module-IV

The Transport Layer: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

Module-V

The Application Layer: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.
Application Layer Protocols: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

Text Book:

1. A.S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.

Reference Books:

1. Behrouz A. Forouzan, "Data communications and Networking, McGraw-Hill India, Fourth Edition,
2. James F. Kurose Keith W. Ross, "Computer Networking: A top down approach", Pearson Education, India, Sixth Edition.

Course Code : **EE802M C**
Course Category: OEC
Course Name : **Computer Networks**

After completion of this course student will be able to-

CO-1: Identify different process dynamics in process industries and their control schemes.

CO-2: Analyze and Design different types of mechanical, optical sensor and actuators.

CO-3: Differentiate process controller's their stability and tuning.

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