K.S.R.M. College of Engineering, Kadapa.

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

VII Semester

S. No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1		Professional Elective Course - III (PEC-III)							
	2002701	Power Quality	PEC	3	0	0	40	60	03
2		Professional Elective Course - IV (PEC-IV)							
	2002705	Electrical Distribution Systems	PEC	3	0	0	40	60	03
3		Professional Elective Course - V (PEC-V)							
	2002707	Flexible AC Transmission Systems	PEC	3	0	0	40	60	03
4	20OEXXX	Open Elective Course -III	OEC	3	0	0	40	60	03
5	20OEXXX	Open Elective Course –IV	OEC	3	0	0	40	60	03
6	2006701	Human Resource Development	HSS	3	0	0	40	60	03
7	2002710	Internship	PROJ	0	0	0	100	---	03
8	2002711	Skill Advanced Course	SC	1	0	2	40	60	02
Total				19	00	02	380	420	23

VIII Semester

S. No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1	2002801	Project Work	PROJ	0	0	-	40	60	12
		Internship in Industry							
Total							40	60	12

B. Tech., VII Semester

<table>
<tr><td>Course Title</td><td colspan="5">POWER QUALITY
(PEC – III)</td><td colspan="3">B. Tech. VII-Semester</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2002701</td><td rowspan="2">Professional Elective (PEC)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td colspan="5">Mid Exam Duration: 2 Hrs</td><td colspan="3">End Exam Duration : 3 Hrs</td></tr>
<tr><td colspan="8">Course Objectives: The student is able to learn the power quality issues, voltage disturbances, power transients, concept of harmonics and their effect in power system equipment, measuring and monitoring concepts of power quality.</td></tr>
<tr><td colspan="8">On successful completion of this course, the students will be able to</td></tr>
<tr><td>CO 1</td><td colspan="7">Understand the different power quality problems in the power system.</td></tr>
<tr><td>CO 2</td><td colspan="7">Understand the effect of harmonics in the system and the equipment</td></tr>
<tr><td>CO 3</td><td colspan="7">Examine the voltage variations and over voltage transients and conventional devices for voltage regulations in the system</td></tr>
<tr><td>CO 4</td><td colspan="7">Analyze the concepts on measuring and monitoring issues of quality</td></tr>
</table>

UNIT-I

Introduction: Definition of Power Quality- Power Quality Terminology – Classification of Power Quality Issues-Magnitude Versus Duration Plot - Power Quality Standards (IEEE & IEC) - Responsibilities of The Suppliers and Users of Electric Power-CBEMA and ITIC Curves.

UNIT-II

Transients, Short Duration and Long Duration Variations: Categories and Characteristics of Electromagnetic Phenomena in Power Systems-Impulsive and Oscillatory Transients-Interruption - Sag-Swell-Sustained Interruption - Under Voltage – Over Voltage–Outage. Sources of Different Power Quality Disturbances- Principles of Regulating the Voltage- Conventional Devices for Voltage Regulation.

UNIT-III

Fundamentals of Harmonics : Harmonic Distortion, Voltage Versus Current Distortion, Harmonics Versus Transients, Power System Quality Under Non Sinusoidal Conditions, Harmonic Indices, Harmonic Sources From Commercial Loads, Harmonic Sources From Industrial Loads.

UNIT-IV

Power Quality Monitoring: Power Quality Benchmarking-Monitoring Considerations- Choosing Monitoring Locations-Permanent Power Quality Monitoring Equipment-Historical Perspective of Power Quality Measuring Instruments-Power Quality Measurement Equipment-Types of Instruments- Assessment of Power Quality Measurement Data-Power Quality Monitoring Standards.

UNIT-V

Power Quality Enhancement Using Custom Power Devices: Introduction to Custom Power Devices-Network Reconfiguring Type: Solid State Current Limiter (SSCL)-Solid State Breaker (SSB) -Solid State Transfer Switch (SSTS) - Compensating Type: Dynamic Voltage Restorer (DVR)-Unified Power Quality Conditioner (UPQC)-Principle of Operation Only.

Text Books

1. Electrical Power Systems Quality, Roger C. Dugan, Mark F. McGranaghan, Surya Santoso, H. Wayne Beaty, 2nd Edition, TMH Education Pvt. Ltd., 2008.
2. Power quality, C. Sankaran, CRC Press, 2002.

Reference Books

1. Understanding Power quality problems, Math H. J. Bollen IEEE Press, 2007.
2. Power quality enhancement using custom power devices, Arindam Ghosh, Gerard Ledwich, Kluwer academic publishers, 2002.
3. Fundamentals of Electric Power Quality, Surya Santoso, Create Space, 2010.

Course Title	Electrical Distribution Systems (PEC – IV)				B. Tech. VII Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2002705	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration : 3Hrs		

Course Objectives: The student is able to learn load modeling characteristics, classification of distribution systems and various substations, improvement of power factor in substations and distribution automation

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

CO 1	Understand The Concept of Load Characteristics, SCADA, Distribution Automation Systems
CO 2	Classify Various Loads In Distribution Systems And Substations
CO 3	Estimate Voltage and Current In Feeders
CO 4	Analyze Distribution Feeder Configurations, Bus bar Arrangements In Substations
CO 5	Analyze Voltage Drop and Power Loss Calculations for Radial Networks and Power Factor Improvement

UNIT- I

Load Modeling and Characteristics: Introduction to Distribution Systems, Load Modeling and Characteristics. Coincidence Factor, Contribution Factor Loss Factor - Relationship between the Load Factor and Loss Factor. Classification of Loads (Residential, Commercial, Agricultural and Industrial) and Their Characteristics.

UNIT-II

Classification of Distribution Systems: Classification of Distribution Systems - Comparison of DC Vs AC–comparison of Under-Ground Vs Over - Head Distribution Systems- Requirements and Design Features of Distribution Systems-

Design Considerations of Distribution Feeders: Radial and Loop Types of Primary Feeders,-Voltage Levels, Feeder Loading, Basic Design Practice of the Secondary Distribution System.

Voltage Drop & Current Calculations (Numerical Problems) in D.C. Distributors.

UNIT-III

Substations: Location of Substations, Rating of Distribution Substation, Service Area within Primary Feeders. Benefits Derived Through Optimal Location of Substations.

Classification of Substations: Air Insulated & Gas insulated Substations, Substation Layouts and functioning of different components of the substations, Merits & Demerits of GIS over AIS, Busbar arrangements in the Sub-Stations with Relevant Diagrams.

UNIT-IV

Power Factor Improvement: Voltage Drop and Power-Loss Calculations: Derivation for Voltage Drop and Power Loss in Lines, Manual Methods of Solution for Radial Networks, Three Phase Balanced Primary Lines.

Causes of Low P. F -Methods of Improving P. F -Phase Advancing and Generation of Reactive KVAR Using Static Capacitors-Most Economical P.F. for Constant KW Load and Constant KVA Type Loads, Numerical Problems.

UNIT-V

Distribution Automation: Distribution Automation (DA) – Project Planning – Definitions – Communication – Sensors – Supervisory Control and Data Acquisition (SCADA) – Consumer Information Service (CIS) – Geographical Information System (GIS) – Automatic Meter Reading (AMR) – Automation Systems.

Text Books

1. Electric Power Distribution System, Engineering by Turan Gonen, Mc Graw-hill Book Company, 1986.
2. Electric Power Distribution by A. S. Pabla, Tata Mc Graw-hill Publishing Company, 4th edition, 1997.

Reference Books

1. Electrical Power Distribution Systems by V. Kamaraju, Jain Book Depot. 2012.
2. HandBook of Electric Power Distribution by G. Ramamurthy, 2nd Edition, Universities Press, 2009.

Course Title	Flexible AC Transmission Systems (PEC – V)				B. Tech. VII Semester		
Course Code	Category	Hours / Week			Credits	Maximum Marks	
2002707	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2Hrs						End Exam Duration : 3Hrs		

Course Objectives: The objective of the course is to learn the fundamentals of FACTS controllers, types of FACTS controllers, voltage source converters, shunt and series compensation, control of STATCOM and SVC.

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

CO 1	Understand the operating principles of various FACTS devices.
CO 2	Choose proper controllers for specific application based on system requirement
CO 3	Understand the importance of compensation methods in power system network
CO 4	Analyze the role of SVC & STATCOM in improving the power system dynamics.
CO 5	Analyze the use of control schemes of TCSC, TSSC, GSC in improving the power quality

UNIT - I

FACTS Concepts: Transmission interconnections, power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT - II

Voltage Source Converters: Single & three phase full wave bridge Converters -transformer connections for 12 pulse 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

UNIT - III

Static Shunt Compensation: Objectives of shunt compensation, midpoint voltage regulation voltage instability prevention, improvement of transient stability, Power oscillation damping. Methods of controllable VAR generation, variable impedance type static VAR generators, switching converter type VAR generators, hybrid VAR generators.

UNIT - IV

Static VAR Compensator(SVC) and Static Synchronous Compensation(STATCOM): The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.

UNIT - V

Static Series Compensators: concept of series capacitive compensation, improvement of transient stability, power oscillation damping.

Functional requirements, GTO thyristor controlled Series Capacitors (GSC), Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC) control schemes for GSC, TSSC and TCSC.

Text Book

1. Concepts and Technology of Flexible AC Transmission Systems-Understanding FACTS by Narain G. Hingorani and Laszlo Gyugyi, Standard Publishers Distributors, IEEE Press Publications, 1st Edition, 2001.
2. FACTS Controllers in Power Transmission & Distribution by K. R. Padiyaar, New Academic Science Publishers, 2020.

Reference Books

1. Thyristor based FACTS Controllers for Electrical Transmission Systems by R. Mohan Mathur, Rajiv K. Varma, IEEE Press Series on Power Engineering, 2002.
2. Flexible AC Transmission Systems by Yong Hua Song and Alln T Johns, The Institute of Electrical Engineers, London, UK, 1999.

<table>
<tr><td>Course Title</td><td colspan="5">Internship</td><td colspan="3">B. Tech. VII Semester</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2002710</td><td rowspan="2">Internship (INT)</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1.5</td><td>100</td><td>00</td><td>100</td></tr>
<tr><td colspan="6"></td><td colspan="3"></td></tr>
<tr><td colspan="9">Course Objectives: The main objective of the course is to learn
• Develop and improve business skills in communication, technology, quantitative reasoning, and teamwork
• Observe and participate in business operations and decision-making
• Meet professional role models and potential mentors who can provide guidance, feedback, and support</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to</td></tr>
<tr><td>CO 1</td><td colspan="8">Assess interests and abilities in their field of study and Integrate theory and practice</td></tr>
<tr><td>CO 2</td><td colspan="8">Develop communication, interpersonal and other critical skills in the job interview process</td></tr>
<tr><td>CO 3</td><td colspan="8">Acquire employment contacts leading directly to a full-time job following graduation from college</td></tr>
<tr><td>CO 4</td><td colspan="8">Identify and carry out performance objectives related to their job assignment</td></tr>
</table>

Course Title	Skill Advanced Course (Introduction to Machine Learning using Python)				B. Tech. EEE VII Sem		
Course Code	**Category**	**Hours/week**		**Credits**	**Maximum Marks**		
2002711	**Skill Course SC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		1	**-**	**2**	**2**	**40**	**60**	**100**
End Exam Duration: 3Hrs								

Course Objectives:

- To create awareness on machine learning
- To understand significance of notebooks for machine learning applications
- To understand the supervised, unsupervised and reinforced algorithms
- To know the architecture of ANN and deep neural networks.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Understand fundamentals of Machine Learning
CO 2	Able to develop a machine learning model using notebooks
CO 3	Apply concepts of Machine learning in real time problems
CO 4	Develop ANN and deep neural network models for real time applications

List of Experiments

1. Introduction on Machine Learning
3. Data Preprocessing
4. Supervised Machine Learning
   - 4.1 Simple Linear Regression
   - 4.2 Multiple Linear Regression
   - 4.3 Polynomial Linear Regression
   - 4.4 Support Vector Machine
   - 4.5 Decision Tree Regression
   - 4.6 Random Forest Regression
   - 4.7 Regression model selection
5. Classification
   - 5.1 Logistic Regression
   - 5.2 K-Nearest Neighbors (K-NN)
   - 5.3 Support Vector Machine (SVM)
   - 5.4 Kernel SVM
   - 5.5 Naive Bayes
   - 5.6 Decision Tree Classification
   - 5.7 Random Forest Classification
   - 5.8 Classification model selection
6. Clustering
   - 6.1 K-Means Clustering
   - 6.2 Hierarchical Clustering
7. Artificial Neural network
   - 7.1 Feedforward neural network
   - 7.2 Back propagation neural network

Text Books:

1.AurélienGéron, “Hands-On Machine Learning with Scikit-Learn and TensorFlowConcepts,Tools, and Techniques to Build Intelligent Systems”, O’reilly publishers, 2017

2. Chris albon, “Machine Learning with Python cookbook”, O’reilly publishers, 2018

Reference Books:

1. Oliver Theobald, “Machine Learning For Absolute Beginners”, A Plain English Introduction (2nd Edition)

2. John Paul Mueller and Luca Massaron, “Machine Learning (in Python and R) For Dummies”(1st Edition)

Course Title	HUMAN RESOURCE DEVELOPMENT (Humanities & Social Sciences Elective)				B.Tech. VI Sem (Humanities Open Elective)		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2006701	Humanities & Social Sciences (HSMC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2Hrs					External Exam Duration: 3Hrs		

Course Objectives: The main objective of the course is to learn

- To develop capability of all individuals working in an organization in relation to their present role
- To develop team spirit.
- To develop co-ordination among different units of an organization.
- To develop organization health by continuous reveal of individual capability keeping peace with the technological changes.
- To develop better interpersonal & employer-employee relationships in an organization.

Course Outcomes: On success Completion This course, the students will be able to

CO1	To understand key functions in management as applied in practice.
CO2	To understand in more specific management related areas from planning till controlling.
CO3	To understand about the authority and responsibility, and different organizational structure..
CO4	To understand about the role of leadership, motivation and communication in an organization.
CO5	To understand the importance of globalization and diversity in modern organizations.

Unit I

Introduction to Human Resource Development: Meaning, significance and objectives of Human Resource Development, Human Resource Management and Human Resource development functions, Human Resource Development challenges

Unit II

HRD Need Assessment & Designing of HRD programs: Strategic/ Organizational Analysis- Task Analysis- Person Analysis- prioritizing HRD needs, defining the objectives of HRD Intervention - Selecting the trainer - Selecting the Training methods - Preparing training material Scheduling an HRD program

Unit III

Implementation &Evaluation of HRD programs: Training methods - Classroom training Approaches - Computer based Training, Purpose of HRD Evaluation- Kirkpatrick's evaluation frame work - Data collection for HRD Evaluation - Assessing the impact of HRD programs in Monetary Terms

Unit IV

Career Management and Development: Introduction to Career management, meaning - Stages of life and Career Development - process of career Development - Issues in career development.

Unit V

HRD & Diversity: Introduction – Organizational culture – Labor Market changes and discrimination adapting to demographic changes

Text books:

1. Jon M Werner,Randy L DeSimone: Human Resource development (Thomson/Cengage)
2. Raymond A Noe: Employee Trainee Development (Tata McGraw Hill)
3. Dr. D.K Bhattacharya, Himalaya Publishing House

References:

1. John P. Wilson Human Resource Development (Kogan Page Business Books)
2. Tripathi P.C : Human Resource Development (Sultan Chand & Sons)
3. Uday Kumar Haldar : Human Resource Development (Oxford)

B. Tech., VIII Semester

<table>
<tr><td>Course Title</td><td colspan="5">Project Work</td><td colspan="3">B. Tech. VIII Semester</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours / Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">2002801</td><td rowspan="2">PROJ</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exam</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>--</td><td>12</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>Internship in Industry</td><td></td><td></td><td></td><td></td><td></td><td>--</td><td>--</td><td>--</td></tr>
<tr><td colspan="9">Course Objectives: The objective of the course is to,
1. Develop and conduct appropriate experimentation, analyze and interpret data, and useengineering judgment to draw conclusions.
2. Acquire and apply new knowledge as needed, using appropriate learning strategies.
3. Apply knowledge of probability and statistics to applications in electrical engineering..</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to,</td></tr>
<tr><td>CO 1</td><td colspan="8">Demonstrate a sound technical knowledge of their selected project topic.</td></tr>
<tr><td>CO 2</td><td colspan="8">Understand problem identification, formulation and solution.</td></tr>
<tr><td>CO 3</td><td colspan="8">Design engineering solutions to complex problems utilizing a systemsapproach.</td></tr>
<tr><td>CO 4</td><td colspan="8">Communicate with engineers and the community at large in written an oralform.</td></tr>
<tr><td>CO 5</td><td colspan="8">Demonstrate the knowledge, skills and attitudes of a professional engineer.</td></tr>
</table>