ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT,
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RAJAMPET, YSR District, AP – 516126, INDIA

2026-27

ELECTRICAL & ELECTRONICS ENGINEERING

Course Structure and Syllabi for

R26

Master of Technology (M. Tech) - ELECTRICAL POWER SYSTEMS

I Semester

S.No	Category	Course Code	Course Title	Hours / week			Credits
				L	T	P	
1.	PC	26DEPS11T	Advanced Power System Protection	3	-	-	3
2.	PC	26DEPS12T	Advanced Power System Analysis	3	-	-	3
3	PE	MOOC-1 (26DEPS13T)		-	-	-	3
4	PE	MOOC-2 (26DEPS14T)		-	-	-	3
5.	MC	26DMBA11T	Research Methodology and IPR	2	-	-	2
6.	AU	26DAUD1AT	English for Research Paper Writing	-	-	-	-
		26DAUD1BT	Disaster Management				
		26DAUD1CT	Sanskrit for Technical Knowledge				
		26DAUD1DT	Value Education				
Lab courses							
7.	PL	26DEPS11L	Power System lab	-	-	4	2
8.	PL	26DEPS12L	Power system Simulation lab-1	-	-	4	2
				14		8	18

II Semester

S.No	Category	Course Code	Course Title	Hours / week			Credits
				L	T	P	
1.	PC	26DEPS21T	Power System Stability and Control	3	-	-	3
2.	PC	26DEPS22T	Power Electronics Applications in Power Systems	3	-	-	3
3	PE	MOOC – 3 (26DEPS23T)			-	-	3
4	PE	MOOC-4 (26DEPS24T)			-	-	3
5	AU	26DAUD2AT	Constitution of India	-	-	-	-
		26DAUD2BT	Pedagogy Studies	-	-	-	-
		26DAUD2CT	Stress Management by Yoga				
		26DAUD2DT	Personality development through life enlightenment skills				
Lab Courses							
6	PL	26DEPS23L	Power System Simulation Lab II	-	-	4	2
7	PL	26DEPS24L	Renewable Energy and Green Technology Lab	-	-	4	2
8	PS	26DEPS21P	Mini Project with Seminar	-	-	4	2
				12		12	18

III semester

S.No	Category	Course Code	Course Title	Hours / week			Credits
				L	T	P	
1.	PE	MOOC – 5 (26DEPS31T)		-	-	-	3
2	OE	MOOC – 6 (26DEPS32T)		-	-	-	3
3.	PW	26DEPS31P	Dissertation Phase-I	-	-	20	10
				6		20	16

IV semester

S.No	Category	Course Code	Course Title	Hours / week			Credits
				L	T	P	
1.	PW	26DEPS41P	Dissertation Phase-II	-	-	32	16
						32	16

List of MOOC Courses in I Semester

S. No.	Category	Course Code	Course Title
1	PE	26DEPS1AT	Optimization theory and Algorithms
2		26DEPS1BT	DC Micro Grid and Control Systems
3		26DEPS1CT	Design of Photo Voltaic Systems
4		26DEPS1DT	Introduction to Electric and Hybrid Electric Vehicle
5		26DEPS1ET	Advances in UHV Transmission and Distribution
6		26DEPS1FT	Advanced Power Electronics and Control

List of MOOC Courses in II-Semester

S. No.	Category	Course Code	Course Title
1	PE	26DEPS2AT	EV Vehicle Dynamics and Electric Motor Dynamics
2		26DEPS2BT	Optimization Techniques in Power systems
3		26DEPS2CT	Power System Dynamics, Control and Monitoring
4		26DEPS2DT	Power Quality Improvement Techniques
5		26DEPS2ET	Introduction to microgrid system
6		26DEPS2FT	Operation and planning of Power Distribution Systems

List of MOOC Courses in III-Semester

S. No	Category	Course code	Course title
1	PE	26DEPS3AT	Design of Photo Voltaic Systems
2		26DEPS3BT	Smart Grid: Basics to Advanced Technologies
3		26DEPS3CT	Digital Power Systems Protection
4	OE	26DCIV3AT	Cost Management of Engineering Projects
5		26DCIV3BT	Industrial Safety
6		26DME3AT	Composite Materials
7		26DME3BT	Operations Research
8		26DEEE3AT	Electric Vehicles
9		26DEEE3BT	Energy Conversion Systems
10		26DECE3AT	Image Processing
11		26DECE3BT	Wireless Communications
12		26DCSE3CT	Artificial Intelligence
13		26DCSE3DT	Introduction to Machine learning
14		26DMBA3AT	Business Analytics
15		26DMBA3BT	Project appraisal and Finance

NOTE: All the above-mentioned MOOCs list of courses are tentative depending upon the semester location with MOOCs calendar and the subject relevant course will be selected by the BOS chairman and Module Coordinator along with students.

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course	**:**	**Advanced Power System Protection**
Course Code	**:**	**26DEPS11T**
Speclization / Sem	**:**	**Electrical Power systems / I SEM**
Credits / Category	**:**	3 - **PC**

Course Objectives

1. Study of numerical relays & static relays.
2. Developing mathematical approach towards protection.
3. Study of algorithms for numerical protection.

Course Outcomes:

1 Learn the importance of Digital Relays& static relays.
2 Apply Mathematical approach towards protection.
3 Learn to develop various Protection algorithms.

Unit 1 Static Relays & Amplitude Comparators **9**

Static Relays: Advantages of static relays-Basic construction of static relays-Replica impedance – Mixing Circuits-General equation for two input phase and amplitude comparators Duality between amplitude and phase comparators.

Amplitude comparators: Circulating current type and opposed voltage type- rectifier bridge comparators, Direct and Instantaneous comparators.

Unit 2 Phase Comparators & Static Over current Relay **9**

Phase Comparators: Coincidence circuit type- block spike phase comparator, techniques to measure the period of coincidence-Integrating type-Rectifier and Vector product type- Phase comparators.

Static over current relays: Instantaneous over-current relay-Time over-current relays basic principles –definite time and Inverse definite time over-current relays.

Unit 3 Static - Differential Relay & Distance Relay **9**

Static Differential relays: Analysis of Static Differential Relays –Static Relay schemes –Duo bias transformer differential protection –Harmonic restraint relay.

Static Distance relays: Static impedance reactance–MHO and angle impedance relay sampling comparator –realization of reactance and MHO relay using sampling comparator.

Unit 4 Transformer Protection **9**

Types of Differential Protection – High Impedance – External fault with one CT saturation –Need for high impedance - Percentage Differential Bias Characteristics – Inrush phenomenon – Zero Sequence filtering – High resistance Ground Faults in Transformers – Restricted Earth fault Protection - Inter-turn faults in transformers – Incipient faults in transformers –DGA for transformer monitoring

Unit 5 Protection of Alternators **9**

Protection against Stator fault (Phase to Phase and Phase to Ground), Balanced earth fault protection, Stator inter turn protection, Unbalanced loading of Alternator, Prime Mover failure, Overvoltage protection, Overloading Protection, Restricted Earth fault and standby earth fault protection, Rotor Fault Protection

Prescribed Textbooks:

1. Badri Ram and Vishwakarma.D.N, "Power System Protection and Switchgear", Tata McGraw- Hill Publishing Company, 2002.

Reference Books:

1. Paithankar.Y.G and Bhide.S.R, "Fundamentals of Power System Protection", Prentice-Hall of India, Second Edition, PHI Learning Pvt.Ltd, 2013.
2. Arun K. Phadke, James. S. Thorp, "Computer relaying for Power system", John Wiley and sons, New York, Second edition, 2012.
3. A.T. Johns and S. K. Salman, "Digital Protection for Power Systems", IEEE Press, Second edition,2022.
4. Gerhard Zeigler " Numerical Distance Protection", Siemens Public Corporate Publishing, 2006.
5. S.R.Bhide"Digital Power System Protection "PHI Learning Pvt. Ltd. 2014

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course	**:**	**Advanced Power System Analysis**
Course Code	**:**	**26DEPS12T**
Speclization / Sem	**:**	**Electrical Power systems / I SEM**
Credits /Category	**:**	3 - **PC**

Course Objectives:

1 To introduce different techniques of dealing with sparse matrix for large scale power systems.
2 To impart in-depth knowledge on different methods of power flow solutions.
3 To perform optimal power flow solutions in detail
4 To perform short circuit fault analysis and understand the consequence of different type of faults.
5 To Illustrate different numeric al integration methods and factors influencing transient stability

Course Outcomes:

1 Understand different techniques dealing with sparse matrix for large scale power systems
2 Analyze different methods of power flow solutions.
3 Analyze various types of short circuit faults.
4 Understand to solve optimal power flow problem
5 Demonstrate different numeric al integration methods and factors influencing transient stability

Unit 1 Sparse Matrix Techniques and Numerical Integration Methods in Power Systems 9

Solution technique: Sparse Matrix techniques for large scale power systems: Optimal ordering schemes for preserving sparsity. Flexible packed storage scheme for storing matrix as compact arrays –Gauss elimination methods, Π- representation of off-nominal tap transformers. **Numerical integration methods:** Introduction, Numerical Integration Methods: Euler and fourth order Runge-Kutta methods, Algorithm for simulation of SMIB and Multi-machine system with classical synchronous machine model; Factors influencing transient stability

Unit 2 Power flow studies 9

Power flow studies: Introduction to load flow analysis, formation of Y_{bus}. Classification of buses, Load flow solution methods – Gauss-Seidal method, Newton Raphson method, Decoupled and fast decoupled load flow, Comparison of load flow methods.

Unit 3 Short circuit analysis 9

Short circuit analysis: Formation of bus impedance matrix with & without mutual coupling (single phase basis) - Computer method for fault analysis using ZBUS and sequence components. Derivation of equations for bus voltages, fault current and line currents, both in sequence and phase.

Unit 4 Optimal power flow 9

Optimal power flow: Problem statement; Solution of Optimal Power Flow (OPF) – The gradient method, Newton's method, Linear Sensitivity Analysis.

Unit 5 State estimation: 9

State estimation: Introduction to state estimation, least squares estimation and weighted least squares estimation, State estimation algorithm for AC network, Detection and identification of bad measurements, Network observability and pseudo-measurements, State estimation and bad data detection using MATLAB Programming (simulation exercise).

Prescribed Textbooks:

1. Pai, M.A., „Computer Techniques in Power System Analysis", Tata McGraw hill, New Delhi, 2006

Reference Books:

1. J.J. Grainger &W.D.Stevenson, "Power system analysis", McGraw Hill, 2003.
2. R. Bergen & Vijay Vittal , "Power System Analysis" ,Pearson , 2000
3. L.P. Singh ,"Advanced Power System Analysis and Dynamics", New Age International, 2006.
4. Rama Swamy Natarajan, "Computer aided power system analysis" ,Marcel Dekkar, Newyork, 2002.
5. A.J. Wood, "Power generation, operation and control" , John Wiley,Third Edition, 1994.
6. Nasser Tlies, "Power Systems Modelling and Fault Analysis" , Second Edition , 2019

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course	**:**	**English for Research Paper Writing**
Course Code	**:**	**26DHUM1AT**
Speclization / Sem	**:**	**Electrical Power systems / I SEM**
Credits /Category	**:**	- AU

Course Outcomes:

1. Structure paragraphs and sentences effectively to ensure clarity and logical flow in research papers.
2. Write concisely, eliminating redundancy and avoiding ambiguity in academic writing.
3. Apply ethical writing practices, including proper paraphrasing and avoiding plagiarism, to maintain academic integrity.
4. Highlight research findings clearly and craft well-written sections of a research paper, such as the abstract, introduction, and conclusions.
5. Develop skills to prepare a research paper for submission, including title selection, phrase usage, and final quality checks.

Unit 1 **4**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit 2 **4**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction.

Unit 3 **4**

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit 4 **4**

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

Unit 5 **4**

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

Unit 6 **4**

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Prescribed Textbooks:

1.Goldbort R (2006) Writing for Science, Yale University Press

Reference Books:

1. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
2. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook
3. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : **Disaster Management**

Course Code : **26DCIV1AT**
Speclization / Sem : **Electrical Power systems / I SEM**
Credits /Category : - **AU**
-

Course Objectives:

1 Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2 Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response
3 Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
4 Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
5 Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

Course Outcomes:

1 Differentiate between hazards and disasters, understanding their types, significance, and the differences between natural and man-made disasters.
2 Assess the economic, human, and ecological impacts of various disasters, recognizing the damage caused by both natural and man-made events.
3 Identify and map disaster-prone areas in India, with a focus on post-disaster issues like diseases and epidemics.
4 Implement disaster preparedness techniques, including risk evaluation and formulating community and governmental preparedness plans.
5 Conduct disaster risk assessments, engage in disaster risk reduction efforts, and develop mitigation strategies focusing on emerging trends

Unit 1 **4**

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude

Unit 2 **4**

Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human and Animal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides And Avalanches, Man- made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks Of Disease and Epidemics, War and Conflicts**.**

Unit 3 **4**

Disaster Prone Areas In India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

Unit 4 **4**

Disaster Preparedness and Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness

Unit 5 **4**

Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival**.**

Unit 6 **4**

Disaster Mitigation: Meaning, Concept And Strategies Of Disaster Mitigation, Emerging trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

Prescribed Textbooks:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.

Reference Books:

1. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
2. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep & Deep Publication Pvt. Ltd., New Delhi.

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course	**:**	**Sanskrit for Technical Knowledge**
Course Code	**:**	**26DCIV1AT**
Speclization / Sem	**:**	**Electrical Power systems / I SEM**
Credits /Category	**:**	- **AU**
		-

Course Objectives:

1 To get a working knowledge in illustrious Sanskrit, the scientific language in the world.
2 Learning of Sanskrit to improve brain functioning.
3 Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power.
4 The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.
5 To get a working knowledge in illustrious Sanskrit, the scientific language in the world.

Course Outcomes:

1 Understand basic Sanskrit language
2 Understand Ancient Sanskrit literature about science & technology
3 Being a logical language will help to develop logic in students

Unit 1 **4**
Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Unit 2 **4**
Order Introduction of roots. Technical information about Sanskrit Literature

Unit 3 **4**
Technical concepts of Engineering-Electrical.

Unit 4 **4**
Technical concepts of Engineering-Mechanical.

Unit 5 **4**
Technical concepts of Engineering- Architecture.

Unit 6 **4**
Technical concepts of Engineering- Mathematics.

Prescribed Textbooks:

1. “Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi

Reference Books:

1. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
2. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.

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Title of the Course	**:**	**Value Education**
Course Code	**:**	**26DJUM1CT**
Speclization / Sem	**:**	**Electrical Power systems / I SEM**
Credits /Category	**:**	**- AU**

Course Objectives:

1 Understand value of education and self- development
2 Imbibe good values in students
3 Let they should know about the importance of character

Course Outcomes:

1 Gain knowledge of self-development
2 Learn the importance of Human values
3 Develop the overall personality

Unit 1 **4**

Values and self-development - Social values and individual attitudes. Work ethics, Indian vision of humanism.

Moral and non- moral valuation. Standards and principles. Value judgements

Unit 2 **4**

Importance of cultivation of values - Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline.

Unit 3 **4**

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking.

Unit 4 **4**

Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature.

Unit 5 **4**

Character and Competence – Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women

Unit 6 **4**

All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Prescribed Textbooks:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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Title of the Course : **Power System Lab**

Course Code : **26DEPS11L**
Speclization / Sem : **Electrical Power systems / I SEM**
Credits /Category : **2- PL**

From the following list of experiments perform any eight experiments

1. Characteristics of IDMT over current relay (electromagnetic type).
2. Characteristics of Negative phase sequence relay (static type).
3. Characteristics of Percentage biased differential relay (static type).
4. Characteristics of Over voltage relay (electromagnetic type).
5. Characteristics of Over voltage/under voltage relay (microprocessor-based type).
6. Characteristics of Percentage biased differential relay (electromagnetic type).
7. Equivalent circuit of three winding transformer.
8. Scott connection.
9. Separation of No-load losses of 3-phase squirrel cage Induction motor
10. Determination of sub-transient of salient pole synchronous machine.
11. Power angle characteristics of salient pole synchronous machine
12. Determination of Sequence Impedances of Three Phase Transformer
13. Performance evaluation of concentrating solar collector

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : **Power System Simulation Lab-1**

Course Code : **26DEPS12L**
Speclization / Sem : **Electrical Power systems / I SEM**
Credits /Category : **2- PL**

From the following list of experiments perform any eight experiments

1. Formation of Bus admittance matrix with and without off-nominal ratios of transformer of a power system network.
2. Develop program for Z_{BUS}.
3. Develop program for G-S load flow algorithm.
4. Develop program for N-R load flow algorithm in polar coordinates.
5. Develop program for FDLF algorithm
6. Develop program for DC load flow algorithm.
7. Develop program for short circuit analysis using Z_{BUS} algorithm.
8. Develop program for transient stability analysis for single machine connected to infinite bus
9. Develop program for economic load dispatch problem using lambda iterative method.
10. Develop program for unit commitment problem using forward dynamic programming method.
11. Develop program for state estimation of power system.
12. Simulink model of single area load frequency control with and without PI controller and with PID controller.
13. Simulink model for two area load frequency control

Title of the Course	**:**	**Power System Stability and Control**
Course Code	**:**	**26DEPS21T**
Speclization / Sem	**:**	**Electrical Power systems / II SEM**
Credits /Category	**:**	**3- PC**

Course Objectives

1 Understand the fundamental concepts of power system stability, synchronous machine dynamics, and the development of the swing equation.
2 Analyze the transient stability of single-machine and multi-machine power systems using classical models and equal area criteria.
3 Study the dynamic response of synchronous machines under small disturbances and examine the effects of excitation systems and governors on system stability.
4 Understand the design and operation of Power System Stabilizers (PSS), excitation systems, and supplementary control techniques for improving power system stability.
5 Evaluate voltage stability and voltage collapse phenomena using PV and QV curves, voltage stability indicators.

Course Outcomes:

1 Analyze the dynamic behavior of synchronous machines and evaluate transient stability of single-machine and multi-machine power systems using swing equations and equal area criteria.
2 Analyze the small-disturbance response and dynamic stability of power systems using state-space models and Routh's stability criterion, considering the effects of excitation systems and governors.
3 Design and analyze Power System Stabilizers (PSS) using supplementary stabilizing signals, linear system models, and lead compensation techniques to improve system damping.
4 Analyze different types of excitation systems using block diagrams and state-space models and evaluate their influence on generator performance, stability, and power limits.
5 Evaluate voltage stability and voltage security using PV and QV curves, voltage stability indicators,

Unit 1 **9**

The elementary mathematical model: Basic Definitions-Dynamics of synchronous machine, Development of swing equation, Classical model of one machine connected to an infinite bus – Equal area criteria, Classical model of multi machine system –Problems, Effect of the excitation system on Transient stability.

Unit 2 **9**

System response to small disturbances: The unregulated synchronous Machine – modes of oscillation of an unregulated Multi machine system – regulated synchronous machine – voltage regulator with one time lag – Governor with one time lag – Problems. Concept of Dynamic stability – state space model of one machine system connected to infinite bus – effect of excitation on Dynamic stability – examination of dynamic stability by Routh’s criterion.

Unit 3 **9**

Power system stabilizers: Introduction to supplementary stabilizing signals- Block diagram of the linear system- Approximate model of the complete exciter generator system – Lead compensation

Unit 4 **9**

Excitation systems: Excitation system response – Non-continuously regulated systems – continuously regulated systems – Excitation system compensation – state space description of the excitation system- simplified linear model – effect of excitation on generator power limits. Type – 2 systems: rotating rectifier system, Type-3 system: Static with terminal potential and current supplies - Type –4 systems: non – continuous acting - Block diagram representation – state space modelling equations of these types.

Unit 5 9

Voltage Stability: Definition and classification, Mechanism of voltage collapse, Analysis of voltage stability of a two-bus system using PV curve, Factors affecting voltage stability, Voltage security, Voltage security assessment using PV and QV curves. **Voltage Stability Indicators:** Introduction to voltage stability indicators, Fundamental indicators using PV and QV curves, dE/dV and dQ/dV criteria of voltage stability, Load voltage indicator, Voltage stability index, Voltage stability analysis using E-Tap and Mi-Power Softwares (simulation exercise).

Prescribed Textbooks:

1. Prabha S Kundur ‘Power system stability and control” by r,MCGrawhill-Inc, USA, 2022

Reference Books:

1. P.M.Anderson, A.A.Fouad, “Power System Control and Stability”, IOWA State University Press, Galgotia Publications, New Delhi, 2003.
2. D.P.Kothari and I.J.Nagrath, “Modern Power System Analysis”, third edition, TMH Publications, 2003.
3. K.R. Padiyar, Power System Dynamics (Stability & Control), 2nd Edition B.S. Publications, 2002.
4. Edward Wilson Kimbark, “Power System stability: Synchronous Machines”, Dover publications Inc., New York.

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course	**:**	**Power Electronics Applications in Power Systems**
Course Code	**:**	**26DEPS22T**
Speclization / Sem	**:**	**Electrical Power systems / II SEM**
Credits /Category	**:**	**2- PC**

Course Objectives

1 Understand power semiconductor devices, converter types, and basic power electronic circuits.
2 Understand FACTS controllers and different types of shunt compensators used in power systems.
3 Study different series and combined FACTS controllers and their applications in power systems.
4 explain HVDC system configurations, converter operation, and control techniques.
5 Know the applications of power electronic converters in solar and wind energy systems.

Course Outcomes:

1 Identify power semiconductor devices and understand their characteristics and applications.
2 Explain the operation of TCR, FC-TCR, TSC, and SVC.
3 Explain the operation of TSSC, TCSC, SSSC, UPFC, and IPFC.
4 Understand HVDC transmission systems, their components, control, and protection methods.
5 Explain the operation of power converters used in solar photovoltaic and wind energy systems.

Unit 1 **9**

Review of power electronics system, power semiconductor devices & their characteristics, converter topologies, control circuits, requirements of synchronization, isolation, amplification devices, and device data sheets

Unit 2 **9**

Flexible ac transmission systems, reactive power control, description and definition of FACTS controllers, Shunt compensators, Configuration and operating characteristics of TCR, FC-TCR, TSC, Comparison of SVCs.

Unit 3 **9**

Series compensators, variable impedance type series compensators, configuration and operating characteristics of TSSC, TCSC, switching converter type series compensators, configuration and operating characteristics of SSSC, combined compensators, UPFC and IPFC

Unit 4 **9**

HVDC transmission system, HVDC system configurations and components, converter theory and performance equations, control and protection of HVDC systems, MTDC operation, modern trends.

Unit 5 **9**

HVDC transmission system, HVDC system configurations and components, converter theory and performance equations, control and protection of HVDC systems, MTDC operation, modern trends.

Prescribed Textbooks:

1. K. R. Padiyar, “HVDC power transmission systems”, New Age International Publishers, 2010.
2. N. G. Hingorani and L. Gyugyi, “Understanding FACTS – Concepts and technology of flexible AC transmission systems”, IEEE Press, Standard Publishers Distributors, 2001.

Reference Books:

1 M. H. Rashid, “Power electronics circuits, devices, and applications”, PHI, Pvt. Ltd, 2004.

2 N. Mohan, T. M. Undeland, & W. P. Robbins, “Power electronics converters, applications and design”, John Wiley & sons, 2009.

3 R. M. Mathur and R. K. Verma, “Thyristor based FACTS controller for electrical transmission systems”, John Wiley and sons, 2002

4 P. Kundur, “Power system stability and control”, McGraw-Hill, 2008.

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : **Constitution of India**
Course Code : 24DHUM2AT
Speclization / Sem : **Electrical Power systems / II SEM**
Credits /Category : - **AU**

Course Objectives

1 Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2 To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3 To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution

Course Outcomes:

1 Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2 Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3 Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

Unit 1 **9**

History of Making of the Indian Constitution: History, Drafting Committee (Composition & Working) audit.

Unit 2 **9**

Philosophy of the Indian Constitution: Preamble Salient Features

Unit 3 **9**

Contours of Constitutional Rights & Duties: Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights Right to Constitutional Remedies Directive Principles of State Policy Fundamental Duties.

Unit 4 **9**

Organs of Governance: Parliament Composition, Qualifications and Disqualifications Powers and Functions

Executive President Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions.

Unit 5 **9**

Local Administration: District's Administration head: Role and Importance,

Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation.
Panchayati raj: Introduction, PRI: ZillaPachayat.Elected officials and their roles, CEO Zilla Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments)
Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Prescribed Textbooks:

1 The Constitution of India, 1950 (Bare Act), Government Publication.

Reference Books:

1 Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
2 M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
3 D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : Pedagogy Studies
Course Code : 26DHUM2BT
Speclization / Sem : Electrical Power systems / II SEM
Credits /Category : - AU

Course Objectives

1 Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2 Identify critical evidence gaps to guide the development.

Course Outcomes:

1 pedagogical practices are being used by teachers in formal and informal classrooms in developing countries
2 Evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners
3 Teacher educates (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy

Unit 1

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education.

Conceptual framework, Research questions. Overview of methodology and Searching.

Unit 2 4

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit 3 **4**

Evidence on the effectiveness of pedagogical practices Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

Unit 4 **4**

Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit 5 **4**

Professional development: alignment with classroom practices and follow-up support
Peer support: Support from the head teacher and the community. Curriculum and assessment. Barriers to learning: limited resources and large class sizes

Unit 6 **4**

Research gaps and future directions Research design Contexts Pedagogy Teacher education
Curriculum and assessment Dissemination and research impact. L

Prescribed Books:

1 Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245 - 261.

Reference Books:

1. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
2. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
3. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
4. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
5. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
6. www.pratham.org/images/resource%20working%20paper%202.pdf.ss

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : **Stress management by Yoga**
Course Code : **26DHUM2CT**
Speclization / Sem : **Electrical Power systems / II SEM**
Credits /Category : - **AU**

Course Objectives

1 To achieve overall health of body and mind
2 To overcome stress

Course Outcomes:

1 Develop healthy mind in a healthy body thus improving social health also Improve efficiency
2 Develop healthy mind in a healthy body thus improving social health also Improve efficiency

Unit 1 **5**

Definitions of Eight parts of yog. (Ashtanga)

Unit 2 **5**

Yam and Niyam. Do's and Don'ts in life. Ahinsa, satya, astheya, bramhacharya and aparigraha

Unit 3 **5**

Yam and Niyam. Do`s and Don'ts in life. Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit 4 **5**

Asan and Pranayam. Various yog poses and their benefits for mind & body

Unit 5 **4**

Regularization of breathing techniques and its effects-Types of pranayama

Prescribed Textbooks:

1 Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yoga bhyasi Mandal, Nagpur

Reference Books:

1 "Rajayog or conquering the Internal Nature" by Swami Vivekananda Advaita Ashrama (Publication Department), Kolkata

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : Personality Development through Life Enlightment Skills
Course Code : 26DHUM2DT
Speclization / Sem : Electrical Power systems / II SEM
Credits /Category : - AU

Course Objectives

1 To learn to achieve the highest goal happily
2 To become a person with stable mind, pleasing personality and determination
3 To awaken wisdom in students

Course Outcomes:

1 Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2 The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3 Study of Neetishatakam will help in developing versatile personality of students

Unit 1 **4**

Neetisatakam-Holistic development of personality
Verses- 19,20,21,22 (wisdom)
Verses- 29,31,32 (pride & heroism)
Verses- 26,28,63,65 (virtue)

Unit 2 Analysis of HVDC Converters **4**

Neetisatakam-Holistic development of personality
Verses- 52,53,59 (dont's)
Verses- 71,73,75,78 (do's)

Unit 3 **4**

Approach to day to day work and duties.
Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48

Unit 4 **4**

Chapter 3-Verses 13, 21, 27, 35,
Chapter 6-Verses 5,13,17, 23, 35,
Chapter 18-Verses 45, 46, 48

Unit 5 **4**

Statements of basic knowledge. Shrimad Bhagwad Geeta:
Chapter2-Verses 56, 62, 68
Chapter 12 -Verses 13, 14, 15, 16,17, 18

Unit 6 **4**

Personality of Role model. Shrimad Bhagwad Geeta:
Chapter2-Verses 17,
Chapter 3-Verses 36,37,42,
Chapter 4-Verses 18, 38,39
Chapter18 – Verses 37,38,63

Prescribed Textbooks:

1 “Srimad Bhagavad Gita” by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata

Reference Books:

1 Bhartrihari’s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course : **Power System Simulation Lab II**
Course Code : **26DHUM2DT**
Speclization / Sem : **Electrical Power systems / II SEM**
Credits /Category : 2- PC

From the following list of experiments perform any eight experiments

1. Determination of line parameters R,L and C.
2. Determination of T/ L efficiency and regulation for a given load.
3. Analysis of Ferranti effect on transmission lines under light loadings.
4. Determination of ABCD parameters of a given transmission line network.
5. Fault analysis:
   I. Single Line to Ground fault (L-G).
   II. Line to Line fault (L-L).
   III. Double Line to Ground fault (L-L-G
   IV. Triple Line to Ground fault (L-L-L-G).
6. Analysis of uncompensated lines and their voltage profiles.
7. Shunt compensation of transmission lines (Capacitor/Reactors)
8. Load compensation analysis
9. Line compensation using FACTS devices.
10. Analysis of transmission lines under surge impedance loading.
11. Determination of sequence impedance of transmission line and SIL analysis.
12. Develop program for generation system reliability analysis.

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RAJAMPET, YSR District, AP – 516126, INDIA

Title of the Course	**:**	**Renewable Energy and Green Technology Lab**
Course Code	**:**	**24CEEE0FT**
Speclization / Sem	**:**	**Electrical Power systems / II SEM**
Credits /Category	**:**	2- **PC**

From the following list of experiments perform any eight experiments

1. Simulation study on solar PV energy system.
2. Experiment on "VI-Characteristics and Efficiency of 1kWp solar PV system".
3. Experiment on "Shadowing effect & diode based solution in1kWp solar PV system".
4. Experiment on performance assessment of Grid connected and standalone 1kWp solar power system.
5. Simulation study on wind energy generator.
6. Experiment on performance assessment of micro wind energy generator.
7. Simulation study on hybrid (Solar-Wind) power system.
8. Experiment on performance assessment of hybrid (Solar-Wind) power system.
9. Simulation study on hydel power.
10. Experiment on performance assessment of 100W fuel.
11. Simulation study on intelligent controllers for hybrid systems