Appendix " Z" Item No. 39

EEE - IV- Year

Semester – I :

 Subject Subject Title Credits Lecture Tutorial Lab Total Sessional Exam Total

 Code Hrs Hrs contact marks marks marks

 Hrs/week

EEE 4101 Power System

 Analysis & Stability 4 3 1 - 4 30 70 100

EEE 4102 Power System

 Protection 4 3 1 - 4 30 70 100

EEE 4103 Engineering Economics 4 3 1 - 4 30 70 100

EEE 4104 Power Systems

 Operation and Control 4 3 1 - 4 30 70 100

EEE 4105 Elective-V HVDC 4 3 1 - 4 30 70 100

 Transmission, Advanced

 Control Systems, Electrical

 Distribution Systems

EEE 4106 Elective-VI Operations 4 3 1 - 4 30 70 100

 Research, Flexible AC

 Transmission, Systems

 Advanced Power Electronics

EEE 4107 Power System

 Simulation Lab 2 - - 3 3 50 50 100

EEE 4108 Power System

 Protection Lab 2 - - 3 3 50 50 100

  **Total 28 18 6 6 30 280 520 800**

Semester – II :

 Subject Subject Title Credits Lecture Tutorial Lab Total Sessional Exam Total

 Code Hrs Hrs contact marks marks marks

 Hrs/week

EEE 4101 Power System

EEE 4201 Internship/ Project Work 14 50 50 100

EEE 4202 MOOCS – III 2 - - - - - - 100

EEE4203 MOOCS – IV 2 - - - - - - 100

  **Total 18 300**

EEE 4101: POWER SYSTEM ANALYSIS & STABILITY

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**UNIT – I** : **Per Unit Representation & Topology** Per Unit Quantities–Single line diagram– Impedance diagram of a power system – Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y– bus matrix by singular transformation and direct inspection methods.

**UNIT – II** : **Power Flow Studies**: Necessity of power flow studies – Derivation of stati power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods

**UNIT – III** : **Symmetrical Fault Analysis**: Formation of Z–Bus: Partial network– Algorithm for the Modification of Zbus Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of Z–Bus for the changes in network (Problems). 3–Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations.

**UNIT – IV : Symmetrical Components**: Synthesis of unsymmetrical phasor from their symmetrical components– Symmetrical components of unsymmetrical phasor–Phase – shift of symmetrical components in Y–Ä–Power in terms of symmetrical components – Sequence networks – Positive, negative and zero sequence networks

**UNIT – IV : Unsymmetrical Faults:** Various types of faults LG– LL– LLG and LLL on unloaded alternator– unsymmetrical faults on power system.

**UNIT – VI : Power System Stability Analysis**: Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance Synchronizing Power Coefficient –Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Application of Equal Area Criterion–Methods to improve steady state and transient stability.

Textbooks:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.

2. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata Mc Graw–Hill Publishing Company, 2nd edition.

Reference Books:

1. Power System Analysis by Hadi Saadat – TMH Edition.

EEE 4102: POWER SYSTEM PROTECTION

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**Introduction to protection scheme**: Need for Protective systems - Nature and causes of Faults -Types of faults - Effect of faults - fault statistics - Evolution of protective relays - Zones of protection - Primary and Back -up Protection - Essential qualities of Protection -Classification of Protective schemes -Automatic reclosing - current transformer for Protection - potential transformer - basic relay terminology.

**Relays**: General considerations - sensing of faults - construction of electro-magnetic attraction and induction types relays - Buchholz and negative sequence relay -concept of reset, pick up, inverse time and definite time characteristics, over current, over voltage, directional, differential and distance relays on R-X diagram - Static Relays: Introduction, advantage and limitation of static relays, static over current, directional, distance and differential relays. Electronic relays - static relays functional circuits: comparators, level detectors, logic and training circuits, microprocessor and computer based protection schemes.

**Protection:** Types & detection of faults and their effects, alternator protection scheme - Power transformer protection , generator-transformer unit protection scheme, bus bar protection - Transmission line protection, Pilot relaying schemes, power line carrier protection.

**Switchgear:** Theory of current interruption- energy balance and recovery rate theory, arc quenching, recovery and restriking voltages - Types of circuit breakers - Rating selection and testing of circuit breakers/operating mechanisms - LT switchgear, HRC fuses, types construction and applications.

Text Books:

1. Badriram & Vishwakarma, “Power System Protection”, Tata Mc Graw-Hill Education, 2011.

2. Paithankar Y. G., S. R. Bhide., “Fundamentals of power system protection”, PHI Learning Pvt. Ltd., 2004.

Reference Books:

 1. Ravindra Nath.B, and Chandar.M, “Power systems protection and switchgear”, New Age International (P) Ltd. 2005.

 2. Rao Sunil.S, “Switchgear and protection”. Khanna Publishers, 1999. 3. Paithankar.Y.G,”

Transmission Network Protection: Theory and Practice”, Marcel Deicker, Inc.1998.

EEE 4103: ENGINEERING ECONOMICS

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**Introduction to Managerial Economics** – Wealth, Welfare and Scarce Definitions of Economics; Micro and Macro Economics; Demand- Law of     Demand, Elasticity of Demand, types of elasticity and Factors determining price elasticity of Demand: Utility- Law of Diminishing Marginal Utility and its limitations.

**Conditions of** **Different Market Structures**– Perfect Competition,  Monopolistic Competition, **Monopoly**, Oligopoly and Duopoly**.**

**Forms of Business Organizations**- Sole Proprietorship, Partnership,Joint Stock Company- Private limited and public limited companies, Public enterprises and their types.

**Introduction to Management**: Functions of Management -Taylor’s  Scientific Management; Henry Fayol’s Principles of Management;

**Human Resource Management–** Basic functions of H R Manager; Man Power Planning, Recruitment, Selection, Training, Development, Placement, Compensation and Performance Appraisal (in brief).

**Production Management –** Production Planning and Control, Plant Location, Break – Even Analysis, assumptions and applications.

 **Financial Management** – Types of Capital: Fixed and   Working Capital and Methods of Raising Finance; Depreciation: Straight Line and  Diminishing Balance Methods. **Marketing Management** - Functions of Marketing and Distribution Channels. Entrepreseuship - Entrepreneurial Functions, Entrepreneurial Development; Objectives, Training Benefits, Phases of Installing a Project.

Text Books:

1. K.K. DEWETT, **Modern Economic Theory**, S. Chand and Company, New Delhi.-55.

2. S. C. Sharma and Banga T. R., **Industrial Organization & Engineering** **Economics,** Khanna  Publications, Delhi -6.

Reference Books:

1. A.R. Aryasri, **Management Science**, Tata Mc Graw- Hill, New Delhi – 20.

2. A.R. Aryasri ,Managerial Economics and Financial Analysis, Tata Mc Graw- Hill, New Delhi – 20.

EEE 4104: POWER SYSTEM OPERATION AND CONTROL

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**Optimal System Operation :** Characteristics of various steam units, combined cycle plants, cogeneration plants, Hydro-electric units, Steam units economic dispatch problem with and without considering losses and solution using Legrange multiplier method only, **Hydro-Thermal Coordination:** Hydro-electric plant models, Scheduling energy, Short-term hydrothermal scheduling.

**Unit Commitment :** Constraints in unit commitment, Generation of state, optimizing the states using Priority-list method, Unit commitment problem solution using Priority-list method and Dynamic Programming; **Optimal Power Flow:** Optimal power flow problem formulation for loss and cost minimisation, Solution of optimal power flow problem using Newton’s method and Linear Programming technique.

**Automatic Generation Control :** Control System structure, Automatic Load–frequency control of single area system with and without control, Steady state and dynamic responses of single area ALFC loop, Automatic Load-frequency control of two area system, Tie-line bias control of two area and multi-area system, **Voltage Control:** Automatic voltage regulator, Exciter types, Exciter modelling, Generator modelling, Static and Dynamic response of AVR loop.

**Power System Security:** Introduction, Factors affecting the power system security, Contingency analysis procedure, Linear sensitivity factors: Line outage distribution factors and Generation shift factors, and its derivation; AC power flow method, contingency selection.

**State Estimation:** Weighted Least Square State Estimation, Basic concepts about network observability, Pseudo-measurements, Bad data detection and identification.

Text Books:

1. Power Generation, Operation and Control, Allen J. Wood and Bruce F. Wollenberg, John Wiley & Sons, Inc., New York, 2nd edition, 1996.

2. Electric Energy Systems Theory: An Introduction, Olle I. Elgerd, TMH Publishing Company Ltd., New Delhi, 2nd edition, 1983.

Eee 4105 (A): High Voltage Direct Current Transmission

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**General aspects of DC transmission and comparison of it with AC transmission:** Introduction, General aspects of transmission, Transmission links, types- Monopolar, Homopolar, Bipolar and Back-to-Back, Constitution of dc and ac links. Technical aspects, Economic aspects, Reliability aspects and Environmental aspects of HVDC Transmission (HVDCT), Advantages and disadvantages of HVDCT, Applications of DC Transmission, HVDC light.

**Converters:** Definition, Thury system, Valves, Valve characteristics, Components of circuits, Properties of converter circuits, Pulse number, Single phase and three phase converters, Assumptions in converter circuit analysis, Analysis of Greatz circuit, Analysis of bridge with grid control without overlap, Analysis of bridge with grid control with overlap less than 600

**HVDC Links and Converters:** Characteristics of converter circuits – Rectifier and inverter characteristics, complete characteristics of rectifier and inverter, Equivalent circuit of HVDC Link, Brief description of 12-pulse, 24-pulse and 48-pulse converters transformer configurations, Choice of converter circuit for HVDC transmission,

**HVDC Converter control:** Desired features and means of control, control of the direct current transmission link, Constant current control, Constant ignition angle control, Constant extinction angle control, Converter firing-angle control-IPC and EPC, frequency control and Tap changer control, Starting, Stopping and Reversal of power flow in HVDC links.

**Misoperation and Protection of DC links:** Malfunction of converter valves, Arc-back, Arc-through, Misfire, Quenching, Commutation failure, Valve blocking and bypass, Short circuits within the converter station. DC reactors, valve dampers, line dampers, circuit breakers.

Text Books:

1. E.W. Kimbark, Direct current transmission, Vol. 1, Wiley Interscience, New York, 1971.

2. P Kundur, Power System Stability and Control, Mc Graw Hill Inc., New York, 1994.

Reference Books:

1. K. R. Padiyar, HVDC Power Transmission Systems: Theory and System Interactions, New Age International Publishers, New Delhi, 2009.

2. Erich Uhlmann, Power Transmission by Direct Current, Springer-Verlag, Berlin/Heidelberg, 1975.

EEE 4105 (b): ADVANCED CONTROL SYSTEMS

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

UNIT I : Control Systems Components: DC & AC Tachometers-Synchros, AC and DC Servo Motors - Stepper Motors and its use in Control Systems, Amplidyne Metadyne - Magnetic Amplifier – Principle, Operation and Characteristics Ward - Leonard Systems.

UNIT - II : State Variable Analysis: concept of State Variables & State Models, State model for Linear Continuous Time Systems, State-Space Representation Using Physical Variables, State-Space Representation Using Phase Variables.

UNIT - III : Diagonalization, Jordan Canonical Form, Solution Of State Equations, Properties Of State Transition Matrix, Computation Of State-Transition Matrix (Using Laplace Transformation, Cayley-Hamilton Theorem).

UNIT - IV : Concept of Controllability & Observability, Controllable Companion Form, Observable Companion Form (For Siso And Mimo Systems), Pole Placement By State Feedback.

UNIT - V : Introduction to Design: Introduction-Preliminary Considerations of Classical Design - Lead Compensation, Lag Compensation, Realization of Compensating Networks, Cascade Compensation In Time Domain And Frequency Domain (Root Locus And Bode Plot Techniques).

Text Books:

(1) Control Systems Engineering, I. J. Nagrath, M. Gopal, New Age International Publishers.

(2)Modern Control System Theory, M. Gopal, New Age International Publishers.

EEE 4105 (b): ADVANCED CONTROL SYSTEMS

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

UNIT - I : Control Systems Components: DC & AC Tachometers-Synchros, AC and DC Servo Motors - Stepper Motors and its use in Control Systems, Amplidyne Metadyne - Magnetic Amplifier – Principle, Operation and Characteristics Ward - Leonard Systems.

UNIT - II : State Variable Analysis: concept of State Variables & State Models, State model for Linear Continuous Time Systems, State-Space Representation Using Physical Variables, State-Space Representation Using Phase Variables.

UNIT - III : Diagonalization, Jordan Canonical Form, Solution Of State Equations, Properties Of State Transition Matrix, Computation Of State-Transition Matrix (Using Laplace Transformation, Cayley-Hamilton Theorem).

UNIT - IV : Concept of Controllability & Observability, Controllable Companion Form, Observable Companion Form (For Siso And Mimo Systems), Pole Placement By State Feedback.

UNIT - V : Introduction to Design: Introduction-Preliminary Considerations of Classical Design - Lead Compensation, Lag Compensation, Realization of Compensating Networks, Cascade Compensation In Time Domain And Frequency Domain (Root Locus And Bode Plot Techniques).

Text Books:

(1) Control Systems Engineering, I. J. Nagrath, M. Gopal, New Age International Publishers.

(2)Modern Control System Theory, M. Gopal, New Age International Publishers.

EEE 4105 (c) : ELECTRICAL DISTRIBUTION SYSTEMS

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

Distribution System Basics : Brief description about electrical power transmission and distribution systems, Factors effecting the system planning, Distribution system planning methods, Planning models, Factors for future planning, Distribution system loading characteristics – demand, demand interval, Maximum demand, diversified demand, Non-coincident demand, demand factor, connected load, utilisation factor, plant factor, load factor, diversity factor, coincidence factor, load diversity, contribution factor, loss factor; relation between load and loss factors, Tariff structures (As per text book and practically existing at the institution location are to be covered).

Distribution Systems: Types of distribution sub-transmission, Substation bus schemes and comparison, Factors effecting the substation location, Rating of a distribution substation for square and hexagonal shaped distribution substation service area, Factors effecting the primary feeder rating, types of primary feeders, Factors affecting the primary feeder voltage level, Factors affecting the primary feeder loading, Tie-lines, Radial feeder with uniformly and non-uniformly distributed loading.

**Distribution System Components:** Approximate line segment model, Various types of loads, Definitions of various terms related to system loading, Detailed description of distribution transformer loading, feeder loading, Modelling of star and delta connected loads, two-phase and single-phase loads, shunt capacitors, Voltage regulators, Line-drop compensator.

**Modern Distribution Systems:** Distribution system automation, Architecture and implementation strategies for distribution automation, Distribution management system functions, Real-time control system, Outage management, Decision support applications, Concepts of distributed generation, Various types of distributed generators. Advanced topics in Distribution Systems: Basic reliability indices, Calculation of SAIDI, SAIFI and MAIFI, Distribution automation communication protocols: MODBUS, DNP 3.0, IEC 60870-5-101, UCA 2.0, IEC 61850; Brief description of Smart-grid, Micro-grid, and Nano-grid with simple examples.

Text Books:

1. Distribution System Modelling and Analysis, William H. Kersting, CRC Press, New York, 2002.

2. Electric Power Distribution System Engineering, Turan Gonen, Mc Graw-Hill Inc., New Delhi, 1986.

3. Control and Automation of Electrical Power Distribution Systems, James Northcote-Green and Robert Wilson, CRC Taylor & Francis, New York, 2007.

EEE4106 (a) : OPERATIONS RESEARCH

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**Introduction to Optimization**: Engineering Applications of Optimization, Statement of Problem, Classification of Optimization Problem Techniques.

**Linear Programming :** Introduction, Requirements For a LP Problem, Examples on The Application of LP, Graphical Solution of 2-Variable LP Problems, Some Exceptional Cases, General Mathematical Formulation For LPP, Canonical And Standard Forms of LP Problem, Simplex Method, Examples on The Application of Simplex Techniques.

**Artificial Variable Techniques:** Big-M Method and Two Phase Techniques.

**Transportation Problem:** Matrix Terminology, Definition and Mathematical Representation of Transportation Model, Formulation and Solution of Transportation Models (Basic Feasible Solution by North-West Corner Method, Inspection Method. Vogell’s Approximation Method).

**Assignment Problem:** Matrix Terminology, Definition of Assignment Model, Comparison With Transportation Model, Mathematical Representation of Assignment Model, Formulation And Solution of Assignment Models.

**Pert Network :** Introduction, Phases of Project Scheduling, Network Logic, Numbering the Events (Fulkerson’s Rule), Measure of Activity. **Pert Network Computations:** Forward Pass And Backward Pass Computations, Slack Critical Path, Probability of Meeting the Scheduled Dates.

**Inventory Models :** Introduction, Necessity For Maintaining Inventory, Classification of Inventory Models, Inventory Models With Deterministic Demand, Demand Rate Uniform Production Rate Infinite, Demand Rate Non-Uniform Production Rate Finite, Demand Rate Uniform-Production Rate Finite.

**Game Theory:** Useful Terminology, Rules For Game Theory, Saddle Point, Pure Strategy, Reduce Game By Dominance, Mixed Strategies, 2x2 Games Without Saddle Point.

TEXT BOOKS :

1. "Operations Research-An Introduction" By H.Taha, Prentice Hall Of India Pvt. Ltd.

2. “Engineering Optimization-Theory & Practice” By S.S. Rao, New Age International (P) Ltd.

3. “Operations Research – An Introduction” By P.K.Gupta & D.S.Hira, S. Chand & Co. Ltd.

EE4106 (b) : FLEXIBLE AC TRANSMISSION SYSTEMS

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**Introduction**: Electrical Transmission Networks, Conventional Control Mechanisms-Automatic Generation Control, Excitation Control, Transformer Tap-Changer Control, Phase-Shifting Transformers; Advances in Power-Electronic Switching Devices, Principles and Applications of Semiconductor Switches; Limitations of Conventional Transmission Systems, Emerging Transmission Networks, HVDC and FACTS options.

**Flexible AC Transmission Systems (FACTS):** Transmission Interconnections, Power Flow in AC System, Factors Limiting the Loading Capability of Transmission Lines, Power Flow and Dynamic Stability Considerations, Importance of Controllable Parameters, Types of FACTS Controllers. Brief Description (only theoretical explanation, No analysis) and Definitions of FACTS Controllers.

**FACTS Converters**: Types of converter, Concept and operation of Voltage sourced converters, Current Sourced converters, Operation of Single-Phase and Three-Phase Bridge Converters, Description of Three-Level VSC and PWM Converters, Transformer Connections for 12-pulse, 24-pulse and 48-pulse operation.

**Shunt, Series Type FACTS Controllers** (Operation and Theoretical Descriptions only): Objective of Shunt Compensation, Methods of Controllable shunt Var Generation (Variable Impedance type, Switching Converter type and Hybrid type), Objective of Series Compensation, Methods of Controllable Series Var Generation (Variable Impedance type, Switching Converter type and Hybrid type).

**UPFC and IPFC** : Unified Power Flow Controller (UPFC) – Principle of operation, Transmission Control Capabilities, Independent Real and Reactive Power Flow Control; Principle of operation and Characteristics of Interline Power Flow Controller (IPFC), UPFC and IPFC control structures (only block diagram description).

Text Books :

1. Narain G. Hingorani and Laszlo Gyugyi, Understanding FACTS:
Concepts and Technology of Flexible AC Transmission Systems,IEEE Press, Wiley-Interscience, New Jersey, 2000.

2. R Mohan Mathur and Rajiv K Varma, Thyristor-Based FACTS Controllers for Electrical Transmission Systems, IEEE Press, Wiley-Interscience, New Jersey, 2002.

Reference Books :

1. K R Padiyar, FACTS Controllers in Power Transmission and Distribution, New Age International Publishers, New Delhi, 2007.

2. Anrique Acha, Claudio R. Fuerte-Esquivel, Hugo Ambriz-Pérez and César Angeles-Camacho, FACTS: Modelling and Simulation in Power Networks, John Wiley & Sons, West Sussex, 2004.

EEE 4106 (c) : ADVANCED POWER ELECTRONICS

No. of Credits : 4

No. of Periods/ Week : 4

Internal Examination - Max. Marks : 30

External Examination - Max. Marks : 70

Total Marks : 100

**Static Switches:** Single Phase AC Switches, Three Phase AC Switches, Three Phase Reversing Switches, AC Switches for Bus Transfer, DC Switches and Solid State Relays.

**Soft Switching and resonant converters:** Switching mechanism of semiconductor devices, resonant switch topologies, concepts of Zero Voltage Switching (ZVS) and Zero Current Switching (ZCS), L – type and M – type ZCS resonant converters, ZVS resonant converters.

**Power Quality Mitigation Devices:** Passive Filters, Active Filters, Hybrid Filters. Distribution Static Compensator (DSTATCOM), Dynamic Voltage Restorer (DVR) and Unified Power Quality Conditioner (UPQC). (Theoretical Approach Only)

**Power Supplies:** Power Line Disturbances – Types And Sources, Effect on Sensitive Equipment, Power Conditioners, Uninterruptible Power Supplies (UPS), DC Power Supplies – Switched Mode, Resonant and Bidirectional DC Power Supplies, AC Power Supplies – Switched Mode, Resonant and Bidirectional AC Power Supplies.

**Power Electronics Application:** Residential Applications, Industrial Applications, Solar and Battery Powered Drives, Motors Suitable for Pump Drives, Solar Power Pump Drives, Battery Powered Vehicles, Solar Powered Electric Vehicles and Boats.

Text Books :

1. MH Rashid, “Power Electronics: Circuits, Systems and Applications”, 2nd edition. Prentice Hall, Eaglewood Cliffs, NJ, 1996.

2. R. W. Erickson, “Fundamentals of Power Electronics”, First Edition. Chapman and Hall, New York, 1997.

3. Ned Mohan, Tore M. Undeland and William P. Robbins, “Power Electronics – Converters, Applications, and Design”, Third Edition. John Wiley & Sons, Inc. 2003.

Reference Books :

1. Narain G. Hingorani and Laszlo Gyugyi, Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems, IEEE Press, Wiley - Interscience, New Jersey, 2000.

2. Gopal K Dubey, “Fundamentals of Electrical Drives”. 1st edition, Narosa Publishing House, New Delhi, 1995.

3 R.S. Ramshaw, “Power Electronics Semiconductor Switches”, 2nd edition, Chapman & Hall, UK. 1993.

 EEE 4107: POWER SYSTEM SIMULATION LAB

No. of Credits : 2

No. of Periods/ Week : 3

Internal Examination - Max. Marks : 50

External Examination - Max. Marks : 50

Total Marks : 100

EEE 4108: POWER SYSTEM PROTECTION LAB

No. of Credits : 2

No. of Periods/ Week : 3

Internal Examination - Max. Marks : 50

External Examination - Max. Marks : 50

Total Marks : 100

EEE 4201: INTERNSHIP / PROJECT WORK

No. of Credits : 14

Internal Examination - Max. Marks : 50

External Examination - Max. Marks : 50

Total Marks : 100