### Table III

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Periods Per Week</th>
<th>Scheme of exam</th>
<th>Total Marks</th>
<th>Credit</th>
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<td>570331(25)</td>
<td>Power System Planning and Reliability</td>
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<td>Electrical and Electronics Engg</td>
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<td>Technical Seminar</td>
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**Note (1)** – 1/4th of total strength of students subject to minimum of eighteen students is required to offer an elective in the college in a particular academic session.

**Note (2)** – Choice of elective course once made for an examination cannot be changed in future examinations.
UNIT-I
Introduction of power planning, National and Regional Planning, structure of P.S., planning tools, Electricity Regulation, Electrical Forecasting, techniques and modeling.

UNIT-II

UNIT-III
**Probability and Reliability:** Review of probability concepts, probability distributions, applications of binomial distribution to engineering problems, probability distribution in reliability evaluation, reliability indices, network modeling and evaluation of simple and complex networks, system reliability evaluation using probability distributions, frequency and load duration techniques, key indices of power system reliability and their calculations.

UNIT-IV
**Generation System Reliability Evaluation:** Concept of loss of load probability (LOLP), Energy demand, E(DNS), Evaluation of these indices for isolated systems, generation system, reliability analysis using the frequency and duration techniques.

**Transmission System Reliability Evaluation:** Evaluation of LOLP and E(DNS), indices for an isolated transmission system, interconnected system reliability, bulk power system reliability. **Operating research, evaluation, transmission and distribution system reliability. Distribution System Reliability Evaluation:** Reliability analysis of radial systems with perfect and imperfect switching. Inter connected system reliability, bulk power system reliability.

**TEXT BOOK:**

**REFERENCE BOOK:**
2. Billinton R., Power System Reliability Calculation, MIT Press, USA
UNIT I
Overview: Comparison of EHV AC and DC transmission, description of DC transmission systems, modern trends in AC and DC transmission.

UNIT II
EHV AC Systems: Limitations of extra long AC transmission, Voltage profile and voltage gradient of conductor, Electrostatic field of transmission line, Reactive Power planning and control, traveling and standing waves, EHV cable transmission system. Static Var System: Reactive VAR requirements, Static VAR systems, SVC in power systems, design concepts and analysis for system dynamic performance, voltage support, damping and reactive support.

UNIT III
HVDC System: Converter configurations and their characteristics, DC link control, converter control characteristics; Monopolar operation, converter with and without overlap, smoothing reactors, transients in DC line, converter faults and protection, HVDC Breakers.

UNIT IV
Corona and Interference: Corona and corona loss due to EHV AC and HVDC, Radio and TV interference due to EHV AC and HVDC systems, methods to reduce noise, radio and TV interference. Harmonic Filters: Generation of harmonics, design of AC filters, DC filters

UNIT V
Power flow analysis in AC/DC systems: Component models, solution of DC load flow, per unit system for DC quantities, solution techniques of AC-DC power flow equations, Parallel operation of HVDC/AC systems, Multi terminal systems.

Text Books:

Reference Books:
UNIT-I
Discrete time Signal & System - Discrete time signal and sequences; resolution of discrete- time signal into impulses; analysis of discrete- time LTI system; convolution seem consality and stability; difference equations and their solutions; response to complex exponential signals; frequency response function.

UNIT-II
Transforms - Representation of sequences by Fourier transform; Z transforms, ROC; LTI in Z domain; sampling, frequency domain representation ; application of Z transform in transient A.C. signal filtering. Discrete-time system -- Block diagram representation of linear constant coefficient difference equation; direct form I and II, cascade form , parallel form ; finite precision ward-length effect , number representation; effect of quantization and rounding of noise; zero input limit cycles in fixed point realization.

UNIT-III
Filter design -- Design of FIR filters by windowing; Butterworth and chebyshew filters; IIR filters impulse invariance and bilinear transformation.

UNIT-IV
Discrete Fourier transform-- Frequency domain sampling; The DFT; linear and circular convolution; application in A.C. transient signal analysis; FFT algorithm, DIT and DIF.

TEXT Books:
1. openheim & Schafer -- Discrete time signal processing; PH  
2. proakes & Manolakes --Digital signal processing ; PHI  
3. Mitra , S.k. --Digital signal processing ; TMH.

Reference Books:
4. B.C.Kuo-- Digital signal processing  
5. M.Gopal--Digital signal processing
UNIT - I  ELECTRICAL ENERGY AND SAFETY AUDIT
Overview of Electricity Act – Energy conservation act - Electrical energy audit - tools for
electrical energy audit - billing elements - tariff system, energy and demand charge,
electrical demand and load factor improvement, power factor correction, power demand
control, demand shifting – Electrical Safety Auditing.

UNIT - II  ELECTRIC MOTORS
Motors efficiency, idle running - motor selection – factors affecting motor
performance, efficiency at low load – high efficiency motors - reduce speed/variable drives,
load reduction - high-starting torque, rewound motors, motor generator sets, energy
efficiency in transformers - Case studies.

UNIT - III  ELECTRICAL ENERGY CONSERVATION IN DRIVEN EQUIPMENTS
Input electrical energy requirements in pumps - fans and compressors – load factor estimation
in the equipments – different types of VFD, energy conservation potential– electrical energy
conservation in refrigeration and A/C system, operation and maintenance practices for
electrical energy conservation case studies.

UNIT - IV  ENERGY CONSERVATION IN INDUSTRIAL LIGHTING
Choice of lighting - energy saving - control of lighting - lighting standards - light meter
audit - methods to reduce costs – summary of different lighting technologies – Case Studies.

UNIT - V  ENERGY EFFICIENCY AND DEMAND SIDE MANAGEMENT
Basic concepts – Co-generation – importance of demand side management – virtues of DSM –
efficiency gains estimation of energy efficiency potential, cost effectiveness, payback
period, barriers for energy efficiency and DSM – Case Studies.

Text Books:

Reference Books: