

**BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE, INDIA
PhD Entrance Test – 2020
SECTION-II: Electrical Engineering - 50 Marks**

Unit No.	Topics covered
UNIT-I	Power Electronics applications in power systems: Three phaseconverters, firing schemes of converters, Inverters in Renewable Energy sources, Multilevel Inverters, Power electronics drives for motors: Chopper, Voltage Source Inverter and Current Source Inverter fed drives, Principle Arrangement of an HVDC Transmission, Harmonic Filters, AC Harmonic Filter, DC Harmonic Filter, Active Harmonic Filter, Control & Protection in HVDC.
UNIT-II	Power System Stability: Basic definitions, statement of the problem, elementary model, Swing equations, power angle equations, Natural frequencies of oscillations, and single-machine-infinite bus system-Equal area criterion-classical model of a multi machines systems.
UNIT-III	Transmission line protection: Distance Protection, Use of optical fibers for protection schemes. System grounding – ground faults and protection; Load shedding and frequency relaying; Out of step relaying; Re-closing and synchronizing, Adaptive relaying.
UNIT-IV	Power Quality: Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring, Long- short interruptions, Voltage sag – characterization – Single phase.Mitigation of Interruptions and Voltage Sags.
UNIT-V	Control System: Stability analysis tools in time domain and frequency domain: root locus, Bode and Nyquist plot, Compensator design of linear system, Advanced PID controller design techniques, Stability analysis of discrete time systems, Controllability and Observability of Multi Input Multi Output systems (MIMO)using state variable techniques. Application of softwares, Simulink and CAD for control system design.
Text Books/References:	
1.	Feedback Control of Dynamic Systems by G.F. Franklin, J.D. Powell and A. Emami-
2.	M. Powella& P. G. Murthy, “Transient Stability of Power Systems - Theory & Practice”, John
3.	S. Sunil Rao, “Switch Gear & Protection”, Khanna Publisher’s, Delhi
4.	Power Electronic Circuits, Devices and Applications – M. H. Rashid – PHI.
5.	Fundamentals of Electrical Drives by GK Dubey, Narosa Publishers.
6.	Stafani et al , “Design of Feedback control Systems” – Oxford Press, 4th edition.
7.	Angelo Baggini, “Hand book of power quality”, wiley publications, 2008.

⌘ ⌘ ⌘ ⌘