

Syllabus for Sandip University Joint Entrance Exam(SU-JEE)

Exam Name – SU-JEE M.Tech Electrical

Sr. No	Topic/subject/section/Unit Name	Number of Question
1.	<p>Electrical Machines</p> <ul style="list-style-type: none">• Single phase transformer: Equivalent circuit, phasor diagram, losses in transformer, parallel operation of single phase transformer, open circuit and short circuit tests, regulation and efficiency; Three phase transformers: connections, parallel operation; Auto transformer, DC machines: construction, separately excited, series and shunt, motoring and generating mode of operation and their characteristics, armature reaction, commutation, starting and speed control of dc motors; Three phase induction motors: principle of operation, types, performance, torque-speed characteristics, no-load and blocked rotor tests, equivalent circuit, power stages in an induction motor, starting and speed control; Single phase induction motors: principle of operation, revolving field theory of single phase induction motor, equivalent circuit, starting methods; Synchronous machines: cylindrical and	20

	<p>salient pole machines, armature reaction, synchronous reactance, performance, regulation and parallel operation of generators, Synchronous motor : Power developed by synchronous motor, V curves & inverted V curves, starting method, applications.</p>	
<p>2.</p>	<p>Power Systems</p> <ul style="list-style-type: none"> • Basic Power Generation Concepts : Steam Power Station, Hydro-Electric Power Station, Diesel Power Station, Nuclear Power Station, Gas turbine Power Plant, Transmission Line Models and Performance: Sag Tension Calculations, Inductance of Two Wire Transmission Line, Inductance of 3 Phase Unsymmetrical Spaced Transmission Line, Transposition of Power Lines, Cable performance and insulation: Electrostatic Stresses in Single Core Cable, Grading of Cables, Insulation resistance of a Cable, Capacitance of a 3-Core Cable, Dielectric Loss. Corona and radio interference. Distribution systems: Radial, Ring Main System, Interconnected 	<p>20</p>

	<p>System, Symmetrical components: Positive, Negative and Zero Sequence Components. Power System Protection: Principles of over-current, differential and distance protection solid state relays and digital protection: Electromagnetic Attraction Relays, Circuit breakers: Principle of Arc Quenching in ABCBs, Principle of Arc Extinction on Oil Breakers, VCB, SF6 C.B. Power System Stability: concepts, swing curves and equal area criterion, Dynamics of a Synchronous Machine, Swing Equation, Power angle Equation, Power angle Curve, Steady state and Transient Stability. HVDC transmission and FACTS concepts.</p>	
<p>3.</p>	<p>Control Systems</p> <ul style="list-style-type: none"> Control System Devices: Potentiometers, Synchros, Servomotors, Stepper motors. Optical Encoder & two tank System, Mathematical modeling of Mechanical and Electrical System. Transfer function and Signal Flow Graph: Pole Zero Concept, Properties and Block Diagram, Mason's Gain Formula. Steady State Errors: Standard test Inputs Step. Ramp, Parabolic & Impulse Signal, Error (type & order of 	<p>20</p>

	<p>system), Steady state and Transient response analysis Design a specification in time domain. Routh-Hurwitz Criterion: Root Loci- Fundamental idea of the root locus Polar Nyquist Plot: Pole Zero configuration, Nyquist Stability Criterion Bode Plot: Magnitude and Phase angle plots, Gain and Phase Margin. Design of Linear Control System Compensator: Lag,Lead,Lag and Lead, Physical realization of compensator using active & passive Element Controllers: P,I,D, PI,PD,PID, State Space Model: State Transition Matrix, Controllability and Observability of Linear Systems.</p>	
<p>4.</p>	<p>Network Analysis</p> <ul style="list-style-type: none"> • Network: elements, energy sources. Network graph: topology, graph. Solution Methods: star-delta transformation, source conversion, current and voltage division, KCL, KVL, cramer's rule, Node and Mesh analysis. Network theorem: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Milliman's theorem, Tellengens theorem, reciprocity theorem. Frequency domain analysis of RLC circuit: resonance, 	<p>20</p>

	<p>quality factor, series resonance, RLC circuit as voltage amplifier, parallel resonance. Time domain analysis: Laplace transformation, Transient response: Transient response of dc and ac networks, Sinusoidal steady state analysis, Resonance, Passive filters, Two port networks: Z, H, ABCD parameters, reciprocity and symmetry condition, dual network. Three phase circuits: Power and power factor in ac circuits.</p>	
<p>5.</p>	<p>Electromagnetic Field Theory</p> <p>Basic Vector Mathematics – Vectors, Del Operator, Gradient, Divergence, Curl. Electrostatics- Electric Field, Field Lines, Potential, Potential Difference, Coulomb's Law, Gauss Law, Ampere's Law, Poisson's Equation. Electromagnetics – Magnetic Field, Magnetic dipoles, Permeability, Biot-Savart's Law, Force Due to Magnetic Field. Dielectric Properties- Dielectric Materials, Dipoles, Dielectric Polarization & types, Dielectric Boundary Conditions, Capacitance, Energy stored in Electric Field, Dielectric loss. Electromagnetic Wave- Electromagnetic Wave Equation, Maxwell's Equations, Penetration Depth, Poynting Theorem. Transmission Lines- Transmission Line, Line Characteristic Impedance, Voltage Standing</p>	<p>20</p>

	Wave Ratio, The Smith Chart, Impedance Matching, Waveguides & types.	
Total		100