

# **PLANNED SYLLABUS COVERAGE (Theory)**

GP Kangra		Department: Electrical Engineering		Subject : IEGS		Remarks
SYLLABUS COVERAGE		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 56		Theory : 56		
Sr. No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	
1	10 (1-10)	<b>Thermal Power Plants: Coal, Gas/ Diesel and Nuclear-based</b>	<p>Layout and working of a typical thermal power plant with steam turbines and electric generators. Properties of conventional fuels used in the energy conversion equipment used in thermal power plants: Coal, Gas/diesel, nuclear fuels-fusion and fission action.</p> <p>Safe Practices and working of various thermal power plants: coal-based, gas-based, diesel-based, and nuclear-based. Functions of the following types of thermal power plants and their major auxiliaries: Coal fired boilers, fire tube and water tube.</p> <p>Gas/diesel based combustion engines.</p> <p>Types of nuclear reactions: Disposal of nuclear waste and nuclear shielding. Thermal power plants in India.</p>	Power Plant Engineering, P. K. Nag McGraw Hill, New Delhi	A Course in Electrical Power- J.B Gupta, S. K Kataria and Sons, New Delhi	
2	10 (11-20)	<b>Large and Micro-Hydro Power Plants</b>	<p>Energy conversion process of hydro power plant. Classification of hydro power plant: High, medium and low head. Construction and working of hydro turbines used in different types of hydro power plant:</p> <p>a. High head – Pelton turbine</p> <p>b. Medium head – Francis turbine</p> <p>c. Low head – Kaplan turbine.</p> <p>Safe Practices for hydro power plants.</p> <p>Different types of micro- hydro turbines for different heads: Pelton, Francis and Kaplan turbines. . Locations of these different types of large and micro-hydro power plants in Himachal.</p> <p>Potential locations of micro-hydro power plants in Himachal</p>	--do--	--do--	

3.	12 (21-32)	<b>Solar and Biomass based Power Plants</b>	<p>Solar Map of India: Global solar power induction, Solar Power Technology</p> <p>a. Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fixed Reflectors</p> <p>b. Solar Photovoltaic (PV) power plant: layout, construction, working. Biomass-based Power Plants</p> <p>c. Layout of a Bio-chemical based (e.g. biogas) power plant:</p> <p>d. Layout of a Thermo-chemical based (e.g. Municipal waste) power plant</p> <p>e. Layout of an Agro-chemical based (e.g. bio-diesel) power plant. Features of the solid, liquid and gas biomasses as fuel for biomass power plant.</p>	--do--	--do--	
4.	12 (33-44)	<b>Wind Power Plants</b>	<p>Wind Map of India: Wind power density in watts per square meter. Layout of Horizontal axis large wind power plant:</p> <p>Cutted wind power plant. Direct-drive wind power plant.</p> <p>Salient Features of electric generators used in large wind power plants:</p> <p>Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG)</p> <p>Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG)</p>	--do--	--do--	
5.	12 (45-56)	<b>Economics of Power Generation and Interconnected Power System</b>	<p>Related terms: connected load, firm power, cold reserve, hot reserve, spinning reserve. Base load and peak load plants. Load curve, load duration curve, integrated duration curve. Cost of generation: Average demand, maximum demand, demand factor, plant capacity factor, plant use factor, diversity factor, load factor and plant load factor.</p> <p>Choice of size and number of generator units, combined operation of power station.</p> <p>Causes, Impact and reasons of Grid system fault: State grid, national grid, brown-out and black-out; sample blackouts at national and international level.</p>	--do--	--do--	

Approved

Date: 10/08/2023

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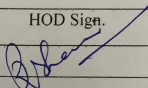


# PLANNED SYLLABUS COVERAGE (Theory)

PSC F-7.1

GP Kangra SYLLABUS COVERAGE		Department: Electrical Engineering		Subject : Electrical Circuits		
		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 70		Theory : 70		
Sr. No.	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1.	12 (1-12)	<b>Single Phase A.C Series Circuits</b>	Generation of alternating voltage, Phasor representation of sinusoidal quantities R, L, C circuit elements its voltage and current response R-L, R-C, R-L-C combination of A.C series circuit, impedance, reactance, impedance triangle, Power factor, active power, reactive power, apparent power, power triangle and vector diagram, Resonance, Bandwidth, Quality factor and voltage magnification in series R-L, R-C, RL-C circuit			
2.	12 (13-24)	<b>Unit – II Single Phase A.C Parallel Circuits</b>	R-L, R-C and R-L-C parallel combination of A.C. circuits. Impedance, reactance, phasor diagram, impedance triangle R-L, R-C, R-L-C parallel A.C. circuits power factor, active power, apparent power, reactive power, power triangle Resonance in parallel R-L, R-C, R-L-C circuit, Bandwidth, Quality factor and voltage magnification			
3.	15 (25-39)	<b>Three Phase Circuits</b>	Phasor and complex representation of three phase supply, Phase sequence and polarity Types of three-phase connections, Phase and line quantities in three phase star and delta system, Balanced and unbalanced load, neutral shift in unbalanced load. Three phase power, active, reactive and apparent power in star and delta system.			

4.	12 (39-50)	<b>Network Reduction and Principles of Circuit Analysis</b>	Source transformation, Star/delta and delta/star transformation Mesh Analysis, Node Analysis			
5.	15 (51-65)	<b>Network Theorems</b>	Superposition theorem. Thevenin's theorem. Norton's theorem Maximum power transfer theorem Reciprocity theorem Duality in electric circuits.			

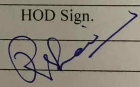
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# PLANNED SYLLABUS COVERAGE (Theory)

PSC F-7.1

GP Kangra		Department: Electrical Engineering		Subject : ED&C		
SYLLABUS COVERAGE		Course : Diploma		Duration: 3 Yrs.		
		Total Period: 56		Theory : 56		
Sr. No.	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1.	10 (1-10)	Semiconductor and Diodes	Unit 1 Semiconductor and Diodes Definition, Extrinsic/Intrinsic, N-type & p-type PN Junction Diode – Forward and Reverse Bias Characteristics Zener Diode – Principle, characteristics, construction, working Diode Rectifiers – Half Wave and Full Wave Filters – C, LC and PI Filters			
2.	11 (11-21)	Bipolar Junction Transistor (BJT)	Unit:2 Bipolar Junction Transistor(BJT) NPN and PNP Transistor – Operation and characteristics Common Base Configuration – characteristics and working Common Emitter Configuration – characteristics and working Common Base Configuration – characteristics and working High frequency model of BJT Classification of amplifiers, negative feedback			

3.	11 (22-32)	<b>Field Effect Transistor s</b>	Unit 3 Field Effect Transistors FET Working Principle, Classification MOSFET Small Signal model N-Channel/ P- Channel MOSFETs - characteristics, enhancement and depletion mode, MOSFET as a Switch Common Source Amplifiers. Uni-Junction Transistor - equivalent circuit and operation			
4.	10 (33-42)	<b>SCR DIAC &amp; TRIAC</b>	Unit 4 SCR DIAC & TRIAC SCR - Construction, operation, working, characteristics DIAC - Construction, operation, working, characteristics TRIAC - Construction, operation, working, characteristics SCR and MOSFET as a Switch, DIAC as bidirectional switch Comparison of SCR, DIAC, TRIAC, MOSFET			
5.	10 (43-52)	<b>Amplifiers and Oscillator s</b>	Unit 5 Amplifiers and Oscillators Feedback Amplifiers - Properties of negative Feedback, impact of feedback on different parameters Basic Feedback Amplifier Topologies: Voltage Series, Voltage Shunt Current Series, Current Shunt Oscillator - Basic Principles, Crystal Oscillator, Non- linear/ Pulse Oscillator			

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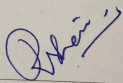
# **PLANNED SYLLABUS COVERAGE (Theory)** **Government Polytechnic Kangra**

<b>GP Kangra</b>		Department: Electrical Engineering Subject : Electrical motor and Transformer				Remark
		Course :Diploma		Duration: 3 Yrs.		
<b>SYLLABUS COVERAGE</b>		Total Period:65		Theory:65		
Sr. No.	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	
1	10 (1-10)	<b>DC GENERATOR</b>	1.1 DC generator: construction, parts, materials and their functions 1.2 Principle of operation of DC generator: Fleming's right hand rule 1.3 schematic diagrams, e.m.f. equation of generator, armature reaction 1.4 commutation and Applications of DC generators	G.C. Garg & P.S. Bimbhra, Electrical Machines, Vol-I, II, Khanna  Theraja, B.L., Electrical Technology Vol-II (AC and DC machines), S. Chand	Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi	
2	12 (11-22)	<b>D.C. Motor</b>	DC motor: Types of DC motors, Fleming's left hand rule, Principle of operation of, Back e.m.f. and its significance, Voltage equation of DC motor. Torque and Speed; Armature torque, Shaft torque, BHP, Brake test, losses, efficiency DC motor starters: Necessity, two point and three point starters. Speed control of DC shunt and series motor: Flux and Armature control. Brushless DC Motor: Construction and working	-----do-----	-----do-----	

3	12 (23-34)	<b>Single Phase Transformers</b>	<p>Types of transformers: Shell type and core type; Construction: Parts and functions, materials used for different parts: CRGO, CRNGO, HRGO, amorphous cores.</p> <p>Transformer: Principle of operation, EMF equation of transformer: Derivation, Voltage transformation ratio, Significance of transformer ratings.</p> <p>Transformer No-load and on-load phasor diagram, Leakage reactance, Equivalent circuit of transformer: Equivalent resistance and reactance.</p> <p>Voltage regulation and Efficiency: Direct loading, OC/SC method, All-day efficiency</p>	-----do-----	-----do-----
4	20 (35-54)	<b>Three Phase Transformers</b>	<p>Bank of three single phase transformers, Single unit of three phase transformer.</p> <p>Distribution and Power transformers, Construction, cooling, Three phase transformers connections as per IS:2026 (part IV)-1977, Three phase to two phase conversion (Scott Connection), Selection of transformer as per IS: 10028 (Part I)-1985, Criteria for selection of distribution transformer, and power transformer.</p> <p>Amorphous Core type Distribution Transformer, Specifications of three-phase distribution transformers as per IS:1180 (part I)-1989</p> <p>Need of parallel operation of three phase transformer, Conditions for parallel operation. Polarity tests on mutually inductive coils and single phase transformers; Polarity test, Phasing out test on Three-phase transformer</p>	-----do-----	-----do-----



5	11 (55-65)	<b>Special Purpose Transformers</b>	<p>Single phase and three phase auto transformers: Construction, working and applications.</p> <p>Instrument Transformers: Construction, working and applications of Current transformer and Potential transformer. Isolation transformer: Constructional Features and applications.</p> <p>Single phase welding transformer: constructional features and applications.</p> <p>Pulse transformer: constructional features and applications.</p> <p>'K' factor of transformers: overheating due to non-linear loads and harmonics</p>	-----do-----	-----do-----	
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10-08-2023	

# PLANNED SYLLABUS COVERAGE (Theory)

GP		Department: Electrical Engineering		Subject : E. & E.M.		
Kangra		Course : Diploma		Duration: 3 Yrs.		
SYLLABUS COVERAGE		Total Period: 56		Theory : 56		
Sr. No.	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1.	14 (1-14)	Fundamentals of Measurements	Significance, units, fundamental quantities and standards Classification of Instrument Systems: Null and deflection type instruments Absolute and secondary instruments Analog and digital instruments Static and dynamic characteristics, types of errors, Calibration: need and procedure Classification of measuring instruments: indicating, recording and integrating instruments. Essential requirements of an indicating instruments			
2.	12 (15-26)	Measurement of voltage and current	DC Ammeter: Basic, Multi range, Universal shunt, DC Voltmeter: Basic, Multi-range, concept of loading effect and sensitivity AC voltmeter: Rectifier type (half wave and full wave) CT and PT: construction, working and applications. Clamp-on meter			
3.	12 (27-38)	Measurement of Electric Power	Analog meters: Permanent magnet moving coil (PMMC) and Permanent magnet moving iron (PMMI) meter, their construction, working, salient features, merits and demerits. Dynamometer type wattmeter: Construction and working Range: Multiplying factor and extension of range using CT and PT Errors and compensations. Active and reactive power measurement: One, two and three wattmeter method. Effect of Power factor on wattmeter reading in two wattmeter method. Maximum Demand indicator			

4	8 175-404	Measurement of Electric Energy	Single and three phase electronic energy meter. Constructional features and working principle, errors and their compensations. Calibration of single phase electronic energy meter using direct loading.			
5	18 043-603	Circuit Parameter Measurements at A.C. R.F. and Other Modes	Measurement of resistance: Low resistance: Kelvin's double bridge, Medium Resistance: Voltmeter and ammeter method, High resistance: Megger and Ohm meter. Series and shunt measurement of inductance using Anderson Bridge (no derivation and phasor diagram) Measurement of capacitance using Schering bridge (no derivation and phasor diagram) Single beam-bridge type CRO, Digital storage Oscilloscope: Basic block diagram, working, Cathode ray tube, electronic deflection, vertical amplifier, time base generator, horizontal amplifier, measurement of voltage/ amplitude/ time period/ frequency/ phase angle/ delay time, specifications, other merits/ faults/ uses, Digital Multi-meter: I-A-R, meter, Frequency meter (electromagnetic and piezo electric type)/Phase sequence indicator, power factor meter (single phase and three phase electromagnetic type), Bridge-circuits: To-voltage meter, Signal generator (ideal, working and basic block diagram), Function generator: ideal, working and basic block diagram, Function of symmetry			

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