

"PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Lecture Planning (Theory)

Branch : **Electrical Engg.**

Semester: **3rd**

Subject : **Electrical Motors & Transformers**

Session: **Aug 26 - Dec 26**

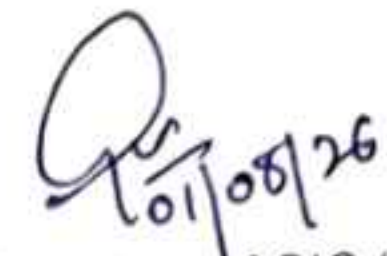
Teacher : **Ashwani Kumar**

Cass Room **LT4**

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Rem
1.	1-10	DC Generators	DC generator construction, parts, materials and their functions. Principle of operation of DC generator. Fleming's right hand rule, schematic diagrams, e.m.f equation of generator, armature reaction, commutation and Applications of DC generators.	R1, R2, R3	
2.	11-23	D.C. Motors	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-	
3.	24-36	Single Phase Transformers	Types of transformers: Shell type and core type. Construction: Parts and functions, materials used for different parts: CRGO, CRNGO, HRGO, amorphous cores. Transformer: Principle of operation, EMF equation of transformer: Derivation, Voltage transformation ratio, Significance of transformer ratings. Transformer No-load and on-load phasor diagram, Leakage reactance, Equivalent circuit of transformer: Equivalent resistance and reactance. Voltage regulation and Efficiency: Direct loading, OC/SC method, All-day efficiency.	-do-	
4.	37-54	Three Phase Transformers	Bank of three single phase transformers, Single unit of three phase transformer. 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, Amorphous Core type Distribution Transformer, Specifications of three-phase distribution transformers as per IS 1180 (part I)-1989. 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.	-do-	
5.	55-64	Special Purpose Transformers	Single phase and three phase auto transformers: Construction, working and applications. Instrument Transformers: Construction, working and	-do-	

applications of Current transformer and Potential transformer Isolation transformer: Constructional features and applications
Single phase welding transformer: constructional features and applications Pulse transformer: constructional features and applications.
'K' factor of transformers: overheating due to non-linear loads and harmonics.


Signature of Teacher with Date 01-8-26


Signature of OIC (EE)

Reference Resource:

- R1: Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi.
- R2: Mehta, V. K. and Mehta, Rohit, Principles of Electrical Machines, S. Chand and Co. Ltd., New Delhi.
- R3: Theraja, B L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Delhi.

"PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Practical Planning & Coverage

Branch : **Electrical Engg.**

Subject : **Electrical Motors & Transformers Lab**

Teacher : **Ashwani Kumar**

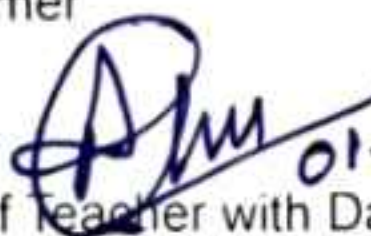
Semester: **3rd**

Session: **Aug 26 - Dec 26**

Laboratory: **Elect. Machine Lab**

Pract. No.	Description of Practical	Reference for Procedure/ Writeup	Likely Dates	Actual Dates	Sign
1	Reverse the direction of rotation of the DC shunt motor .	Lab Manual			
2	Control the speed of DC shunt motor by different methods.	Lab Manual			
3.	Control the speed of DC series motor by different methods	Lab Manual			
4.	Perform the brake test on DC series motor.	Lab Manual			
5	Check the functioning of single phase transformer.	Lab Manual			
6	Determine regulation and efficiency of single phase transformer by direct loading.	Lab Manual			
7	Perform open circuit and short circuit test on single phase transformer to determine equivalent circuit constants, voltage regulation and efficiency.	Lab Manual			
8	Perform parallel operation of two single phase transformers to determine the load current sharing.	Lab Manual			
9	Perform parallel operation of two single phase transformers and determine the apparent and real power load sharing.	Lab Manual			
10	Perform polarity test on a single phase transformer whose polarity markings are masked.	Lab Manual			
11	Connect the auto-transformer in step-up and step-down modes noting the input/output readings.	Lab Manual			
12	Check the functioning of the CT, PT and isolation transformer	Lab Manual			

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"PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Lecture Planning (Theory)

Branch : ELECTRICAL ENGINEERING

Subject : INTRODUCTION TO ELECTRICAL GENERATION SYSTEM

Teacher : JYOTI BALA

Semester: 3rd

Session: AUG - DEC, 26

Class Room: L4

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1.	1 - 11	Thermal Power Plants: Coal, Gas/ Diesel and Nuclear-based	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. 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. Gas/diesel based combustion engines. Types of nuclear reactors: Disposal of nuclear waste and nuclear shielding. Thermal power plants in India.	R1,R2,R3,R4, R5,R7, R8,R9,R10,R11	
2.	12 - 22	Large and Micro-Hydro Power Plants	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: a. High head – Pelton turbine b. Medium head – Francis turbine c. Low head – Kaplan turbine. Safe Practices for hydro power plants. 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. Potential locations of micro-hydro power plants in Himachal	-do-	
3.	23 - 36	Solar and Biomass based Power Plants	Solar Map of India: Global solar power radiation. Solar Power Technology a. Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors b. Solar Photovoltaic (PV) power plant: layout, construction, working. Biomass-based Power Plants c. Layout of a Bio-chemical based (e.g. biogas) power plant: d. Layout of a Thermo-chemical based (e.g. Municipal waste) power plant 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.	-do-	
4.	37 - 50	Wind Power Plants	Wind Map of India: Wind power density in watts per square meter Layout of Horizontal axis large wind power plant: Geared wind power plant. Direct-drive wind power plant. Salient Features of electric generators used in large wind power plants: Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG) Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG)	-do-	

5.	51 - 64	Economics of Power Generation and Interconnected Power System	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. Choice of size and number of generator units, combined operation of power station. Causes, Impact and reasons of Grid system fault: State grid, national grid, brown-out and black-out; sample blackouts at national and international level.	-do-	
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Reference Resource:

- R1: Nag. P. K. Power Plant Engineering, McGraw Hill, New Delhi, ISBN: 978-9339204044
R2: Tanmoy Deb, Electrical Power Generation, Khanna Publishing House, Delhi (Ed. 2018)
R3: Gupta, B.R., Generation of Electrical Energy, S. Chand & Co. New Delhi,
R4: Rachel, Sthuthi; Earnest, Joshua – Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49-3; E-book 978-93-88028-50-9
R5: Solanki, Chetan Singh, – Solar Photovoltaics: Fundamentals, Technologies and Applications, PHI Learning, New Delhi, ISBN: 9788120351110
R6: Hau, Erich, Wind Turbines, Springer-Verlag, Berlin Heidelberg, Germany, ISBN: 978-3-642-27150-2
R7: Gipe, Paul, Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
R8: Wizelius, Tore; Earnest, Joshua – Wind Power Plants and Project Development, PHI
R9: Gupta, J.B. A Course in Electrical Power– S. K Kataria and Sons, New Delhi. 2014,
R10: Soni, Gupta, Bhatnagar, A Course in Electrical Power. – Dhanpatrai and Sons
R11: System, S.Chand & Co. New Delhi, 2005, ISBN: 9788121924962

PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Practical Planning & Coverage

Branch : **Electrical Engg.**

Subject : **INTRODUCTION TO ELECTRICAL GENERATION SYSTEM**

Teacher : **Jyoti Bala**

Semester: **3rd**

Session: **AUG- DEC, 26**

Lab Name :

Practical. No.	Description of Practical	Reference for Procedure/ Write up	Likely Dates	Actual Dates	Sign
1	Identify the routine maintenance parts of the gas fired thermal power plant after watching a video programme	Lab Manual			
2.	Assemble and dismantle a small diesel generator power plant..	Lab Manual			
3.	Identify the routine maintenance parts of the nuclear fired thermal power plant after watching a video programme	Lab Manual			
4.	Identify the routine maintenance parts of the large hydro power plant after watching a video programme	Lab Manual			
5	Identify the routine maintenance parts of the micro hydro power plant after watching a video programme	Lab Manual			
6	Assemble a micro hydro power plant and then dismantle it.	Lab Manual			
7	Assemble the parabolic trough or parabolic dish Concentrated Solar Power (CSP) plant	Lab Manual			
8	Dismantle the parabolic trough or parabolic dish CSP plant	Lab Manual			
9	Assemble the solar PV plant to produce electric power and then dismantle it.	Lab Manual			
10	Assemble a small biogas plant to generate electric power	Lab Manual			
11	Dismantle the biogas plant.	Lab Manual			
12	Identify the routine maintenance parts of the large wind power plant after watching a video programme	Lab Manual			

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Signature of HOD (EE)

“PVC” NSSK Govt. Polytechnic Bilaspur at Kalol
Lecture Planning (Theory)

Branch : **ELECTRICAL ENGINEERING**

Subject : **ELECTRICAL AND ELECTRONICS MEASUREMENT**

Teacher : **SRISHTI NEGI(Apprentice)**

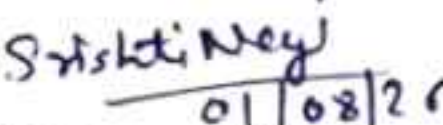
Semester: **3rd**

Session: **AUG - DEC, 26**

Cass Room: **L4**

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1.	1 - 14	Fundamentals of Measurements	Measurement: 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	R1, R2, R3, R4, R5, R6	
2.	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.	-do-	
3.	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	-do-	
4.	39 - 46	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.	-do-	

5.	47 - 64	Circuit Parameter Measurement, CRO and Other Meters	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/single trace CRO, Digital storage Oscilloscope: Basic block diagram, working, Cathode ray tube, electrostatic deflection, vertical amplifier, time base generator, horizontal amplifier, measurement of voltage/ amplitude/ time period/ frequency/ phase angle delay line, specifications. Other meters: Earth tester, Digital Multi-meter; L-C-R meter, Frequency meter (ferromagnetic and Weston type), Phase sequence indicator, power factor meter (single phase and three phase dynamometer type), Synchroscope, Tri-vector meter, Signal generator need, working and basic block diagram. Function generator: need, working and basic block diagram, function of symmetry.	-do-	
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Reference Resource:

- R1: Theraja B. L., Theraja A. K., A Text Book of Electrical Technology Vol-I(Basic Electrical Engg.), S.Chand and Co. New Delhi, ISBN: 9788121924405
- R2: Mittle V. N., Basic Electrical Engineering, McGraw-Hill New Delhi, ISBN : 978-0-07-0088572-5,
- R3: Edward Hughes, Electrical Technology, Pearson Education, New Delhi, ISBN-13: 978-0582405196
- R4: Rajput R.K., Electrical and Electronic Measurement and Instrumentation, S.Chand and Co. New Delhi, ISBN : 9789385676017
- R5: Sawhney A.K., Electrical and Electronics Measurements and Instrumentation., Dhanpai Rai andn Sons, New Delhi, ISBN : 9780000279744
- R6: Suryanarayna N.V., Electrical Measurements and Measuring Instruments, S.Chand and Co. New Delhi , ISBN : 8121920116

PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Practical Planning & Coverage

Branch : **ELECTRICAL ENGINEERING**

Subject : **ELECTRICAL AND ELECTRONICS MEASUREMENT LABORATORY**

Teacher : **SRISHTI NEGI**

Semester: 3rd

Session: **AUG - DEC, 26**

Lab Name:

Practical. No.	Description of Practical	Reference for Procedure/ Write up	Likely Dates	Actual Dates	Sign
1	Identify measuring instruments on the basis of symbols on dial, type, accuracy, class position and scale.	Lab Manual			
2.	Identify the components of PMMC and MI instruments.	Lab Manual			
3.	Troubleshoot PMMC and MI instruments.	Lab Manual			
4.	Measure AC and DC quantities in a working circuit.	Lab Manual			
5	Extend range of ammeter and voltmeter by using (i) shunt and multiplier (ii) CT and PT.	Lab Manual			
6	Use Clamp-on meter for measurement of AC/DC current, AC/DC voltage.	Lab Manual			
7	Use electro-dynamic watt-meter for measurement of power in a single phase circuit	Lab Manual			
8	Troubleshoot electrodynamic watt-meter for measurement of power in a single phase circuit.	Lab Manual			
9	Use single wattmeter for measurement of active and reactive power of three phase balanced load.	Lab Manual			
10	Use two watt-meters for measuring active power of three-phase balanced load.	Lab Manual			
11	Calibrate single phase electronic energy meter by direct loading.	Lab Manual			
12	Troubleshoot single phase electronic energy meter.	Lab Manual			
13	Use digital multi-meter for measurement of AC/DC current, AC/DC voltage.	Lab Manual			
14	Use Kelvin's double bridge for measurement of low resistance.	Lab Manual			
15	Use voltmeter and ammeter method for measurement of medium resistance.	Lab Manual			
16	Use Megger for insulation resistance measurements.	Lab Manual			
17	Use earth tester for measurement of earth resistance.	Lab Manual			
18	Use CRO for the Measurement of supply frequency in single-phase circuit.	Lab Manual			
19	Use Tri-vector meter for measuring kW, kVAR and kVA of a power line.	Lab Manual			

Srishti Negi

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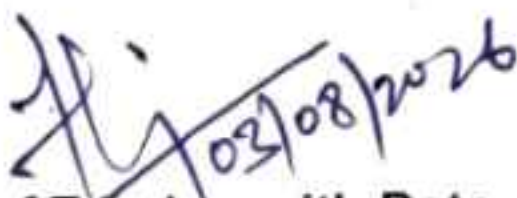
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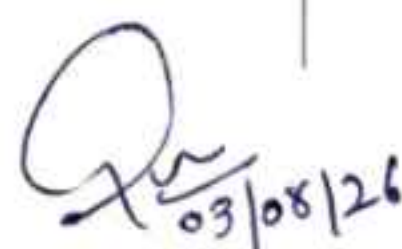
PVC" NSSK Govt. Polytechnic Bilaspur at Kalol
Lecture Planning (Theory)

Branch : **Electrical Engg.**
Subject **ELECTRONIC DEVICES & CIRCUITS**
Teacher : **Er. Satish Kumar**

Semester: **3rd**
Session: **AUG- DEC, 26**
Cass Room : **L4**

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1.	1-12	Semiconductor and Diodes	Definition, Extrinsic/Intrinsic, N-type & P-type. PN Junction Diode – Forward and Reverse Bias Characteristics. Zener Diode – Principle, characteristics, construction, and working. Diode Rectifiers Half Wave and Full Wave. Filters – C, LC, and PI Filters.	R1,R2, R3,R4,R5	
2.	13-26	Bipolar Junction Transistor (BJT)	NPN and PNP Transistor – Operation and characteristics. Common Base Configuration – characteristics and working. Common Emitter Configuration – characteristics and working. Common Collector Configuration – characteristics and working. High frequency model of BJT. Classification of amplifiers, negative feedback	-do-	
3.	27-38	Field Effect Transistors	FET – Working Principle, Classification. MOSFET Small Signal model. N-Channel/ P-Channel MOSFETs – characteristics, enhancement, and depletion mode, MOS- FET as a Switch. Common Source Amplifiers. Uni-Junction Transistor – equivalent circuit and operation.	-do-	
4.	39 -52	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	-do-	
5.	53-64	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.	-do-	


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Signature of HOD (EE)

Reference Resource:

1. Analog Circuits A.K. Maini Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173- 584).
2. Electronic Devices and Circuits S. Salivahanan and N. Suresh Kumar McGraw Hill Education; Fourth edition (1 July 2017) ISBN: 978-9339219505.
3. Electronics Devices and circuit theory Boyestad&Nashelsky Pearson Education India; 11 edition (2015) ISBN: 978-9332542600.
4. Electronic Principles Albert Malvino& David Bates Tata McGraw Hill Publication 2010 ISBN: 9780070634244.
5. Electronics Devices & Circuits Jacob Millman McGraw Hill Education; 4 edition (2015) ISBN: 978-9339219543.