

Bangladesh Sweden Polytechnic Institute, Kaptai
 Electrical Department
 Semester Plan (Practical)/2015
 (4th Semester/Electrical)

Subject: DC Machines (26742)

T-P-C

Teacher: Manash Barua (Instructor Electrical)

3-3-4

No. of Week	No. of Lesson	Theory Content	Teaching Aid
		General & Specific Objectives (G.O. & S.O.)	
1	Lesson-1	G.O.1: CELL AND BATTERY 1.1 Define cell, Primary cell and Secondary cell. 1.2 Classify cell and Primary cell. 1.3 Explain Series, Parallel and combined cell connection 1.4 Describe the construction and principle of a simple voltaic cell. 1.5 List the defects of a simple voltaic cell. * Feedback	White Board & Marker, MM
	Lesson-2	S.O: 1.6 Illustrate the causes and methods of removing of defects of a Simple voltaic cell. 1.7 Mention the construction of Dry cell and its chemical reaction. 1.8 Solve problem related cell combination/connection. 1.9 Illustrate the construction of alkaline batteries. 1.10 Describe the construction of lead acid battery and its chemical reaction . * Feedback	White Board & Marker, MM
2	Lesson-3	G.O.2: FUEL CELLS 2.1 Discuss the concept of Fuel cell. 2.2 Mention the types of Fuel cell. 2.3 Describe the photon exchange membrane fuel cell (PEMFC) and phosphoric acid fuel cell (PAFC).	White Board & Marker, MM
	Lesson-4	S.O: 2.4 Explain the solid acid fuel cell (SAFC) and alkaline fuel cell (AFC). 2.5 Illustrate the High Temperature Fuel Cell of Solid Oxide Fuel Cell (SOFC), Molten carbonate fuel cells (MCFC). 2.6 Mention the uses of PEMFC, PAFC, SAFC, SOFC, MCFC and AFC. . * Feedback, Assignment	White Board & Marker, MM
3	Lesson-5	G.O.2: BATTERY CHARGING 3.1 List the types of battery charging system.	White Board & Marker, MM

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		General & Specific Objectives (G.O. & S.O.)	
		<p>3.2 Describe the procedure of slow charging of battery by 220-230VAC source.</p> <p>3.3 Describe the procedure of quick charging of battery by 220-230VAC source.</p> <p>3.4 Illustrate the procedure of preparing electrolyte.</p>	
4	Lesson-6	<p>3.5 Outline the construction of dry charged battery. 3.6 Explain the charging procedure of sulfated battery.3.7 Describe the process of charging more than one battery at a time.</p> <p>. * Feedback, Assignment</p>	White Board & Marker, MM
5	Lesson-7	<p>DE-ASSEMBLE AND RE-ASSEMBLE THE PARTS OF A DC GENERATOR/ DC MOTOR.</p> <p>4.1 Select the necessary tools required for de-assembling and re-assembling the parts of DC generator/ DC motor.</p> <p>4.2 Identify at least ten main parts of the generator/motor.</p> <p>4.3 Sketch at least ten main parts of the generator/motor.</p> <p>4.4 Re-assemble the parts of the generator/motor.</p> <p>4.5 Connect the generator/motor to the proper power source.</p> <p>4.6 Start the generator/motor.</p> <p>4.7 Maintain the record of performed task.</p>	White Board & Marker, MM White Board & Marker, MM
6	Lesson-8	<p>DEVELOP 4 POLES, 24 SLOTS; DOUBLE LAYER LAP WINDING (SIMPLEX & DUPLEX) OF A DC GENERATOR.</p> <p>5.1 Select pole pitch, back pitch, front pitch and commutator pitch for the generator.</p> <p>5.2 Sketch the developed winding diagram (simplex and duplex) showing the position of carbon brushes.</p> <p>5.3 Select the coil turns, coil number and coil grouping for the winding.</p> <p>5.4 Select the sizes and types of wires required for the winding.</p> <p>5.5 Construct required number of coils.5.6 Insert the coils into the slot using the proper insulation.5.7 Connect the coils in proper way.5.8 Test the winding step by step.5.9 Maintain the record of performed task.</p>	White Board & Marker, MM

No. of Week	No. of Lesson	Theory Content	Teaching Aid
		General & Specific Objectives (G.O. & S.O.)	
7		MID TERM	
8	Lesson-9	<p>DEVELOP A 4 POLES, 16 SLOTS, DOUBLE LAYER WAVE WINDING (SIMPLEX & DUPLEX) OF A DC GENERATOR.</p> <p>6.1 Identify pole pitch, back pitch, front pitch, commutator pitch. 6.2 Sketch the developed winding diagram (simplex & duplex) showing the position of carbon brushes. 6.3 Determine the number of turns required on the basis of coil grouping and layer of winding.</p>	White Board & Marker, MM
9	Lesson-10	<p>6.4 Determine the size and type of wires required for the winding. 6.5 Perform winding. 6.6 Maintain the record of performed task.</p>	White Board & Marker, MM
10	Lesson-11	<p>DETERMINE GENERATED EMF OF A DC SHUNT GENERATOR</p> <p>7.1 Sketch the required diagram of the shunt generator. 7.2 Set the experiment as per diagram. 7.3 Start the generating set and build up the voltage. 7.4 Measure the developed EMF by starting the generator. 7.5 Record the required data. 7.6 Plot the I_f versus V_g curve from the data. 7.7 Maintain the record of performed task</p>	White Board & Marker, MM
11	Lesson-12	<p>PLOT THE V_L- I_L CHARACTERISTIC CURVES OF A SHUNT GENERATOR.</p> <p>8.1 Sketch the required diagram for the experiment. 8.2 Collect the materials, meters and equipment required for the experiment. 8.3 Connect all the meters and equipment as per diagram. 8.4 Record the necessary readings from the meters. 8.5 Plot the V_L- I_L curve from the data. 8.6 Maintain the record of performed task.</p>	White Board & Marker, MM

No. of Week	No. of Lesson	Theory Content	Teaching Aid
		General & Specific Objectives (G.O. & S.O.)	
12	Lesson-13	<p>PLOT THE $V_L - I_L$ CHARACTERISTIC CURVE OF A SERIES GENERATOR.</p> <p>9.1 Sketch the required diagram for the experiment. 9.2 Collect the required instruments & materials. 9.3 Connect all the meters and equipment as per diagram. 9.4 Record the necessary readings from the meters. 9.5 Plot the $V_L - I_L$ curve from the data. 9.6 Maintain the record of performed task. .</p>	White Board & Marker, MM
	Lesson-14	<p>PLOT THE $V_L - I_L$ CHARACTERISTIC CURVE OF A COMPOUND GENERATOR.</p> <p>10.1 Sketch the required diagram for the experiment. 10.2 Collect the required instruments & materials. 10.3 Connect all the meters and equipment as per diagram. 10.4 Record the necessary readings from the meters. 10.5 Plot the $V_L - I_L$ curve from the data. 10.6 Maintain the record of performed task.</p>	White Board & Marker, MM

Sl	Book Name	Writer Name	Publisher Name & Edition
01	A Text Book of Electrical Technology	B. L. Theraja	S.Chand, Millenium Edition
02	Electrical Machines	Charles Siskind	2nd edition
03	DC Machines	Samadder & Gongopadhya	2021` edition
04	A course in Electrical Power	J. B. Gupta	Katson books
05	Electric Machinery fundamentals	Stephen J. Chapman	Mc Grew Hill international, Fourth Edition.

No. of Week	No. of Job./ Experiment	Practical Content	Teaching Aid
		General & Specific Objectives (G.O. & S.O.)	
1	Job./Exp.-1	<p>MAKE A VOLTAIC CELL</p> <p>1.1 Collect tools and necessary materials for making a voltaic cell.</p> <p>1.2 Sketch the connection diagram.</p> <p>1.3 Connect all components according to diagram.</p> <p>1.4 Observe the chemical reaction.</p> <p>1.5 Measure the output voltage.</p> <p>1.6 Maintain the record of performed task.</p>	White Board & Marker, MM, Tools & Instruments
2	Job./Exp.-2	<p>PERFORM CHARGE A LEAD ACID BATTERY.</p> <p>2.1 Sketch the connection diagram for constant potential/Constant current method of charging.</p> <p>2.2 Identify the equipment and materials for charging a lead acid battery.</p> <p>2.3 Record the readings by measuring the terminal voltage of the discharged battery and specific gravity of electrolytes.</p> <p>2.4 Connect the positive and negative terminal of the battery to the positive and negative terminals of the charger respectively.</p> <p>2.5 Set the charging voltage and switch on the charger.</p> <p>2.6 Record the readings by measuring the specific gravity of electrolyte and the terminal voltage of the battery.</p> <p>2.7 Maintain the record of performed task.</p>	White Board & Marker, MM, Tools & Instruments
3	Job./Exp.-3	<p>MEASURE THE INTERNAL RESISTANCE OF A BATTERY.</p> <p>3.1 Sketch necessary circuit diagram.</p> <p>3.2 Connect a resistance (known value) with the battery.</p> <p>3.3 Record the readings by measuring the voltage and current of the battery.</p> <p>3.4 Calculate the internal resistance of a battery</p> <p>3.5 Maintain the record of performed task.</p>	White Board & Marker, MM, Tools & Instruments
4	Job./Exp.-4	<p>DE-ASSEMBLE AND RE-ASSEMBLE THE PARTS OF A DC GENERATOR/ DC MOTOR.</p> <p>4.1 Select the necessary tools required for de-assembling and re-assembling the parts of DC generator/ DC motor.</p>	White Board & Marker, MM, Tools & Instruments

		<p>4.2 Identify at least ten main parts of the generator/motor.</p> <p>4.3 Sketch at least ten main parts of the generator/motor.</p> <p>4.4 Re-assemble the parts of the generator/motor.</p> <p>4.5 Connect the generator/motor to the proper power source.</p> <p>4.6 Start the generator/motor.</p> <p>4.7 Maintain the record of performed task.</p>	
5	Job./Exp.-5	<p>DEVELOP 4 POLES, 24 SLOTS; DOUBLE LAYER LAP WINDING (SIMPLEX & DUPLEX) OF A DC GENERATOR.</p> <p>5.1 Select pole pitch, back pitch, front pitch and commutator pitch for the generator.</p> <p>5.2 Sketch the developed winding diagram (simplex and duplex) showing the position of carbon brushes.</p> <p>5.3 Select the coil turns, coil number and coil grouping for the winding.</p> <p>5.4 Select the sizes and types of wires required for the winding.</p> <p>5.5 Construct required number of coils.</p> <p>5.6 Insert the coils into the slot using the proper insulation.</p> <p>5.7 Connect the coils in proper way.</p> <p>5.8 Test the winding step by step.</p> <p>5.9 Maintain the record of performed task.</p>	White Board & Marker, MM,Tools & Instruments
6	Job./Exp.-6	<p>DEVELOP A 4 POLES, 16 SLOTS, DOUBLE LAYER WAVE WINDING (SIMPLEX & DUPLEX) OF A DC GENERATOR.</p> <p>6.1 Identify pole pitch, back pitch, front pitch, commutator pitch.</p> <p>6.2 Sketch the developed winding diagram (simplex & duplex) showing the position of carbon brushes.</p> <p>6.3 Determine the number of turns required on the basis of coil grouping and layer of winding.</p> <p>6.4 Determine the size and type of wires required for the winding.</p> <p>6.5 Perform winding.</p> <p>6.6 Maintain the record of performed task.</p>	White Board & Marker, MM,Tools & Instruments
7	Job./Exp.-7	<p>DETERMINE GENERATED EMF OF A DC SHUNT GENERATOR.</p> <p>7.1 Sketch the required diagram of the shunt generator.</p> <p>7.2 Set the experiment as per diagram.</p> <p>7.3 Start the generating set and build up the voltage.</p>	White Board & Marker, MM,Tools & Instruments

		<p>7.4 Measure the developed emf by starting the generator.</p> <p>7.5 Record the required data.</p> <p>7.6 Plot the I_r versus V_g curve from the data.</p> <p>7.7 Maintain the record of performed task.</p>	
8	Job./Exp.-8	<p>PLOT THE V_L- I_L CHARACTERISTIC CURVES OF A SHUNT GENERATOR.</p> <p>8.1 Sketch the required diagram for the experiment.</p> <p>8.2 Collect the materials, meters and equipment required for the experiment.</p> <p>8.3 Connect all the meters and equipment as per diagram.</p> <p>8.4 Record the necessary readings from the meters.</p> <p>8.5 Plot the V_L- I_L curve from the data.</p> <p>8.6 Maintain the record of performed task.</p>	<p>White Board & Marker, MM, Tools & Instruments</p>