higher education & training
Department: Higher Education and Training
REPUBLIC OF SOUTH AFRICA

Tshwane South TVET College
"achieve the future"

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**DC Machines**	**5/4/2020**	**5/8/2020**
Week Number: 1	**Learning Objective /Learning Outcome** **Learning Objective/ Learning Outcomes: TO understand dc machines Speed Control serie shunt, Traction — choice of motors and generators. Series — parallel and speed control. Bridge and shunt Tansition.**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Monday	**DC Machines : Traction — choice of motors and generators. Series — parallel and speed control. Bridge and shunt Transition**	The full-load current of a shunt motor is 120 A and the applied voltage is 400 V. The armature and shunt field resistances are 0,2 ohms and 200 ohms respectively, while the speed is 780 r/min. The torque developed by the	**Read Exercise Workbook**	**Board text book models Workbook**	yes	

		motor is reduced to 70% of the full-load value with an additional resistance of 1,2 ohms in series with the armature. Determine the speed of the motor.				
Tuesday	**DC Machines : Traction — choice of motors and generators. Series — parallel and speed control. Bridge and shunt Transition**	A 400 V, DC series motor takes a current of 30 A when running at 800 r/min. The resistance of the motor is 0,6 ohms. Assume the flux is proportional the current. Calculate the following: 1.2.1 The speed when the current is 50 A 1.2.2 The ratio of the TWO torques developed	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Wednesday	**Calculation of torque and power. Load sharing. Equalizing bars aid cross—connection fields. Test — direct and indirect;**	A 11 kW shunt-wound motor takes a current of 32 A from a 400 V mains at full-load. The armature has a resistance of 0,1 ohms and the field circuit resistance is 200 ohms. Calculate the following: 1.2.1 The combined iron and friction losses 1.2.2 The efficiency at full-load	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Week Days	**Objectives**	**Activities**		**Teaching Methodology** (Demonstarion,Discussions,Practical,etc)	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Thursday	**Calculation of torque and power. Load sharing. Equalizing bars aid cross—connection fields. Test — direct and indirect;**	Calculate the efficiencies of the generator and motor in a Hopkinson test if the following information is available: Terminal voltage of each machine = 500V Armature circuit resistance of each machine = 0,04 0hm Generator output current = 1000 A Input current from the bus bars = 400 A Motor field current = 24 A Generator field	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		current= 20 A Assume the two machines **have equal iron and friction losses**				
Friday	**REVISION. Dynamic braking. Plugging control. Regenerative braking.**	**Do revision**	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

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Lecturer Signature

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Senior/HoD Signature

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**AC THEORY**	**5/11/2020**	**5/15/2020**
Week Number: 2	**Learning Objective /Learning Outcome** **Learning Objective/ Learning Outcomes: TO understand operation HARMONIC (PARALLEL) STAR/DELTA STAR (NO NEUTRAL)**	**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min	

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology	Lesson Completed	
		What will the lecturer do?	What will students do?	(Demonstarion,Discussions,Practical,etc)	Yes	No
Monday	**Complex notations and phasors for mixed CIRCUITS**	A three-phase, star-connected alternator with a line voltage of 380 V, supplies an unbalanced star-connected load with no neutral connection. The load consists of the following impedances:ZR 20 + j0Zy 15 – j0ZB 10 + j0 Take VRN as reference between phasor and	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		assume a phase rotation of R-Y-B. Calculate the following: 2.1 The potential difference between the star point of the load and the neutral point of the alternator 2.2 The potential difference across each phase of the load 2.3 The current in each line				
Tuesday	**Three-phase, delta-**	A 380 V, unbalanced, three-phase, delta-connected load consists of the following impedances: ZRY= 50 + j40 ohms ZYB = 30 - j20 ohms ZBR = 35 + j25 ohms Take VRY as reference phasor and assume a phase rotation of R-Y-B. Calculate the following: 2.1 The current in each phase of the load 2.2 The current in each line	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Wednesday	**Four-wire, star-connected**	A three-phase, four-wire, star-connected alternator, with a line voltage of 440 V, supplies a star-connected unbalanced load consisting of the following: ZRN = 5 + j10ZYN = 10 - j12 ZBN = 15 + j10 Take VRN as reference phasor and assume a phase rotation of R-Y-B. Calculate the following: 2.1 The THREE line currents 2.2 The current in the neutral conductor 2.3 The power dissipated in each load 2.4 The total power	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Week Days	**Objectives**	**Activities**		**Teaching Methodology** (Demonstarion,Discussions,Practical,etc)	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Thursday	**Complex waveforms. Breaking down of fundamental and harmonics**	An alternating voltage represented by: V = 500 Sin 314t + 75 Sin 942t + 30° Sin 1 570t volt is applied to the terminals of a series circuit consisting of a 10 ohms resistor, a 0,02 henry inductor and a 100 microfarad	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		capacitor. Calculate the following: 2.1 The expression for the instantaneous value of the current supplied by the source 2.2 The RMS value of the current 2.3 The power factor of the circuit 2.4 The energy dissipated in the circuit during 5 milliseconds				
Friday	**Complex waveforms. Breaking down of fundamental and harmonics**	**Do revision** An EMF represented by e = l70sin3l4t-60° + l20sin(942t + 30°) volt is applied across a resistor of 10 ohms in parallel with an inductor of 0,02 henry. Calculate the following: 2.1 The RMS value of the current 2.2 The power absorbed by the circuit 2.3 The power factor of the circuit 2.4 The energy dissipated in the circuit during 5 milliseconds	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

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LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**TRANSFORMERS**	**5/18/2020**	**5/22/2020**
Week Number: 3	**Learning Objective /Learning Outcome** **: TO understand operation of transformers**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Monday	**Transformers : Calculations on load using equivalent circuit**	Transformers : Calculations on load using equivalent circuit A 400 kVA, 6 600/500 V, single-phase transformer has its maximum efficiency at 0,75 of full-load current. The maximum efficiency is 95,6 % at	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		a power factor of 0,8 lagging. Calculate the following: 3.2.1 The iron losses 3.2.2 The full-load copper losses 3.2.3 The full-load efficiency at 0,8 power factor lagging 3.2.4 The full-load voltage regulation at unity power factor				
Tuesday	**Transformers Calculations on load using equivalent circuit**	The impedance that refers to the primary of a 250 kVA, 6 000/500 V, single- phase, 50 Hz transformer is (0,5 + j4) ohms. The power factor is 0,8 lagging. Calculate: 3.2.1 The turns ratio 3.2.2 The percentage resistance 3.2.3 The percentage reactance 3.2.4 The full-load copper loss 3.2.5 The power factor at which maximum regulation occurs 3.2.6 The voltage to be applied to the primary to circulate full-load current in the secondary circuit on short circuit	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Wednesday	**Transformers**	A 12 kVA, 2 000/400	**Read**	**Board text book**	**yes**	

	Calculations on load using equivalent circuit	V, 50 Hz, single-phase transformer gives the following test results: Open-circuit test: 400 V at normal frequency applied to the 400 V winding. The power input is 120 W. Short-circuit test: 25 V at normal frequency applied to the 400 V winding and full-load current circulating in the 2 000 V winding. The power input is 150 W. Calculate the following: 3.2.1 The resistance, reactance and impedance referred to the secondary side 3.2.2The percentage regulation at full load and 0,8 power factor lagging 3.2.3The efficiency at full load and 0,8 power factor lagging	**Exercise Workbook**	**models Workbook**		
Week Days	**Objectives**	**Activities**		**Teaching Methodology** (Demonstarion,Discussions,Practical,etc)	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Thursday	**Tests — back to back; delta — delta; Scott**	A 500 kVA, single-phase transformer has	**Read Exercise**	**Board text book models Workbook**	**yes**	

	connection; economics; harmonics; zig—zag connection; tertiary windings. Regulation	an iron loss of 2,9 kW. PRIMARY SECONDARY 6600V 400V 420 milliohms 1,1 milliohms For a load power factor of 0,8 lagging, calculate the following: 3.2.1 Full load efficiency 3.2.2 Efficiency at half-load 3.2.3 Maximum efficiency 3.2.4 Output at maximum efficiency	**Workbook**			

Friday	**Tests — back to back; delta — delta; Scott connection; economics; harmonics; zig—zag connection; tertiary windings. Regulation**	A 165 kVA single-phase transformer has a voltage ratio of 3 300/660 V. The primary short circuit voltage is 358,5 V and the short circuit power is 3,875 kW. The iron loss is 900 W and the power factor is 0,8 lagging. Calculate the following: 3.2.1 The equivalent resistance and reactance referred to the primary 3.2.2 The percentage full load voltage regulation 3.2.3 The efficiency at half load 3.2.4 The maximum efficiency	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Lecturer signature

Senior/HoD Signature

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**ALTERNATORS**	**5/25/2020**	**5/29/2020**
Week Number: 4	**Learning Objective /Learning Outcome : TO understand operation ALTERERNATORS Synchronous motor Induction motor**	**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min	

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Monday	**AC Machines : Alternators**	AC Machines : Alternators The armature of a 10 pole, star-connected, three-phase alternator with a flux per pole of 0,04 wb has 150 slots. There are 4 conductors in each slot and the coil pitch is 0,75 of the pole pitch. If the	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		alternator runs at a speed of 600 r/min and the form factor is 1,13, calculate the open-circuit line voltage.				
Tuesday	**Alternators**	A 750 kVA, 3 000 V, 50 Hz three-phase, star-connected alternator has an armature resistance of 0,3 ohms per phase. A certain field current produces a short-circuit current of 180 A and an open circuit terminal EMF of 1 500 V (line value). Calculate: (i) The synchronous impedance (ii) The Synchronous reactance (iii) The full load percentage voltage regulation at a power factor of 0,8 lagging	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Wednesday	**Calculations of regulation and phasor diagrams; varying excitation; V— curves. Synchronous motor: back emf; back emf; armature reaction; load angle;**	Calculations of regulation and phasor diagrams; varying excitation; V— curves. Synchronous motor: back emf; back emf; armature reaction; load angle;	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		A 300 kVA, 2,2 kV, four pole. 50 Hz Star-connected synchronous motor has a percentage synchronous impedance of (5 + j 45) per cent. The machine is fully loaded at 0,8 power factor leading. Calculate: The resistance The reactance The EMF to which the machine is excited The load angle in mechanical degrees				
Week Days	**Objectives**	**Activities**		**Teaching Methodology**	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**	(Demonstarion,Discussions,Practical,etc)	**Yes**	**No**
Thursday	**Induction motor: calculations using slip and torque; starting resistances (slipring motors); double cage rotors; dc injection; plugging; frequency in stator and rotor**	Induction motor: calculations using slip and torque; starting resistances (slipring motors); double cage rotors; dc injection; plugging; frequency in stator and rotor The standstill EMF of a three-phase, 50 Hz, 6 pole induction motor with a star-connected rotor is 290 V between slip-rings. The standstill rotor impedance is (0,16 +	**Read** **Exercise** **Workbook**	**Board text book models Workbook**	**yes**	

		ill) ohm per phase. Calculate the following: 6.2.1 The torque developed at a full-load slip of 5% 6.2.2 The full-load power output if the friction and wind losses are 880W 6.2.3 The speed at maximum torque				

Friday	**Draw the circle diagram**	Draw the circle diagram of a 66,12 kW, 380 V, 50 Hz, 6 pole, star-connected, three- phase induction motor, given the following additional data: No-load test: 20 A 380 V 2 000 W Locked rotor test 115 A 150 V 0,23 power factor The stator resistance, per phase, is 0, 08 ohms. Use scale 1 cm 12,5 A Determine the following from the circle diagram at full-load: 6.1 The power factor 6.2 The line current 6.3 The percentage slip 6 4 The efficiency 6.5 The input power 6.6 The torque in synchronous watts	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Lecturer signature

Senior/HoD Signature

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**POWER FACTOR**	**6/1/2020**	**6/5/2020**
Week Number: 5	**Learning Objective /Learning Outcome: TO understand POWER FACTOR IMPROVEMENT**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	What will students do?		Yes	No
Monday	**Generation and supply of ac : Power—factor correction — causes of low power factor; reasons for improvement; capacitors and synchronous motors; KVA and KVA reactive; Calculations and phasor diagrams.**	A number of induction motors operate in parallel at a combined power factor of 0,7 lagging and an input of 500 kW. A synchronous motor having an input of 100 kW and at a power factor of 0,6 leading, is	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		connected in parallel with the induction motors. Calculate the following: 7.2.1 The total kVA 7.2.2 The total power factor				
Tuesday	**Generation and supply of ac : Power—factor correction — causes of low power factor; reasons for improvement; capacitors and synchronous motors; KVA and KVA reactive; Calculations and phasor diagrams.**	The power factor of a 250 kW, three-phase, balanced load must be improved from 0,8 to 0,9 lagging, by connecting loss-free capacitors in star across the supply of a 2 200 V, 50 Hz supply. There are 3 capacitors in series per phase. Calculate the following: 6.2.1 The total kVA rating of the capacitors 6 2.2 The capacitance of one capacitor.	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Wednesday	**Generation and supply of ac : Power—factor correction — causes of low power factor; reasons for improvement; capacitors and synchronous motors; KVA and KVA reactive;**	The voltage supply to a consumer is 400 V, 50 Hz, three-phase. The consumer has a lighting load of 2 kW at unity power factor and a 30 kW induction motor	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

	Calculations and phasor diagrams.	operating at a power factor of 0,8 lagging. The efficiency of the motor is 85%. Calculate the following: 7.2.1 The total kVA of the load 7.2.2 The power factor of the load 7.2.3 The value of the line current to a delta-connected capacitor bank which, when connected in parallel with the load, will limit the current taken from the mains to 60 A				
Week Days	**Objectives**	**Activities**		**Teaching Methodology** (Demonstarion,Discussions,Practical,etc)	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Thursday		A three-phase, 3 kV, 50 Hz induction motor develops 500 kW at 0,78 power factor lagging with an efficiency of 92%. A delta-connected bank of capacitors is connected in parallel with the motor to improve the power factor to 0,95 lagging. Each phase	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		of the bank consists of 5 identical capacitors connected in parallel. Determine the capacitance of each capacitor.				

Friday	**Two 2 200 V star-connected alternators operating in parallel**	Two 2 200 V star-connected alternators operating in parallel, supply the following loads: 50 kW at unity power factor 400 kW at 0,9 power factor lagging 350 kW at 0,8 power factor lagging 100 kW at 0,8 power factor leading One machine supplies a current of 190 A at a power factor of 0,8 lagging. Calculate the following: 6.1 The armature current of the second machine 6.2 The power factor of the second machine 6.3 The output of the second machine in kilowatts	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Lecturer signature

Senior/HoD Signature

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**TRANSMISSION LINES**	**6/8/2020**	**6/12/2020**
Week Number: 6	**Learning Objective /Learning Outcome** **: TO understand operation of transmission lines**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	What will students do?		Yes	No
Monday	**Transformers : Calculations on load using equivalent circuit Measure instruments : Use, construction and operation of — wattmeters; watt hours meter; power factor meter; frequency meter.**	Calculate by means of the T-method, the sending end voltage, current and power factor for a long transmission line supplying a load of 40 MVA, three-phase at a power factor of 0, 8 lagging and 110 kV, 50 Hz. Each conductor	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		has a resistance of 30 ohms, an inductance of 0, 25 henry and a capacitance to neutral of 2 microfarads. IMPORTANT: Draw the T-method circuit diagram.				
Tuesday	**Transformers** **Calculations on load using equivalent circuit** **Measure instruments : Use, construction and operation of — wattmeters; watt hours meter; power factor meter; frequency meter.**	Apply the π method to calculate the sending end voltage, current and power factor of a 150 km transmission line. The line delivers a three-phase load of 15 MW at a power factor of 0,8 lagging and a line voltage of 90 kV, 50 Hz. Each conductor has a resistance of 0,285 ohms/km an inductance of 1,845 mH/km and a capacitance of 0,00863 uF/km to neutral. Note: Draw the π method circuit diagram.	**Read** **Exercise** **Workbook**	**Board text book models Workbook**	**yes**	

Wednesday	**Transformers Calculations on load using equivalent circuit Diagrams .diagrams connections. Cable fault's. Murray loop tests — ground fault, short—circuit fault.**	A three-phase overhead transmission line is 100 km long. The phase values of resistance, inductance and capacitance per km are 0, 15 ohm, 1,2 mH and 0,0087 μF respectively. The line supplies a balanced load of 80 MW at a power factor of 0, 8 lagging and at a line voltage of 132 kV at 50Hz. Use the π method and determine the following: 1) The sending end voltage 2)The sending end current 3) The power factor on the sending end	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Week Days	**Objectives**	**Activities**		**Teaching Methodology**	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**	(Demonstarion,Discussions,Practical,etc)	**Yes**	**No**
Thursday	**Cable fault's. Murray loop tests — ground fault, short—circuit fault.**	Use the T-method and calculate the following of a three-phase transmission line: 1 The sending current 2 The sending voltage 3 The power factor at the sending end 4 The efficiency of the line	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		Each conductor of a 150 km transmission line has a resistance of 0, 3 ohm per km, an inductance of 1,95 millihenry per km and a capacitance of 0,0097 microfarad per km to neutral. The line delivers a three-phase load of 25 MW at a power factor of 0, 8 lagging and a line voltage of 110 kV, 50 Hz. NOTE: Draw the T-method circuit diagram				
Friday	**Diagrams .diagrams connections. Cable fault's. Murray loop tests — ground fault, short— circuit fault.**	REVISION ON TRANSMISSION LINES	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Lecturer signature

Senior/HoD Signature

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	ELECTRO	OVERHEAD LINE PROTECTION	6/15/2020	6/19/2020
Week Number: 7	**Learning Objective /Learning Outcome** **: TO understand operation of OVERHEAD LINE PROTECTION**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology	Lesson Completed	
		What will the lecturer do?	What will students do?	(Demonstarion,Discussions,Practical,etc)	Yes	No
Monday	**Transformers : Calculations on load using equivalent circuit Switchgear and protective devices : Induction disc relays. Current and voltage break capacities of contactors. Re— verse phase relay. High voltage and current circuit breakers.**	Transformers : Calculations on load using equivalent circuit A 400 kVA, 6 600/500 V, single-phase transformer has its maximum efficiency at 0,75 of full-load current. The maximum efficiency is 95,6 % at a power factor of 0,8 lagging. Calculate the following:	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		3.2.1 The iron losses 3.2.2 The full-load copper losses 3.2.3 The full-load efficiency at 0,8 power factor lagging 3.2.4 The full-load voltage regulation at unity power factor				
Tuesday	**Transformers Calculations on load using equivalent circuit Switchgear and protective devices : Induction disc relays. Current and voltage break capacities of contactors. Re— verse phase relay. High voltage and current circuit breakers.**	The impedance that refers to the primary of a 250 kVA, 6 000/500 V, single- phase, 50 Hz transformer is (0,5 + j4) ohms. The power factor is 0,8 lagging. Calculate: 3.2.1 The turns ratio 3.2.2 The percentage resistance 3.2.3 The percentage reactance 3.2.4 The full-load copper loss 3.2.5 The power factor at which maximum regulation occurs 3.2.6 The voltage to be applied to the primary to circulate full-load current in the secondary circuit on short circuit	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Wednesday	**Transformers Calculations on load using equivalent circuit Switchgear and protective devices : Induction disc relays. Current and voltage**	A 12 kVA, 2 000/400 V, 50 Hz, single-phase transformer gives the following test results: Open-circuit test: 400 V at normal frequency applied to the 400 V	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

	break capacities of contactors. Re— verse phase relay. High voltage and current circuit breakers.	winding. The power input is 120 W. Short-circuit test: 25 V at normal frequency applied to the 400 V winding and full-load current circulating in the 2 000 V winding. The power input is 150 W. Calculate the following: 3.2.1 The resistance, reactance and impedance referred to the secondary side 3.2.2The percentage regulation at full load and 0,8 power factor lagging 3.2.3The efficiency at full load and 0,8 power factor lagging				
Week Days	**Objectives**	**Activities**		**Teaching Methodology** (Demonstarion,Discussions,Practical,etc)	**Lesson Completed**	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Thursday	**Tests — back to back; delta — delta; Scott connection; economics; harmonics; zig—zag connection; tertiary windings. Regulation Fault calculations to determine switchgear fault capacities. KVA rating of reactors to reduce fault current+ levels.**	A 500 kVA, single-phase transformer has an iron loss of 2,9 kW. PRIMARY SECONDARY 6600V 400V 420 milliohms 1,1 milliohms For a load power factor of 0,8 lagging, calculate the following:	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		3.2.1 Full load efficiency 3.2.2 Efficiency at half-load 3.2.3 Maximum efficiency 3.2.4 Output at maximum efficiency				
Friday	**Tests — back to back; delta — delta; Scott connection; economics; harmonics; zig—zag connection; tertiary windings. Regulation Fault calculations to determine switchgear fault capacities. KVA rating of reactors to reduce fault current+ levels.**	A 165 kVA single-phase transformer has a voltage ratio of 3 300/660 V. The primary short circuit voltage is 358,5 V and the short circuit power is 3,875 kW. The iron loss is 900 W and the power factor is 0,8 lagging. Calculate the following: 3.2.1 The equivalent resistance and reactance referred to the primary 3.2.2 The percentage full load voltage regulation 3.2.3 The efficiency at half load 3.2.4 The maximum efficiency	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Lecturer signature

Senior/HoD Signature

LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**CABLE FAULTS**	**6/22/2020**	**6/26/2020**
Week Number: 8	**Learning Objective /Learning Outcome : TO understand operation of cable faults, Static control : Analogue to digital conversion. Digital to analogue conversion.**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	**What will students do?**		**Yes**	**No**
Monday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	Transformers : Calculations on load using equivalent circuit A 400 kVA, 6 600/500 V, single-phase transformer has its maximum efficiency at 0,75 of full-load current. The maximum efficiency is 95,6 % at	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		a power factor of 0,8 lagging. Calculate the following: 3.2.1 The iron losses 3.2.2 The full-load copper losses 3.2.3 The full-load efficiency at 0,8 power factor lagging 3.2.4 The full-load voltage regulation at unity power factor				
Tuesday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	The impedance that refers to the primary of a 250 kVA, 6 000/500 V, single- phase, 50 Hz transformer is (0,5 + j4) ohms. The power factor is 0,8 lagging. Calculate: 3.2.1 The turns ratio 3.2.2 The percentage resistance 3.2.3 The percentage reactance 3.2.4 The full-load copper loss 3.2.5 The power factor at which maximum regulation occurs 3.2.6 The voltage to be applied to the primary to circulate full-load current in the secondary circuit on short circuit	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Wednesday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	A 12 kVA, 2 000/400 V, 50 Hz, single-phase transformer gives the following test results: Open-circuit test: 400 V at normal frequency applied to the 400 V winding. The power input is 120 W. Short-circuit test: 25 V at normal frequency applied to the 400 V winding and full-load current circulating in the 2 000 V winding. The power input is 150 W. Calculate the following: 3.2.1 The resistance, reactance and impedance referred to the secondary side 3.2.2The percentage regulation at full load and 0,8 power factor lagging 3.2.3The efficiency at full load and 0,8 power factor lagging	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	What will students do?		Yes	No
Thursday	**RC network phase control. Phase control of armature voltage of dc motors.**	A 500 kVA, single-phase transformer has an iron loss of 2,9 kW. PRIMARY SECONDARY 6600V 400V 420 milliohms 1,1 milliohms For a load power factor of 0,8 lagging, calculate the following: 3.2.1 Full load efficiency 3.2.2 Efficiency at half-load 3.2.3 Maximum efficiency 3.2.4 Output at maximum efficiency	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	
Friday	**RC network phase control. Phase control of armature voltage of dc motors.**	A 165 kVA single-phase transformer has a voltage ratio of 3 300/660 V. The primary short circuit voltage is 358,5 V and the short circuit power is 3,875 kW. The iron loss is 900 W and the power factor is 0,8 lagging. Calculate the	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

		following: 3.2.1 The equivalent resistance and reactance referred to the primary 3.2.2 The percentage full load voltage regulation 3.2.3 The efficiency at half load 3.2.4 The maximum efficiency				

Lecturer signature

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LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**CABLE FAULTS**	**6/29/2020**	**7/3/2020**
Week Number: 9	**Learning Objective /Learning Outcome** **: TO understand operation of cable faults, Static control : Analogue to digital conversion. Digital to analogue conversion.**	**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min	

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
		What will the lecturer do?	What will students do?		Yes	No
Monday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	Transformers : Calculations on load using equivalent circuit A 400 kVA, 6 600/500 V, single-phase transformer has its maximum efficiency at 0,75 of full-load current. The maximum	**Read** **Exercise** **Workbook**	**Board text book models Workbook**	yes	

		efficiency is 95,6 % at a power factor of 0,8 lagging. Calculate the following: 3.2.1 The iron losses 3.2.2 The full-load copper losses 3.2.3 The full-load efficiency at 0,8 power factor lagging 3.2.4 The full-load voltage regulation at unity power factor				
Tuesday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	The impedance that refers to the primary of a 250 kVA, 6 000/500 V, single- phase, 50 Hz transformer is (0,5 + j4) ohms. The power factor is 0,8 lagging. Calculate: 3.2.1 The turns ratio 3.2.2 The percentage resistance 3.2.3 The percentage reactance 3.2.4 The full-load copper loss 3.2.5 The power factor at which maximum regulation occurs 3.2.6 The voltage to be applied to the primary to circulate full-load current in the secondary circuit on short circuit	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Wednesday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	A 12 kVA, 2 000/400 V, 50 Hz, single-phase transformer gives the following test results: Open-circuit test: 400 V at normal frequency applied to the 400 V winding. The power input is 120 W. Short-circuit test: 25 V at normal frequency applied to the 400 V winding and full-load current circulating in the 2 000 V winding. The power input is 150 W. Calculate the following: 3.2.1 The resistance, reactance and impedance referred to the secondary side 3.2.2The percentage regulation at full load and 0,8 power factor lagging 3.2.3The efficiency at full load and 0,8 power factor lagging	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

<table>
<tr><th rowspan="2">Week Days</th><th rowspan="2">Objectives</th><th colspan="2">Activities</th><th rowspan="2">Teaching Methodology
(Demonstarion,Discussions,Practical,etc)</th><th colspan="2">Lesson Completed</th></tr>
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LESSON PLAN

CAMPUS: ___________ CENTURION_________________

Lecture's Name	Subject	Topic	Date From	Date To
KOEN	**ELECTRO**	**CABLE FAULTS**	**7/6/2020**	**7/10/2020**
Week Number: 10	**Learning Objective /Learning Outcome : TO understand operation of cable faults, Static control : Analogue to digital conversion. Digital to analogue conversion.**		**Teaching Resources/Aids** Board text book models	**Length of period** 1hour 10min

ACTIVITIES

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
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Wednesday	**Static control : Analogue to digital conversion. Digital to analogue conversion.**	A 12 kVA, 2 000/400 V, 50 Hz, single-phase transformer gives the following test results: Open-circuit test: 400 V at normal frequency applied to the 400 V winding. The power input is 120 W. Short-circuit test: 25 V at normal frequency applied to the 400 V winding and full-load current circulating in the 2 000 V winding. The power input is 150 W. Calculate the following: 3.2.1 The resistance, reactance and impedance referred to the secondary side 3.2.2The percentage regulation at full load and 0,8 power factor lagging 3.2.3The efficiency at full load and 0,8 power factor lagging	**Read Exercise Workbook**	**Board text book models Workbook**	**yes**	

Week Days	Objectives	Activities		Teaching Methodology (Demonstarion,Discussions,Practical,etc)	Lesson Completed	
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