زانکۆی پۆلیتەکنیکی هەولێر
ERBIL POLYTECHNIC UNIVERSITY

(Electric Networks) ELN305

Course Catalogue 2023-2024

institute	**Erbil Technology Collage**	
Department	**Automation Industrial Technology Engineering**	
Module Name	**Electric networks**	
Module Code	**ELN305**	
Semester	**3**	
Credit	**6**	
Module type	**Core**	
Weekly hours	**4**	
Weekly hours (Theory)	**(2)hr Class**	**(81)hr Workload**
Weekly hours (Practical)	**(2)hr Class**	**(69)hr Workload**
Lecturer (Theory)	**Salar Ismael Ahmed**	
E-Mail	Salar.ahmed@epu.edu.iq	
Lecturer (Practical)	**Pshtiwan Kamal Mahmood**	
Email	Pshtiwan.Mahmood @epu.edu.iq	

Course Book

Keywords	Generation& distribution stations, transmission lines, load curves, power factor correction, protection of power system, electrical cables.

Course overview:

This subject is important for the second-year students of electrical power department to let them identify the main electric power system components: generation stations, transmission, distribution and protection of the electric power. Thy will learn about the types of energies and the electrical power generating stations such as: Thermal, hydro and nuclear power stations, the construction and the methods of their operation, the advantage and disadvantages of each, then transmission, distribution of electrical energy with related important electrical networks of the power system components like: types of transmission lines with some mechanical calculations related to them such as span, sag, tension, effect of wind and ice calculations , power losses and the equivalent circuits of transmission line by both methods of T & Π. The students will understand the impotence of the voltage regulation, power factor improvement, load curves and doing the important power calculations. The protection principles.

Course objective:

The aim of this subject is to get the students be familiar about generation, transmission and distribution of electrical energy, the minimizing of the electrical losses by choosing a proper conductor, span, sag for an economical method of distribution, also they will have sufficient knowledge about power stations construction also the type of lines so that the cost is convenient.

The students will be able to calculate the parameters of transmission lines (resistance, inductance and capacitance) voltage regulation calculations, also they will be able to draw the vector diagrams of different lines (short, medium and long), then finding the sending and receiving (voltages, currents, powers, power factors, powers, power factor). The most important theories by reasonably brief outline of essential information, definitions, formulas, procedures with solved examples and unsolved ones for homework.

At the end of the course the student will have sufficient knowledge about power system operation, different measurements and calculations which they need.

Student's obligation

The students should attend the theoretical lectures and study them very well to understand them and ask about any part which is not clear, also the students should have daily examinations about the previous lecture and solve the homework questions.

For the practical part the students should attend in time every week to make the experiment and prepare a report about it, in addition the students should have daily exams about the previous experiment and of course there will exams at the end of each term.

At the end of the year the students should have both practical and theoretical examinations.

Missed classes will not be compensated including the quizzes and the scheduled assignments.

The students will lose marks on unattended classes with quizzes unless a legal

document or authorized leave is presented which should explain the excuse of the absence. However, the absent student should take the responsibility for making up the missed lecture.

Forms of teaching

For teaching this subject the lectures are divided on four weekly hours. Mainly, the first two hours will be dedicated for the topic backgrounds and the main principles. Notes and handouts are given to the students containing the detail of the topics with solved examples and homework. This will be assisted by presentations using word and/or power point slides with writing on the board during the lecture time. Discussion time is provided for the students for questions. The second part of the week is dedicated for teaching the practical part which is related to the theoretical lectures by doing experiments in networks lab to let the students practicing, connecting circuits and measuring the important electrical quantities and theoretically.

Assessment scheme

60% Semester

- **14% Homework (Three home works are the minimum required)**
- **2%Class Activity**
- **10% Report, Seminar, Paper, Essay and Project (Two of them are the minimum required)**
- **14%Lab Report and it's activity (Two of them are the minimum required)**
- **4% Quiz ((Four Quizzes are the minimum required)**

.16% [6% Theory /Mid Term Exam&10% Practical /Mid Term Exam]

40% Final Exam

- **15%Theory**
- **25%Practical**

Student learning outcome:

This course will help the students to be familiar with the different types of electrical power generating stations including (thermal, hydropower, nuclear) stations with the advantage, disadvantage of each one. How to transmit this power to minimize the power losses, main methods of transmission and distribution, calculation of the different types of losses and the (efficiency, voltage drops, voltage regulation, power factor improvement) for (Resistive, Inductive, Capacitive) loads. Principles of protection

The knowledge which they will gain helps them to get jobs in engineering projects, electrical installations, counting electrical tariffs, doing electrical measurements, and reading electrical plans

Course Reading List and References:

At the end of the course the student will have sufficient knowledge about power system		
Course Reading List and References		
Main references	Useful references	Magazines and review (Internet)
1-Electrical Power	1- The Transmission &	1. www.circuits

Transmission & Distribution.	Distribution of Electrical Power/H.cotton,H.barbar	today.com	
2.Acourse in Transmission & Distribution./s.k.GIRDAR-S.M. DHIR	2-ندسة القُوِ الكيربائية/ابراييم يُسف مجيد 3-ملزمة شبكات النظري ًالعملي / -معيد التكنُلجيا اربيل 4- ندسة القُوِ الكيربائية د. محمُد جيالني	2.www.4share .com	
3.Acourse in Electrical power/M.L.SONI	4.Acourse in Electrical power/M.L.SONI	3.www.freebookspot.com	
Principles of power systems V.K Mehta			
4-Power system analysis P.P Doe			

The Topics:	Lecturer's name
Theory	**Salar Ismael Ahmed**

No. Of Weeks	Description
1	Electrical power importance, power system from generation to consumer, standered voltages. Thermal and steam power plants advantage and disadvantages. Hydro power plants, plants between head of the water, and the rate of flow of water. Nuclear power plants, construction advantage and disadvantages. Solar power generation/
2	-load curve calculations.
3	Transmission lines implementations, advantages and disadvantages. parameters of transmission lines (resistance, inductance &capacitance types of Conductors, inductance &capacitance calculations for single line, single phase, three Phase symmetrical & unsymmetrical, transposition process.
4	Mechanical calculations of transmission lines. (same level)
5	Mechanical calculations of transmission lines. (different level)
6	DC transmission its advantages, skin effect Numerical examples on resistance, inductance &capacitance calculations.
7	Geometric mean distance GMD & geometric mean radius GMR
8	Voltage regulation &vector diagrams. Transmission lines types and representation.
9	Different types of ring distribution networks. , radial, ring main -Comparison between different types.
10	Power factor improvement.
11	Feeders and current & voltage drop calculations.
12	Circuit breakers types for (HT, LT).

The Topics:	Lecturer's name
PRACTIC	Salar Ismael Ahmed Pshtiwan Kamal Mahmood

No. Of Weeks	Description
1	To introduce the students instruments used in network lab.
2	Three phase transformers loading by A three phase star connected balanced &unbalance resistive load.
3	Three phase transformers loading by A three phase delta connected balanced& unbalanced resistive load.
4	Three phase transformers loading by A three phase star connected inductive load balanced.
5	Three phase transformers loading by A three phase star connected capacitive load balanced
6	measuring transformers, Current transformers (CT), PT voltage transformers.
7	load curve &calculation of energy, average power, maximum power, load factor
8	O.C.T Calculation of capacitances of A transmission line model (open circuit)
9	9- (Short circuits) for transmission line model impedance calculations.
10	10-Power factor improvement.
11	4- Three phase transformer loading by A three phase star connected inductive load
12	5- Three phase transformer loading by A three phase star connected capacitive load balanced

Ministry of Higher Education & Scientific Research

Erbil Polytechnic University

Erbil Technology Institute

Class: Second

Subject: Elec .Networks

Time:Two hours

Q1 //**A**- Draw the load curve for following consumers on apower plant during 24 hours and find 1- total energy 2- avarge energy. (13 marks)

Load	20MW	40MW	60MW	20MW	50MW
Time	0 ----8	8 -----12	12 ---- 16	16 ---20	20----24

B - Answer only (t w o **)** branches: - (12marks)

1- Draw and discuss the effects of transposition for long transmission lines.

2 - Difference between Isolator and Circuit Breaker.

3 - What are the disadvantages of low power factor?

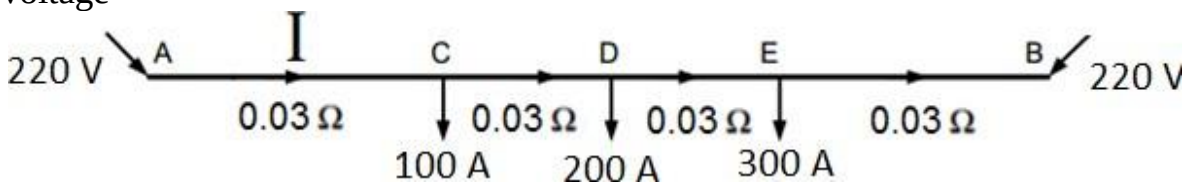
Q2 // A – Find the capacitance rate (C) for three phase load (37.3KW , 440V , 50 Hz) for power factor correction , from $\cos\emptyset_1$ = 0.85 lag to $\cos\emptyset_2$ = 0.95 lag When capacitance connected in 1- Star 2- Delta (15marks)

B - Answer only **one** branch :-

1- Conditions for Parallel Operation of Transformer . (10marks)

2- What are the types of Electrical Substations.

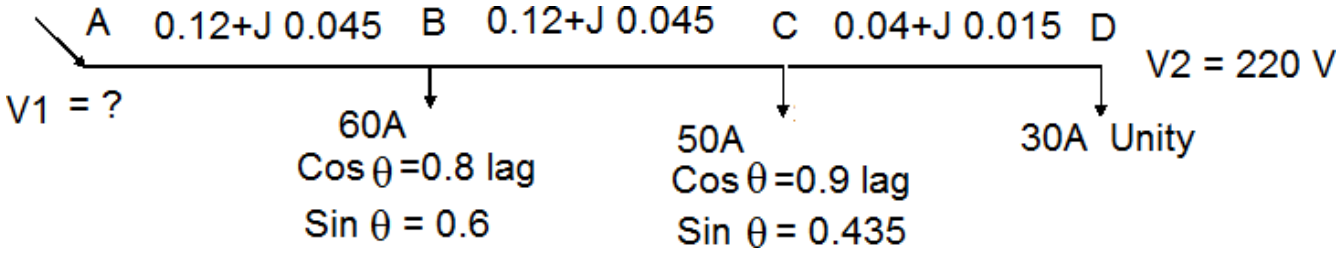
Q3//A - DC distributor shown .Find the currents in each sections and mid-point voltage



(15marks)

B - Answer only **one** branch :- (10 marks)

1 - In the fig shown below find Supply voltage (V1) .

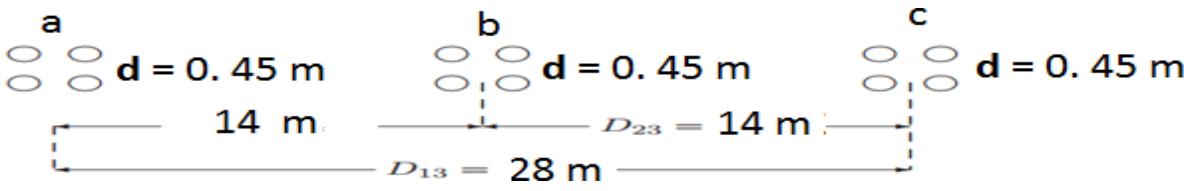


2 - An over head transmission lines three phase (33kV) , (3) insulators

if (m = 0. 11) . Calculate (V1 , V2 , V3 , efficiency)

بۆ لاپەرەی پشتەوە

Q4 //A - Find the inductance (L) of the Four bundle O.H.T.L if (r = 1.14 cm)



(10marks)

B - Fill only (5) five of the following blanks :- (15marks)

1 –The Circuit Breaker types are ---------, ----------,---------- ,----------

2 – The methods of transformers cooling.----------,----------, ----------.

3 - The parameters of transmission lines are --------- , ---------- ,----------, - - - - - -

4 – Reaplaced Cupper by Aluminum in transmission lines because ---------, - - - - - -

5 - The Types of Aluminium Conductors use in transmissions lines------- ,- - - - -,- - - -

6 - The main tyeps of power plant stations ---------- , ----------,----------,- - - - - - -

((good luck and best wishes))

Ministry of Higher Education & Scientific Research

Erbil Polytechnic University

Erbil Technology Institute

Academic year: 2018 – 2019

Class: Second

Subject: Elec .Networks

Time:Two hours

Q1 / A- The following consumers on apower plant during 24 hours (10marks)

Draw the load curve

Load	10MW	20MW	30MW	40MW	40 MW	30MW	20MW	10MW
Time	0 ---- 3	3 ----- 6	6 ----- 9	9 ----12	12 --- 15	15 ---- 18	18 --- 21	21--- 24

B // Choose the correct answer of the following :-

(15 marks) **1-** For 33 kV transimission lines the number of insulator discs used are

a - 3 numbers b - 5 numbers C - 8 numbers

2- Which of the following voltage regulation is be the best.

a- 2% b - 30% C - 90%

3- The terminals which connect the consumer's terminals to the distributors called

a- Distributors b- Feeders C- Service mains

4 - A 30 km transmission line carrying power at 33 kV is known as

a- midium transmission line b- long TR.L C - short TR.L

5- It used to step down the current of power system to a lower level to be measured by small rating Ammeter

a- Current transformer (C.T.) b- Voltage transformer (V.T.) C- circuit breker

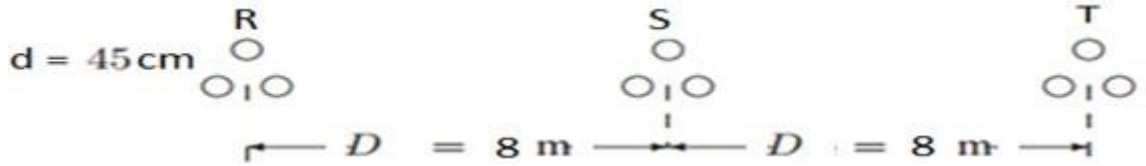
Q 2 // A - Answer only **(two)** branches :-

(15marks)

1- Draw the Bus-Bar types Arrangements
2- Draw the low voltage (L.V.) distribution system .
3- Types of Electrical Power stations.
4- Advantages of using capacitors banks for Powe Factor correction.

(10marks)

B - Find the inductance (L) of the three bundle O.H.T.L if (r = 1.14 cm)



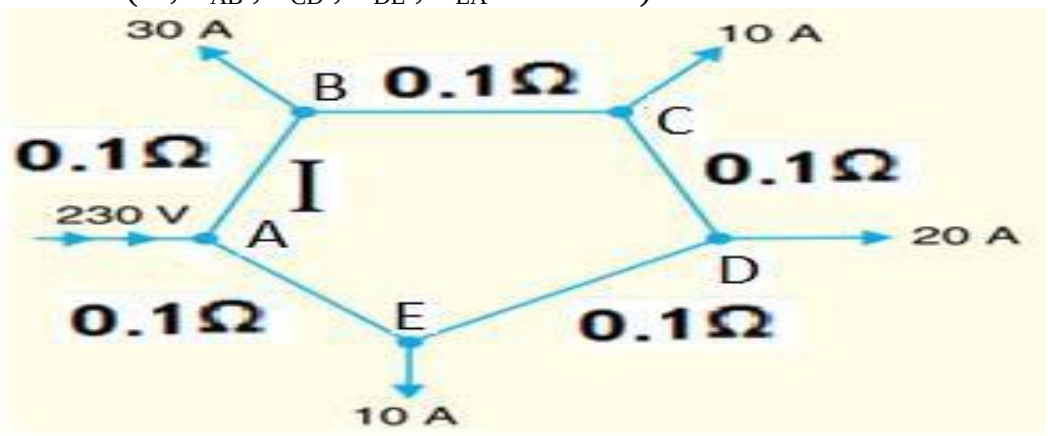
Q3 // Answer only (**two)** branches :-

(30 marks)

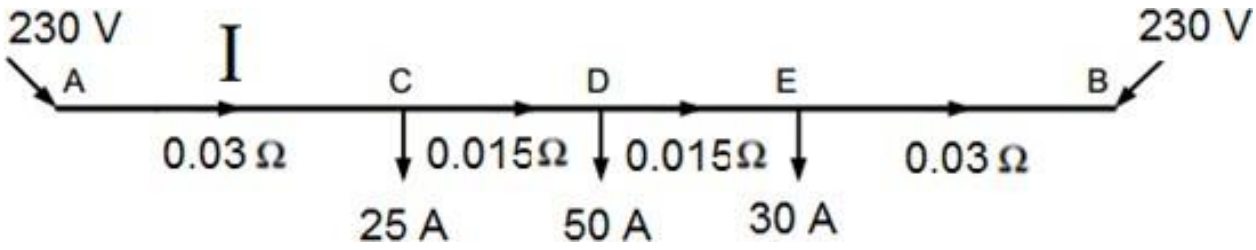
1– An O.H.T.L three phase (33 kv) , (3) insulators if (V3 = 8.286 kv ,V2 = 5.917 kv)

Calculate (V1 , ratio of shunt to self capacitance (m) , effeicincy (η) .

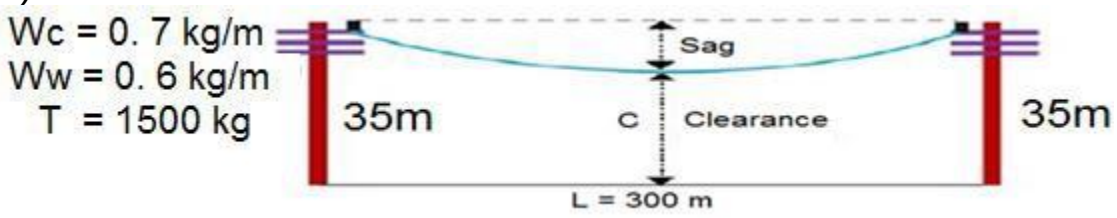
2 - DC ring distributors shown calculate currents in each sections with diagram.
(I , I_{AB} , I_{CD} , I_{DE} , I_{EA} and VD)



3 - DC distributor supplied from two ends
Calculate (I , I_{CD} , I_{DE} , I_{EB} , and V minimum Voltage point)



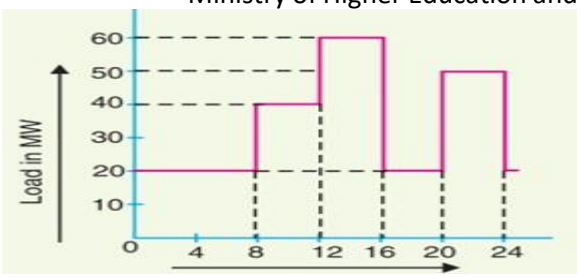
Q4 // An O.H.T.L, same level as shown below (20 marks) Calculate (Sag , vertical sag , clearance (C).



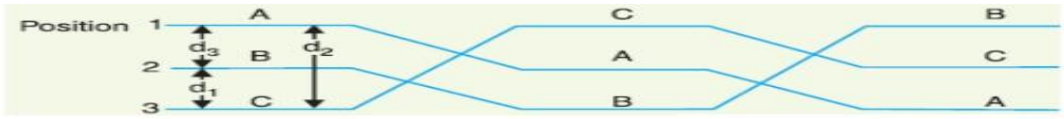
((good luck and best wishes))

أجُبة Exam: (First Attempt) Academic year: 2018 – 2019 الدور االول

Q1/A



B//1-



$$L/phase = 0.05 + 0.2\,L_n \frac{D}{r}$$

اذن

$$D_3 \neq D_2 \neq D1$$

$$L_3 \neq L_2 \neq L_1$$

$$X_{L3} \neq X_{L2} \neq X_{L1}$$

$$Vd\,1 \neq Vd2 \neq Vd3$$

$$Vr1 \neq Vr2 \neq Vr3$$

an exchange of positions is known as transposition

$$D\ eq. = \sqrt[3]{D_1 D_2 D_3}$$

2-

Isolator	Circuit Breaker
1- off load device	1- on load device
2- operated manually	2- operate automatically
3- low capacity	3- high capacity

3-

Disadvantages of Low Power Factor $\cos\theta$ ⇩

1- $S = \frac{P}{\cos\theta}$ KVA ⇧

2- Line Current I ⇧

3- Cross Section of Conductor A mm^2 ⇧

4- Copper Loss = I^2R ⇧

5- Efficiency ⇩

6 - Voltage Regulation ⇧

$$\uparrow VR = \frac{\uparrow I R\cos\theta + \uparrow I X\sin\theta}{V}$$

Q2// A

B//1-

1. **Same voltage and Turns Ratio**
2. **Same KVA ratings**
3. **Same Phase angle shift**
4. **Same Frequency rating**
5. **Same Polarity**
6. **Same Phase sequence**

2-

1. Step Up 2- Step Down 3- Primary Step Down 4- Secondary Step Down

5- Outdoor Type 6- Indoor 7- underground Substation

Q3// B//

1-

2-

V phase = 33 / $\sqrt{3}$ = 33/ 1.732 = 19. 053 kv

V1= V phase /(3 + 4 m + m^2) = 19. 053 kv / (3+ 4 X 0.11+ 0.11^2)

V1 = 19. 053 kv / 3 + 0.452 = 19. 053 kv / 3.452 = 5.519 kv

V2 = V1(1 + m) = 5.519 (1+ 0.11) = 5.519 x 1.11 = 6.126 kv

V3= V1 (1 +3 m+ m^2) = 5.519 x(1+ 3 x 0.11 + 0.11^2) = 5.519 x 1.342 = 7.4 kv

Efficiency = V phase / 3 V3 = 19. 053 / 3 x 7.4 = % 86

Q4// A

$$GMD = \sqrt[3]{(14)(14)(28)} = 17.63889 \text{ m}$$

$$GMR_L = 1.02\sqrt[4]{rd^3} = 1.02\sqrt[4]{(1.4173)(45)^3} = 20.66 \text{ cm}$$

$$L = 0.2 \ln \frac{GMD}{GMRL} = 0.2 \ln \frac{17.63889}{0.2066} = 0.889 \text{ mH/Km}$$

B//

1- Vacum, sf6,oil,air

2- **(ONAN) ,ONAF ,OFAN, OFAF, ONWF, OFWF**

3- **R,L,C,G**

4- **Low cost,low weight**

5- AAC ,AAAC , ACSR , ACAR , AAACSR,

Thermal , -Hydro ,Nuclea ,Gas ,Diesel , Solar ,Wind

20. Extra notes:

/

21. Peer review

The course book has been reviewed by me. It's well prepared for academic purpose and suitable for education of technology institute students

Reviewer's Name:_____nawal pato kano _____

Title:_____Lecturer _____ Date ____10/10/2020____

Ministry of Higher Education & Scientific Research
Erbil Polytechnic University
Erbil Technology Collage
Dept. of ATTE

Ministry of Higher Education and Scientific research

Examination
Third Semester 2022-2023
Final First Trial Exam

Class : Second
Subject : Electrical Networks
Time : 2 Hours
Date : 18 - 12 - 2022
Code : ELN305

Q1/ Choose True (**T**) or False (**F**) for the following, then correct the false: — 20 Marks

1. The main sources of electrical energy are wind, sun, and geothermal.
2. Distribution for low voltages are: 6.6 kV and 11 kV.
3. A photovoltaic cell is the basic device that converts solar radiation into electricity.
4. Long transmission lines are longer than 80 km, we consider the resistance and inductance.
5. The line supports or poles must be mechanically strong with factor of safety of 1.5 to 2.

Q2/A/ Define the power factor, then write down the types of power factor according to phase angle between the active and reactive power. — 10 Marks

/B/ Write down the Electric Power System stages. — 8 Marks

Q3/A/ What are the advantages and disadvantages of Wind Energy Systems. — 10 Marks

/B/ For a three-phase load (100 kW, 400V), power factor (0.8) lag. If the line resistance is (0.4Ω) and line reactance (0.6Ω). Find the voltage regulation. — 10 Marks

Q4/A/ An overhead line has a span of (l = 220 m), the lines conductor weights (W = 684 kg) per (1,000 m). If the maximum allowable tension in the line is (T_o = 1,450 kg). Calculate the max. sag in the line (D), and the clearance (C) where height of tower (H = 50 m). — 12 Marks

/B/ Write down the Forms of Towers. — 8 Marks

Q5/A/ A generating station has the following daily load cycle: — 10 Marks

Time (Hours)	0-6	6-10	10-12	12-16	16-20	21-24
Load (M W)	40	50	60	50	70	40

Draw the load curve and find: (1) maximum demand. (2) units generated per day.
(3) average load. (4) load factor.

/B/ A motor (80 kW) have a power factor of (0.8) lag. Find the capacitor rating to improve the power factor to (0.9). — 12 Marks

wish you all the success

Salar Ismael Ahmed
Lecturer

Ministry of Higher Education & Scientific Research		Class : Second
Erbil Polytechnic University		Subject : Electrical Networks
Erbil Technology Collage	Examination	Time : 2 Hours
Dept. of AITE	Third Semester 2022-2023	Date : 18 - 12 - 2022
	Final First Trial Exam	Code : ELN305

Typical answers

Q1/ 1. F (The main sources of electrical energy are fuel, water, and atom.

2. F (Distribution high voltages are: 6.6 kV and 11 kV). Or (Distribution low voltages are: 380V and 220 V).
3. T
4. F (Long transmission lines are longer than 250 km, we consider the resistance, inductance, and capacitance).
5. F (The line supports or poles must be mechanically strong with factor of safety of 2.5 to 3.

Q2/A/ Power factor define as the cosine of the angle between voltage and current, so it is always less than one.

1-Leading : the angle is positive means the current lead the voltage , this type is for capacitive load.

2-Lagging : the angle is negative means the current lags the voltage , this type is for inducive load .

3-Unity : the angle is zero means the current confirm the voltage , this type is for resistive load .

/B/ What are the electric Power system stages.

power systems pass through three stages which are:

1- generation.
2- transmission.
3 - distribution.

Q3/ A/

Advantages of Wind Energy System

- The wind is free and with modern technology.
- Causes no pollution.
- Ideal for remote locations that cannot be tied to the grid.
- Wind turbines are available in a range of sizes, Single households to small towns and villages can make good use of wind turbines available today.

Disadvantages of Wind Power

- The strength of the wind is not constant and it varies from zero to storm force.
- Wind turbines do not produce the same amount of electricity all the time.
- There will be times when they produce no electricity at all.
- Wind turbines are noisy.

/B/ For a three-phase load 100 kW, 400V, power factor 0.8 lag. If the line resistance is (0.4Ω) and line reactance (0.6Ω). Find the voltage regulati

$$COS\Phi = 0.8 \text{ , } \sin \Phi = 0.6$$

$$P = \sqrt{3}\ VR\ I\ R\ COS\Phi \text{ , } I\ R = P/\sqrt{3}\ VR\ COS\Phi = 180.421\ A$$

$$\%age\ voltage\ regulation = \frac{V_S - V_R}{V_R} \cong I_R \frac{(R\ \cos\phi_R + X_L\ \sin\phi_R)}{V_R}$$

$$= \frac{180.421 \text{x } [\ 0.4 \text{x } 0.8 + 0.6 \text{x} 0.6]}{400} \text{ x} 100 = 3.0\%$$

Q4/A/ An overhead line has a span of (l = 220 m), the lines conductor weights (W = 684 km) per (1,000 m). If the maximum allowable tension in the line is (T_0 = 1,450 kg). Calculate the max. sag in the line (D), and the clearance (C) where height of tower (H = 50m).

$$\text{Maximum sag} = \frac{W\ \ell^2}{8\ T_0}$$

$$\ell = 220 \quad \text{m}$$

$$T_0 = 1{,}450 \quad \text{Kg}$$

Weight per unit length

$$= \frac{684}{1{,}000} \quad \text{Kg}$$

$$= 0.684 \quad \text{Kg}$$

Max. sag

$$= \frac{0.684 \times 220 \times 220}{8 \times 1{,}450}$$

$$= 2.85 \quad \text{m}$$

(Clearance) C = H – D = 50 – 2.85 = 47.15 m

/B/ Write down the Forms of Towers.

1- Hunging tower: used for straight line carring the conductor.

2- Angle tower: used for line diverting and carring the conductor.

3-Crossing tower: used in case of crossing railways and rivers.

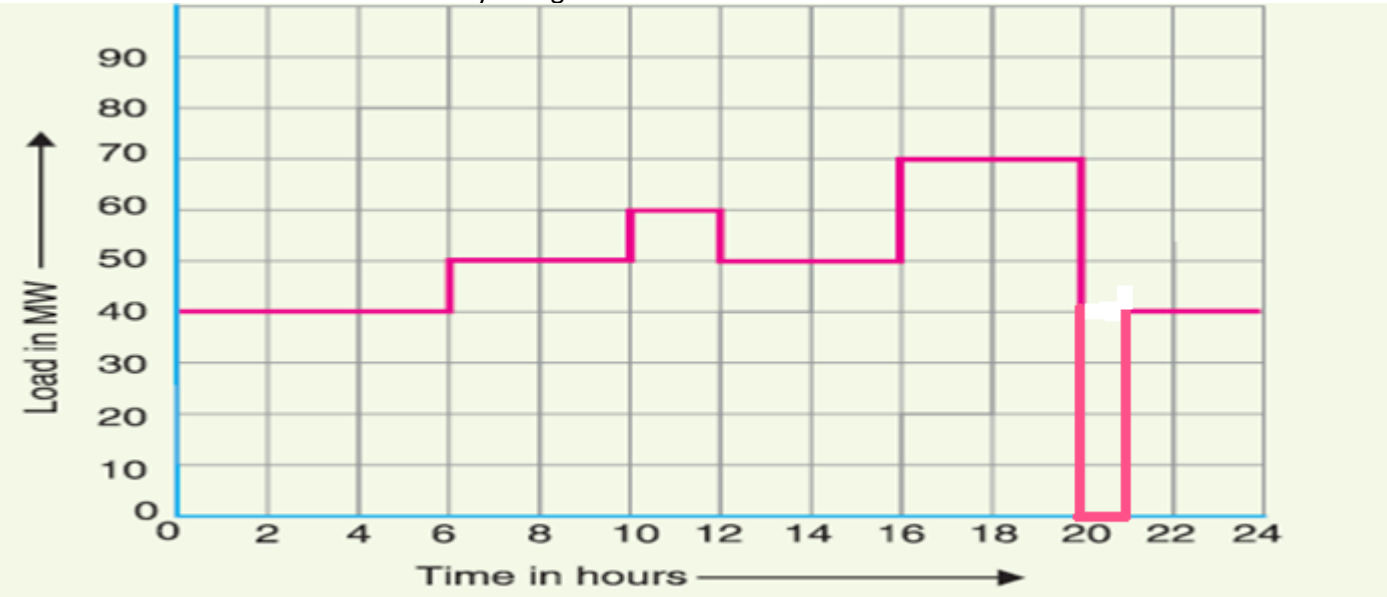
4- final tower: used in both ends of the transmission line, conductors are in the same level and parallel to each other.

Q5/A/ A generating station has the following daily load cycle:

Time (Hours)	0-6	6-10	10-12	12-16	16-20	21-24
Load (M W)	40	50	60	50	70	40

Draw the load curve and find: (1) maximum demand. (2) units generated per day.

(3) average load. (4) load factor.



(1) Maximum demand = 70 MW

(2) Units generated/day = Area (in kWh) under the load curve

$$= 10^3 [40 \times 6 + 50 \times 4 + 60 \times 2 + 50 \times 4 + 70 \times 4 + 40 \times 3]$$

$$= 10^3 [240 + 200 + 120 + 200 + 280 + 120] \text{ kWh}$$

$$= 11.6 \times 10^5 \text{ kWh}$$

(3) Average load $= \dfrac{\text{Units generated / day}}{24 \text{ hours}} = \dfrac{11.6 \times 10^5}{24} = 48.33 \text{ kW}$

(4) Load factor $= \dfrac{\text{Average load}}{\text{Max. demand}} = \dfrac{48333.3}{70 \times 10^3} = 0.69 = 69\%$

/B/ A motor 80 KW have a power factor of 0.8 lag find the capacitor rating to improve the power factor to 0.9.

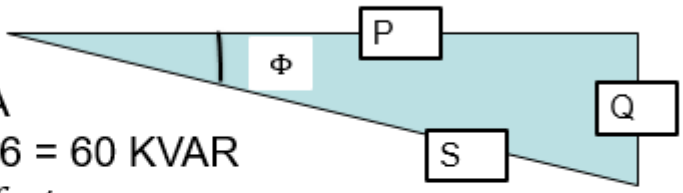
$\cos \Phi_1 = 0.8$,

$sin^2\Phi + cos^2\ \Phi = 1$, $\sin \Phi = 0.6$, $\tan \Phi = 0.75$

$P = S \cos \Phi$

$S_1 = P / \cos \Phi = 80/0.8$

$= 100KVA$



$Q_1 = S_1 \sin \Phi = 100 \times 0.6 = 60$ KVAR

If $\cos \Phi_2 = 0.9$ *power factor*

$\sin \Phi_2 = 0.435$

$\tan \Phi_2 = 0.484$

$Q_2 = P_2 \tan \Phi_2 = 80 \times 0.484 = 38.75$ KVAR

Capacitor rating $= Q_1 - Q_2 = 60 - 38.75 = 21.25$ KVAR

Erbil Technology College

زانکۆی پۆلیتەکنیکی هەولێر
ERBIL POLYTECHNIC UNIVERSITY

Program: Diploma (120 ECTS)
Department name:
 # Weeks/Semester: **15-20 weeks**

(Min. 12 weeks active lecturing (Including Mid Term exams with no stopping of lectures) + 3 weeks Final & Re-sit Exams (including one week break inbetween))

		1.0 ECTS =	27	working hours
Lecturer Name:	salar Ismael Ahmed			
Module Name:	Electrical Networks	X	Y	Z
Module Code:	ELN305	2	2	0

ECTS Workload Calculation Form

Activity	S	Description		Activity Type	No.	T.F. Range		Time Factor	Workload
						Min	Max		
Course	1	Theory	In class	f	12			2	24
	2		Online	f				2	0
	3	Preparation: (1-2)* X)		h	12	2	4	**3**	36
	4	Practical		f	12	2	2	2	24
	5	Preparation: (1-1.5)* Y		h	12	2	3	**2**	24
	6	Tutorial		f	12	1	1	0	0
	7	Preparation (0.5-1.5) * Z)		h	12	0	0	**0**	0
Site Visists and Lab Experiments	8	Scientific/Field Trips		f	1	2	6	0	0
	9	Practical/Lab Reports		h	8	1	2	2	16
Assignment	10	Homework		h	2	1	4	3	6
	11	Report		h	1	1	4	2	2
	12	Seminar		h	1	2	10	5	5
	13	Paper		h		4	15	0	0

	14	Essay		h		1	6	0	0
	15	Project/Poster		h		4	15	0	0
Assessment	16	Quiz		h	2	1	2	2	4
	17	Mid Term	Theory	f	1	2	2	2	2
	18		Preparation: (1.5-3)*X	h	1	3	6	**3**	3
	19		Practical	f	1	1	1	1	1
	20		Preparation: (1-2)*Y	h	1	2	4	**2**	2
	21	Final	Theory	f	1	2	2	2	2
	22		Preparation: (3-5)*X	h	1	6	10	**6**	6
	23		Practical	f	1	1	1	1	1
	24		Preparation: (2-4)*Y	h	1	4	8	**4**	4
Face to face hours (f)/12 week			4.50	Face to face hours (f)					54
Home hours (h)/15 week			7.20	Home hours (h)					108
Total hours/15 week			10.80	Total hours					162
ECTS (Total hours/ 27)									**6.000**

f: Face to face activity hours h: Home activity hours
X: Theoretical class hours/ week Y: Practical hours/ week Z: Tutorial hours/ week

Module Name:	Module type: Theory + Practice	Module Code:

Student Scores/ Semester

S	Student Name	Scores / Assignment (27%)																Scores / Assessment (33%)								Total
		Theory									Practice							Theory				Practice				
		Homework				Class Activity	Report	Seminar	Paper	Essay	Project\Poster	Lab. Reports & Activities							Quiz (Theory + Practice)				Mid Term	Final	Mid Term	Final	
		5%				2%	10%					10%							8%				10%	20%	15%	20%	100%
		*	*			*	*	*											*	*							
1																										
2																										
3																										
4																										