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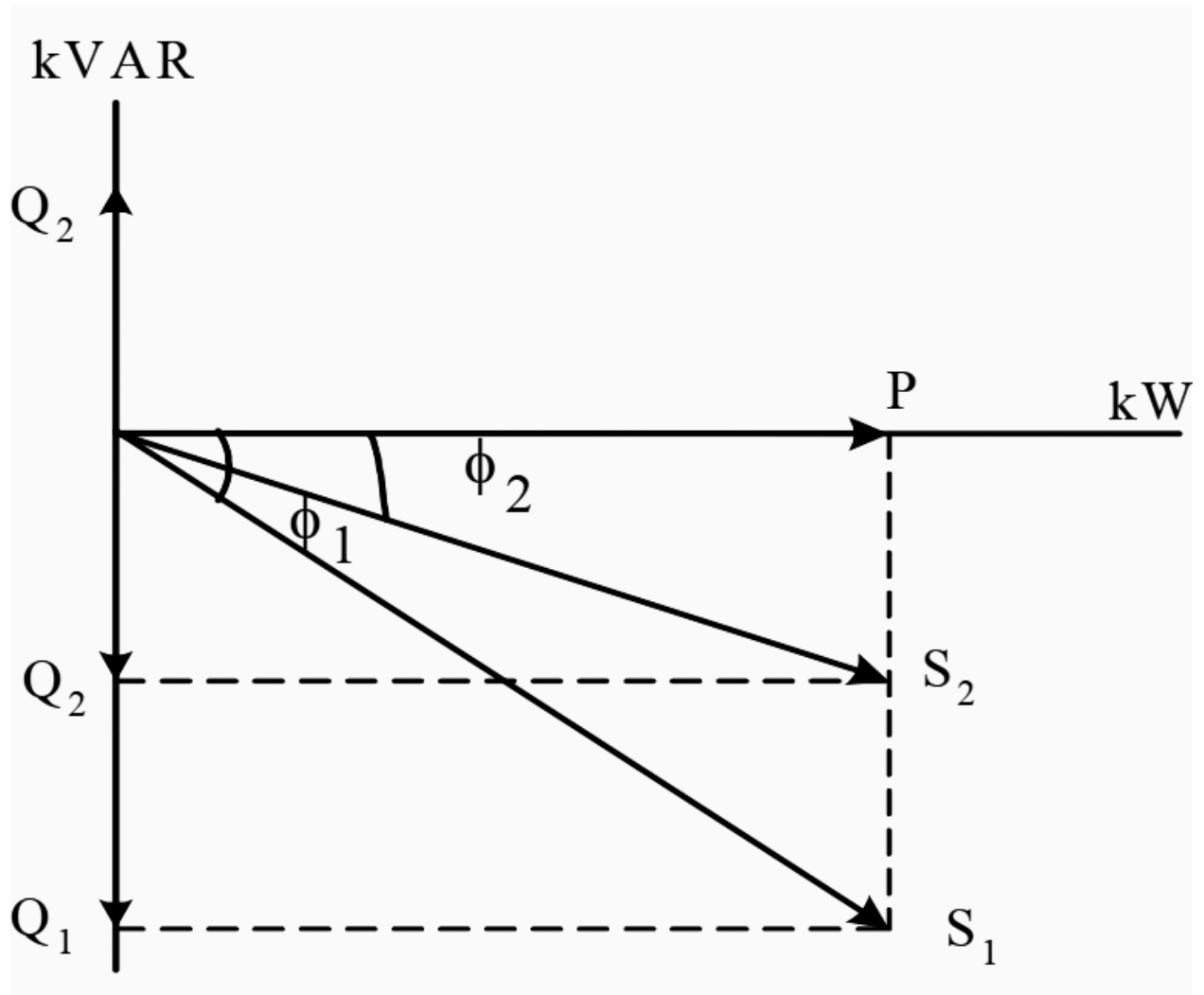
18/ENG04/077

Electrical/Electronics Engineering

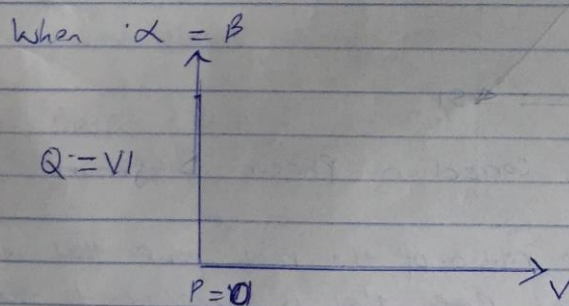
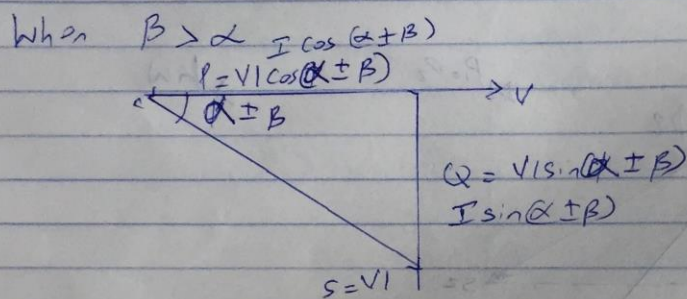
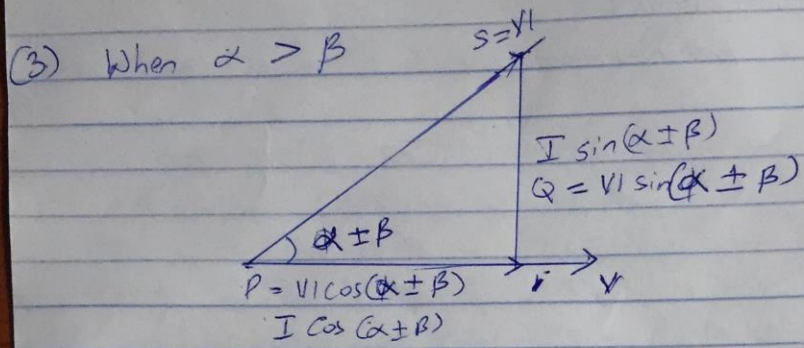
EEE326

Assignment

1. 1



2. The power factor is the ratio of the real power that is used to do work and that is supplied to the circuit. The power factor can get values in the range from 0 – 1  
The power factor is equal to real power divided by apparent power measured in kilo volt amperes (KVA). Apparent power, also known as the measure of the amount of power machinery and equipment during a certain period it is found by multiplying (KVA = V x A) the result is expressed as KVA units
- 3.



4.  $P = VI \cos (a \pm b)$

$Q = VI \sin (a \pm b)$

P represents Active power

Q represents Reactive power

5. a. To improve voltage

b. To lower the cost of electric energy, when the electric utility rates vary with the power factor at the meeting point

c. To reduce energy loss in conductors

d. To utilize the full capacity of transformers, switches, overcurrent devices, buses and conductors for active power only thereby lowering the capital investments and annual costs

6. Reactive power is needed in an industrial complex with numerous induction motors so as to control the voltage in an electrical power system and is important for proper operation for electrical power equipment to prevent damage such as overheating of generators and motors, to reduce transmission losses and to maintain the ability of the system to withstand and prevent voltage collapse.

7. True power = p.f x reactive power

$$= 0.4 \times 50000000$$

$$= 2\text{MW}$$

$$O1 = \cos^{-1} (0.4) = 66.42$$

$$O2 = \cos^{-1} (0.85) = 37.79$$

$$\tan O1 = \tan (66.42) = 2.29$$

$$\tan O2 = \tan (37.79) = 0.78$$

$$\text{Required capacitor KVAR (C)} = P (\tan o1 - \tan O2)$$

$$= 2000000 \times (2.29 - 0.78)$$

$$= 3020 \text{ KVAR}$$

$$\text{Reactive power (Q)} = P \sin (O1 \pm O2)$$

$$= 2000000 \sin (66.42 - 37.79)$$

$$= 958 \text{ KVAR}$$

8. The load flow study determines the voltage , current, power and reactive power in various points and branches of the system under simulated conditions of normal operation. The load studies are essential in optimizing existing network ensuring an economical and efficient distribution of loads and plan future networks.

9. true power = 100KW

$$a = \cos^{-1} (0.85) = 31.79$$

$$b = \cos^{-1}(0.95) = 18.19$$

$$\tan a = \tan 31.79 = 0.62$$

$$\tan b = \tan 18.19 = 0.33$$

$$\begin{aligned}\text{Required capacitor KVAR ( C )} &= P ( \tan a - \tan b ) \\ &= 100000 \times ( 0.62 - 0.33 ) \\ &= 29\text{KVAR}\end{aligned}$$

$$\begin{aligned}\text{Reactive power (Q)} &= p \sin ( a - b ) \\ &= 100000 \sin x (31.79 - 18 .19) \\ &= 23\text{KVAR}\end{aligned}$$

The facility manager should advise NUC to accept the improved power factor and avoid all the payment of penalties.

10. Modern development of new technologies, equipment and materials in the field of electric power engineering has allowed a fresh look at the problem of increasing economic efficiency. Operational reliability, environmental performance and competitiveness of electric propulsion for helicopter drive trains considering the higher requirements regarding reliability and fault tolerance, we use POSITIONAL CONTROL OR TORQUE CONTROL MOTOR often require feedback to verify correct motor position servo pr stepper motors are the best option for telecommunications applications but a DC motor with feedback or an inverter duty AC motor with an encoder often is used for tight torque control in steel or paper lines as well as similar applications.