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**MATRIC NO:17/ENG04/071**

**DEPT: ELECT/ELECT**

**QUESTION 1**



 POWER FACTOR CORRECTION PHASOR DIAGRAM

**QUESTION 2**

The power factor is the ratio of the real power factor that is used to do work and apparent power that is supplied to the circuit. The power factor can get values in the range from 0 to 1. The power factor to apparent power, measured in kilo volts ampere (KVA). Apparent power, also known as demands, is the measure of the amount of power used to run machinery and equipment during a certain period. It is found by multiplying (KVA=VxA). The results are expressed as KVA units

**QUESTION 3**

When $∝>β$



When $β>∝$



When $∝=β$

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**QUESTION 4**

P=VI COS ($∝\pm β$)

Q=VI SIN ($∝\pm β$)

P= active power

Q= reactive power

**QUESTION 5**

* To improve voltage
* To reduce the energy loss in the conductors
* To manage full capacity of transformers, switches, conductors as it lowers the capital investment and crucial cost
* To reduce the cost electrical energy when electricity varies with the power facror at the meeting point

**QUESTION 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 over-heating of generators and motors, to reduce transmission losses and to maintain the ability of the system to withstand and prevent voltage collapse

**QUESTION 7**

True power= 0.4x5x$10^{6}$= 2mw

$$θ\_{1}=cos^{-1}(0.4)=66.42°$$

$$θ\_{2}=cos^{-1}\left(0.85\right)=37.79°$$

$$\tan(θ)\_{1}=\tan(\left(66.42\right))=2.29°$$

$$\tan(θ)\_{2}=\tan(\left(37.79\right))=0.78°$$

Required capacitor KVAR(C)= P ($\tan(θ)\_{1}-\tan(θ)\_{2})$

 =2 x$10^{6}$(2.29-0.78)

 =3020KVAR

Reactive power(Q)= p sin ($θ\_{1}\pm θ\_{2})$

 =2x$10^{6}\sin((66.42-37.79))$

 =9.58KVAR

**QUESTION 8**

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

**QUESTION 9**

$$∝=cos^{-1}\left(0.85\right)=31.79°$$

$$β=cos^{-1}\left(0.99\right)=18.19°$$

$$\tan(∝=\tan(31.79=0.62))$$

$$\tan(β=\tan(18.19=0.33))$$

Required capacitor KVAR(C)= p ($\tan(∝-\tan(β)))$

 =100x$10^{3}$(0.62-0.33)

 =29KVAR

Reactive power (Q)= p $\sin((∝-β))$

100x$10^{3}\sin((31.79-18.19))$

=23KVAR

NB: The NUC should advise the government to accept improved power factor and avoid all punishments

**QUESTION 10**

Modern development of new technology, 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 completeness of elastic 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 of 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 toque control in steel or paper line as well as similar applications