**25/05/2020**

**ANSWER ALL QUESTIONS AND SUBMIT ON THE LMS ON OR BEFORE MIDNIGHT OF MONDAY 01/06/2020**

**EEE 326 : POWER FACTOR CORRECTION ASSIGNMENT II**

**SECTION A: THEORETICAL FRAMEWORK**

1. Develop the theoretical framework required for the correction of the power factor for a multi - sectioned industrial complex from to where ; ; ; and to determine the kVAR rating of the capacitor and the magnitude of the capacitor (C) in farads required to correct the power factor of the complex. **USE APPROPRIATE PHASOR DIAGRAMS.**
2. What determines the power factor of the Dangote Cement Factory at Abajana, Kogi State ?
3. The power factor (pf) of Eleme Petrochemical Industry PortHarcourt is given as ; what is the state of the pf of the complex when ;

and . Draw the respective Phasor diagrams.

1. For ; Write an expression for P and Q respectively with units in W and VAR. What does P and Q represent.
2. Justify the need for power factor correction to ABUAD and PHCN or an IPP.
3. Why is Q needed in an industrial complex with numerous induction motors?

**SECTION B: APPLICATION OF THEORETICAL FRAMEWORK**

1. An industrial load absorbs 5 MVA at a pf of 40% capacitive at 6kV. To improve the pf upto 85% capacitive, determine Q and C of the required capacitor. State how the correcting equipment will be integrated into the industrial power network for this load.
2. An industrial load absorbs 5 MVA at a pf of 40% inductive at 6kV. To improve the pf. upto 85% inductive, determine Q and C of the required and necessary capacitor. State how the correcting equipment will be integrated into the industrial power network for this load. How different are the values of Q7 and Q8 in terms of magnitude and type of pf correction?
3. The National Universities Commission (NUC) Complex in Abuja has a total load of 100kW. It is powered by a 415 V, three phase, 4 wire power supply. The power factor is 0.85lagging and NUC desires to avoid the payment of penalties for this poor power factor. What Should the facility manager advise NUC management to do? If an improved pf of 0.95 lagging is desired, determine the magnitude of the required Q and C.
4. Undertake a comparative analysis as an Electrical Power Management Consultant and use techno – economic facts and data to advice a client (Globacom Nigeria Ltd) requiring a 20kW induction motor to power its intended fruit juice factory from motor choices given the following details:

|  |  |  |
| --- | --- | --- |
| **Motor/parameters** |  |  |
| **kW** | 20 | 20 |
| **Phases** | 3 | 3 |
| **Line Voltage** | 415 | 415 |
| **pf** | 0.85 | 0.95 |
| **S** |  |  |
| **Q** |  |  |
| **PREVIOUS METER READING (kWhr)** | 23,000 | |
| **NEW METER READING (kWhr)** | 25,000 | |
| **kWhr charge** | #55/kWhr | |
| **Demand(kW) Charge** | #35/kW | |
| **Capacity (kVA) Charge** | #70/kVA | |
| **Reactive Power (kVAR) Charge** | #25/kVAR | |

**Justify clearly your choice of recommended motor.**

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