**NAME: YAHYA FAWAZ OLAWOLE**

**MATRIC NO: 17/ENG04/075**

**COURSE: ELECTRICAL ELECTRONICS ENGINEERING**

**EEE 326**

**SECTION A**

**Question 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.**

Where:

Θ1> θ2

P1=P2

Q1>Q2

S1>S2



kVAR supplied by p.f correction equipment= Qcap= Q1 -Q2

Qcap= kVAR1- kVAR2

Qcap= P2(tan Θ1-tan θ2)

Recall Q= V2/XC

Therefore XC=V2/ Qcap

Also for capacitors; XC= 1/2πfC

Therefore C= 1/2πfXC

**Question 2**

**What determines the power factor of the Dangote Cement Factory at Abajana, Kogi State?**

The power factor of the dangote cement factory at abajana, kogi state is determined by its apparent power {KVA} and real power {KW}. Where the apparent power = real power + reactive power. The reactive power is the useless power or whereas the power that sustains the electromagnetic field and the real power is the power actually being used

**Question 3**

**The power factor (pf) of Eleme Petrochemical Industry Port Harcourt is given as ; what is the state of the pf of the complex when ; and . Draw the respective Phasor diagrams**.

When α>β, the state of the P.F is lagging or Inductive

When α<β. The state of the P.F is leading or Capacitive

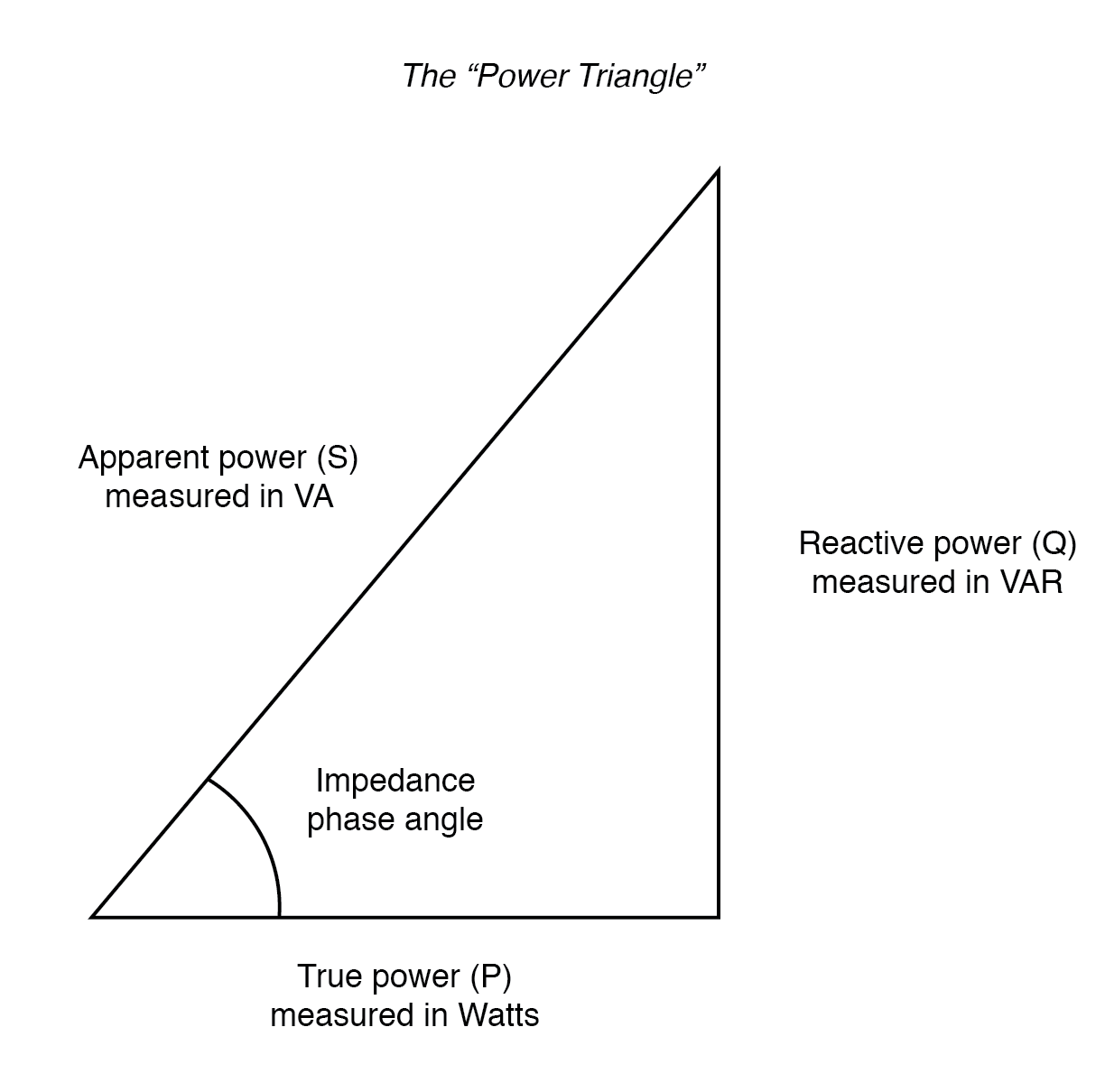
When α=β. The power factor is unity. It is neither leading nor lagging.

![A close up of a map

Description automatically generated](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RDaRXhpZgAATU0AKgAAAAgABAE7AAIAAAAFAAAISodpAAQAAAABAAAIUJydAAEAAAAKAAAQyOocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAEZpa28AAAAFkAMAAgAAABQAABCekAQAAgAAABQAABCykpEAAgAAAAM0OQAAkpIAAgAAAAM0OQAA6hwABwAACAwAAAiSAAAAABzqAAAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAMjAxNDowNDoxNCAyMTo0NjoxOQAyMDE0OjA0OjE0IDIxOjQ2OjE5AAAARgBpAGsAbwAAAP/hCxdodHRwOi8vbnMuYWRvYmUuY29tL3hhcC8xLjAvADw/eHBhY2tldCBiZWdpbj0n77u/JyBpZD0nVzVNME1wQ2VoaUh6cmVTek5UY3prYzlkJz8+DQo8eDp4bXBtZXRhIHhtbG5zOng9ImFkb2JlOm5zOm1ldGEvIj48cmRmOlJERiB4bWxuczpyZGY9Imh0dHA6Ly93d3cudzMub3JnLzE5OTkvMDIvMjItcmRmLXN5bnRheC1ucyMiPjxyZGY6RGVzY3JpcHRpb24gcmRmOmFib3V0PSJ1dWlkOmZhZjViZGQ1LWJhM2QtMTFkYS1hZDMxLWQzM2Q3NTE4MmYxYiIgeG1sbnM6ZGM9Imh0dHA6Ly9wdXJsLm9yZy9kYy9lbGVtZW50cy8xLjEvIi8+PHJkZjpEZXNjcmlwdGlvbiByZGY6YWJvdXQ9InV1aWQ6ZmFmNWJkZDUtYmEzZC0xMWRhLWFkMzEtZDMzZDc1MTgyZjFiIiB4bWxuczp4bXA9Imh0dHA6Ly9ucy5hZG9iZS5jb20veGFwLzEuMC8iPjx4bXA6Q3JlYXRlRGF0ZT4yMDE0LTA0LTE0VDIxOjQ2OjE5LjQ5MDwveG1wOkNyZWF0ZURhdGU+PC9yZGY6RGVzY3JpcHRpb24+PHJkZjpEZXNjcmlwdGlvbiByZGY6YWJvdXQ9InV1aWQ6ZmFmNWJkZDUtYmEzZC0xMWRhLWFkMzEtZDMzZDc1MTgyZjFiIiB4bWxuczpkYz0iaHR0cDovL3B1cmwub3JnL2RjL2VsZW1lbnRzLzEuMS8iPjxkYzpjcmVhdG9yPjxyZGY6U2VxIHhtbG5zOnJkZj0iaHR0cDovL3d3dy53My5vcmcvMTk5OS8wMi8yMi1yZGYtc3ludGF4LW5zIyI+PHJkZjpsaT5GaWtvPC9yZGY6bGk+PC9yZGY6U2VxPg0KCQkJPC9kYzpjcmVhdG9yPjwvcmRmOkRlc2NyaXB0aW9uPjwvcmRmOlJERj48L3g6eG1wbWV0YT4NCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgPD94cGFja2V0IGVuZD0ndyc/Pv/bAEMAAgEBAgEBAgICAgICAgIDBQMDAwMDBgQEAwUHBgcHBwYHBwgJCwkICAoIBwcKDQoKCwwMDAwHCQ4PDQwOCwwMDP/bAEMBAgICAwMDBgMDBgwIBwgMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDP/AABEIAKMCOQMBIgACEQEDEQH/xAAfAAABBQEBAQEBAQAAAAAAAAAAAQIDBAUGBwgJCgv/xAC1EAACAQMDAgQDBQUEBAAAAX0BAgMABBEFEiExQQYTUWEHInEUMoGRoQgjQrHBFVLR8CQzYnKCCQoWFxgZGiUmJygpKjQ1Njc4OTpDREVGR0hJSlNUVVZXWFlaY2RlZmdoaWpzdHV2d3h5eoOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4eLj5OXm5+jp6vHy8/T19vf4+fr/xAAfAQADAQEBAQEBAQEBAAAAAAAAAQIDBAUGBwgJCgv/xAC1EQACAQIEBAMEBwUEBAABAncAAQIDEQQFITEGEkFRB2FxEyIygQgUQpGhscEJIzNS8BVictEKFiQ04SXxFxgZGiYnKCkqNTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqCg4SFhoeIiYqSk5SVlpeYmZqio6Slpqeoqaqys7S1tre4ubrCw8TFxsfIycrS09TV1tfY2dri4+Tl5ufo6ery8/T19vf4+fr/2gAMAwEAAhEDEQA/AP38ooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiivIf22/jHr37Pf7JPxB8deGl0uXWPB+iXGrW0eo20l3bzeQnmFHSN43O9Rjh6APXqK8r/Z+8e+IPiDfeJW1TVtN1Sx0q4isY44PCuo+Hru1uvL86ZJEvZnMiGOa1KOgQcydeMeqUAFFeL/EP9ubwb4T8XXfhXw7HrXxM8dWbmKfw54QtU1K7s5M42XUxdLSyP/X5PCK/Nf8A4Lufso/tZfHHwV4f+Mfgnxkfg3q3huY6bN4c8M+NNUjuJoHSRrV57mF44HvpLvybWOG3tz+8vk33DxxiSMA/Y4PvHy06vkv/AIIr/B74mfs9/wDBObwX4J+MVvex/EPw3e6vDq1xdah9uOoGTVbueO587e/meZHMj7zzz2r60oAKKKKACiiigAooooAKKKKACoWnbcwwvygY9/8AAds+ufxmooAKKK4f4++LdU8AfBDxhr2jmxi1bQ9FvNRs/tkL3FuZoYHkTzI0eNnQ7COHQ0AdxRXgP7IPx/8AEnxzs7K51nVNJmaTw3p2sXlnH4N1HQ5LWe98wxmOa6mkSeH9xOn7sdUQ7zvr36gAquLpvTtxgcHrznOORzirFcD8a/2i/Bv7POj2d54w8QW+knVJfs+n2aRvcahq0/8AzxtbWEPPdS8j93BG7+1AHdF2/TGB2NSV+c//AAU6/Zv+P/8AwU2/Zuuofh5a6x8C77QX+3eHLm58QXFn4k1x/ueTPDZzpBZWsifPmeSeT5BmCB68D/4IBfFP9ob4Tftk/Ej4O/Evw/8AF3WPhq1rb/2N4i8UQXc95p97CjyLNc+c7yWiX8XmTBJ/9WY4IaAP2UooooAKKKKACiiigAqNLjcPmUr16c8ZOD+OM/jUhOBQDkUr9QCiiimA1ZQw7/lTRPn+FuuPp15/SpKKACmrKGHf8qdRQAUUV49+3jrmpeFf2I/i9q2j399pOsaH4M1fUrC9tZvJntLmCylnhkR+xR0WgD2GivEf2YTef2pdG60n4gaK0+k2UkS+JPEP9qxak53+ZPAn2mfy9mU3/OmfMT5PuO/t1ABQa89/aA/aT8E/spfC+88ZfELxFZ+GPCenyJBcapdK5t7dncRpvKIduXIX8RXnvwF/4Kgfs/8A7UWt2em/D/4peGPE15qV7/ZtultI6/arryJLgwpvQb5PIhkk2jnYmaAPoAXHC/I3zEDjt6/lUlH3RR1FACbx/wDqpaKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAoorjfiz8a/CfwL8It4g8Y+JNF8L6PHKIvtWpXscEUsj52RIW+/I/OxE+dzwATxQB2Vec/tPfB/R/j38AfFvg/xFrmoeHdB8QafJa6nqFlNDbzW9sc+YQ8ySRp8ufmKcV58v7RnxK+Og8v4TfD+TQ9FkbB8X/EO3uNNtdh6SWuk/Jf3XXlLj7CndJHqxpX7Bui+Mr+21T4u65q/wAaNWt5FnhtfECJH4fsJM/8sNIhxafJ1SS4SedP+e560Acl4H/arufE2t6kvwjbxx+0FNexxwR6tdzWOk+DNM2O+ZP7UjtUSff5gD/ZI72QeXH+7T566KX9lHxt8boxN8ZPiBfapp78/wDCH+DXm0HRB/sT3CP9uvf+BzwwSD79vX0LDClrEkcahUT5VVR92paAOc+G3ww8O/B7wdZ+H/Ceg6R4Z0PT49lrp2l2Udpb24/2EQBB+VfO37VZ/wCGhP28fgj8JVXztF8GvN8W/E6vC/ly/YX+yaPAJB8m/wDtKb7VsP8A0DPz+rK+Tf8Agmrcj44678Xvj80tvcQ/FzxRJpnh2aGeYxjw7ojyabY4SThPOuE1C7+TtfJ1oA+sqKKKACiiigAooooAKKKKACiiigAooooAK5n4oeAIfih8Ode8M3F9f6ba+IdPn02e4svL+0QRzR7HaPzEePfhjjejj2rpq434ufGvwr8B/B8mv+MPEWmeHNHSRLdbi9uBGJ5nJCQR93kfjZGmXc9BQBh/Bf4ETfBy00m2Xxp4y17T9F0mPR7LT9SNkkESJ5e1z5FtCzyYh2h5CeJH4+etT4x/Hrwn+z94bXV/GOvWOhWM8/2e1Ez7ri/uD/q4LeJMyTzvzshiR3fHAJ4ry8fFX4sftHSFPAOgyfDHwndHjxT4w06T+2LpTn57LRX2PGDj/WX7xuh/5dJENdh8H/2QvB/we8UN4ob+0/Fnjq4iMF14t8Rz/btYlQ53pG+0R2sJ6+RaRwwZ/wCWYoA5EeOPjD+0gpj8J6VL8GPB0pyNe8R2S3Xie/Tj57TTCTHaez329x/HaV23wa/ZL8G/A3VrrW7G2vdY8YapCIdQ8U67cvqeuagn9x7qT50hzyII9kEf8EaV6lRQAV8+fs6f8n3/ALRn18M/+m6SvoOvnz9nT/k+/wDaM+vhn/03SUAfQdFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABXN/Ej4eaP8V/A2seGdfsk1DQ9ftnsb+zkZkS8gkBSSN9hB2OmV+hrpK8f+L37X/hX4W+L28J2Ees+OviA0KTR+E/DEKXmqokn+rkny6QWUL9p7uSGP/boA6rwJ8EPD/w21RrrTI9Va58j7Kkt7q13qUkMPXy4zcyP5aZx8icHYn90Y434mftl6D4T8YXPg/wvp+rfEv4gW5xP4e8Mqk0mmcZU31y7pb2Sf9fEiO4+4knSsCD4F/E/9ootL8SvEn/CA+F7n5j4P8FajOl5cKQMpfa1+7nbOAfLs47fYcp586dfXfhl8JvDPwY8I2vh/wAI6Fo/hnQ7PJgsNOtUt7ePJG5tqY+f1agDw3xx+yP4v/bF8Fahpfx18SLY+EtYtWt7jwF4NuZYNPkjfjZe6iUS7vv9xEtYHHySQSV8B/tt/wDBAnTfgl8CP2fIPBvxC1TwR4J/Z/1fTpru90a12a/q+r6prGnwX2uNN9yGS3jSOZCfMwibPkSMb/2YrzH9r74QyftBfsufEbwNHJ5N34r8OahpNrMP+WE89vIkMi/7aSbH+ooA7Xwlpt9pHhbT7XU9S/trUre3SO5vvs6Q/bZAvzybE+RNx5wOOa2a88/Zf+L8f7Qn7N3w/wDHaRLGPGXhzTta2D/lm1xBHKV/4AXIr0OgAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAoorw7xn+3V4U0/xVeeF/BNjrnxY8Z6fJ9nutG8IQpeJpkn/ADzvb53jsbJ+PuXE6SH+BHoA9xry340ftd+BfgNqlnpWvaw03ibVE8zT/Dml2s2pa5qS/wB+Cxt0kndPWTZ5afxulcWPhN8ZP2gx5njrxlb/AAw8OTdPDngS5eTVLlP7tzrU0ccid/ktIIJE/wCe8lejfBP9m/wP+zppd5b+C/C+n6G2ov52oXiL5t/qkg/5bXVzIXnupP8AppO7v70AebLr/wAdv2gmP9n6fZfAvwvcHP2zVBBrXiyeP/pnaxu9hZPzw8kl3/twJXUfCb9izwP8KvGCeKpLPUPGHjpUKnxb4ou21bWUVz88cE0nFrEef3FokEHP+rr2GigAooooAKKKKAPnb/gpt8YtY+EX7IWtWvhW8htfiB8Q7q18C+Dd919n/wCJvqsyWkEiP/0w8yS6/wBy3evW/gp8KNJ+Anwd8JeBfD6zLongzR7XQtOWaTzJBBawRwR737vsQc18++OL4/tJf8FU/CXhuCaaTw3+zv4dfxfq6w3sZjl17WEnsdOgmg5ffBYR6pN2/wCPyA19YUAFFFFABRRRQAUUUUAFFFFABRRXP+PfiDoXwq8HX2v+Jtb0vw3oumx+Zc6hqV3Ha21snq7vhFoA6CuW+J3xa8MfBnwldeIPFmvaR4b0Oz4nv9Su0t7ePOfl3vj5uPu14h4m/aP+Kvx+8O3a/Anwbp9hb+RJ9m8Z/ESC607Srl/4PstggF9dIcj98/kQbH3xvPgpUX7G/wAHfCPxR0nT/iZrk3iTxt8SdPnn0+9vPGTwz6h4S1GF/LurKC2hCWlkY5E2b7SNBOnlyeZPG6SEA1W+OXxM/aIxH8MfDLeB/DU4IXxn41sJUe4Tn95ZaQHS4kz/AH7x7UDhxHOnXpvhP+xv4Z+GXi2PxXql1rHxA+ISxvEfFnie4S71GBH++lqqIkFlG56w2kcMZ9K9iooAKKKKACiiigAr58/Z0/5Pv/aM+vhn/wBN0lfQdfPn7On/ACff+0Z9fDP/AKbpKAPoOiiigAooooAKKKKACiiigAooooAKKK8v+Nf7U/g/4EXGn6brN9dXPibWFdtL8N6TaSahrmrYzkwWsIeQxj+ObAjjzl3TrQB6hXlHxr/a38I/BLXIfD9xc33iLxxqEJlsfCnh+1/tLW7tM4EnkJ/qYe3nzmOBP45BXBeJfBXxv/az8PX1rqGtXP7Pnhm8hkSC30WaDUvF8neN57r57Sy/24bfz5P7l2lcD8Lte8P/AAr/AGX9U8K6PpVn4B+KsPi608I62lj58z6n4ikeF4Lue6kk+13FpdwPHP50k/ni0ndN/npsAB6V/wAK1+L37SCeZ401qT4S+EZv+Za8Lah5niC9jP8ADe6uP+PU88x2GHT+C7evUvg98EvCnwB8Ff2D4P8AD+l+H9LM73UkNnbhPtFw+PMnmb78078b5JCXfua4/wDYo8bf8Jh8H7i1uIdctdY8M67qmhanbapq0mrS21zBdyHYl5IiSXMHlunkySDzDAY/M/eB69moAKKKKACoppktYnd2ConzMzH7tZ3iXxdpfg+w+0atqWn6Ta/89ry5S3j/ADeviX9un4q/C/8AaM8V/CDUrPQG/aF8KeF9eN5ruieH/Dr+LNPuNPvtLv0tb7y0R7Sby7uG1xJvPlh3OUoA9f8A+CZfiLT5Pgn4t8J6dqFpqVr8OPHmv+HoZre4SeNLX7c99Yxh04/d2N7aJ/wCvpGvzp/Yy8Z+Pfhv+2H8ctD8A/Au68C6H490bSPGvhjw54v1Ox8P2kF1AiaVfPs077f5EckdtavxH5m9PnjHmbx9c33g/wCLXi2a9F3448N+FLH7TqkMEei6F9qvDbPB5di/nXUjxieCTfM/7h45f3abECOZAD12is3S45LDSbcT3FzdPDCFeafYHl4+++wBff5RXM+Efjh4V8b+KLfRdN1yzutYuNIg8QR2WWSc2E5IhuvLYb0RyHUEgco4/gNAHcUVx3xA+OPhH4V+JPDmk+I/EOl6LqXi++/s3Q7e7uBG+rXXXyYc/fk/2BzWp4V8eaR43/tJdKv7bUDpN7Jpt55L5+z3MZ/eQn/bTjNAG7RRRQAUUUUAFFFFABRRRQAUUUUAFFcL8Xvjz4N/Z58Nx6p428UaP4bsbiTyLVr642S3k3UQwR/fmkOOI4w7v6V5oPjp8Wvjx8vw18BnwTochx/wlPxEtJ4ZJU/v2uixvHdv1/5fJLFx/cegD2/xN4m07wdod1qurX9npem2EZnubu7nSC3t0/vu78IPrXh5/bavPjE/k/BDwXqPxMikPyeJry4/sXweno6ag6PJex/7dhBdR/7aVa0L9g3w7rGtWevfErVNb+MniSzf7RBP4qkjk03T5OzWulxolhA6fwSCD7Rj7879a98oA+cL79jLWfj5YzH43ePNW8YafeDY/hXw55/h7w5Gv9yRIZPtd7jkH7RcPA/3hAlQf8E7NX0/4U/sp/8ACG3f2XTj8Jdd1DwLIsUGzzI7S+eDTm2Jy01xZvYv/fkkn/jJ5+lq+Ifib/bXg/48ftFeE9F0ubVLbxVe+CfF2rW8NgdQmGmak/8AYuqTRQbH8ySO00J32JG/P8DkigD64+H3xA0j4o+Hv7U0W+XULKK6nsJG2PG8FxBO8M8MiPh0kjkjdHRxwUrpq8a/Y8tfFmmeEfElr4gu9cvNHtfEd9H4WuNbWX+1ZNI+QwJc+f8AvjJHIZo0eb95JAkDyF5Hdz7LQAUV5baftSeEp9G+Jl9JNqFvH8I55rfxPFJZSR3FoY7SO+yidZENvNG6OmQ+75K9E0u9/tfTIbjybi2EyK/lTJskj/2WXtQBeooooAKztc1qz8M6RdahqFxDY2VjC9xcXEreXHAiAu7s56KB1rRr5d/4Kq6tfeKv2etJ+EOhzXkGufH7XrXwCs1rAlw9npc/mTaxcuknGyPSoL75+cO8fqKAPMf2ePHN54A/4Jw/Fz9o3WrHXDrXxgk1T4ktb/aorDVLbSHRINItUuY0k2SR6VBabOHxI7+te+/s6eKdc8RftHfH3TdQ1i+vdL8OeJNOsNJtJdnl6fC+hWFzIqYAPzz3Uj/PurV/aM/Z2k+M3wGu/hrpNxo/hrwjrWnyaFqMKae0kkOnyQmPZa7HRIXTjG9JExjgVV+IP7NmnvD4uj8N6fqFvefFy9RPFt8+ozzxiAWogd/JedNm+CGO1/0fY6eYj/8ALOgDif8AgoJ8RvG37OWmeG/ip4W1DWNU03wldONe8EQ/6vxZZSQyb3j2wSTpPaD/AEr93w8cE4dD8mPZPgc3n/Cjw/df8JQ3jRdUtF1GPWomjaLUUmPnI8JTjyNkg8sfOfL2ZkkfLvyvwC+FGqf2D4X8RePotUk+I+h6DJ4avL/+15/s19D5ib7pLVJvIje48iCdyE8xCQm87K8zX9g/T/hN8S/Bq/Dfw6ll4b8Lvp2y11q/Or6fHAl9NPPHD57vd2VxBnzIHt5PIkeTy5o9kaPGAfWFFFFABRRWVr/iGz8LaPc6lqd7a6fp9jE89zc3MyxQQInLs7vwqDHXtQBq1i+L/GOkfD3wvf61rmrafoej6bD595f310lvb2kY/jeRzsRfc14m/wC1/r/x5b7N8DfCyeKNPlOP+E410SWPhOMc/vLWT/X6p/sG0T7PJ0+1R1oeFf2J9P1XxPY+JvilrV98WPFmnz/bLKTVIvs+i6NODkPY6XH/AKPC6fwTyeddD/nuaAM8/tUeL/2hCbf4KeFVuNHkJU+OvFlvPY6FH/00srX5LvU/+AeRBID8l3Wn4C/Yr0XT/F9j4s+IGqap8VvHWnOJrPVfECo1no8nrp2noPstl0wJI0+0FOJJ5K9zooAK+e7c/wDCiP8AgoCbeP8Ac+HfjtpEl20YH7uPxDpSRo7/APXS7014/wDgGi19CV8+f8FIF/4RT4D6X8Q4f3d38H/E+l+M/O7w2MM/kar+ek3Oop/wOgDX/bJ1prnw74N8Ix+Xb33xD8Tw6LY3dxHHPZ6fNHaXeo+ZdQP8k8eyyePyf+WjyR/PH/rEsfsOa5/b37L/AIfjfQ7Hw22h3N/oDWVjLNJYIdOvrix861M2X+yyfZvOh3/8s5I/rXpHjHwbpPj7w/caVr2l2OsaZdbPPs723S4gn2OHXejjYfnUHkdcVpafp0Ol2UVtbwxwwQpsijRNiInAC4oAtUUV418Yvjdrnwp/aL+F+h3MOmr4K8f3N7os+oyxkXFnqiWr3FrBv3hNlxHDdclCRJbxpyZ02AHstFef/Azxhrvj/wAMXmsawtjHa3Oq3qaN9midPtGnxzvHBO5d33+eieejJgGORPevQKACvnz9nT/k+/8AaM+vhn/03SV9B18+fs6f8n3/ALRn18M/+m6SgD2L4hXFxZ+A9amtPsfnx2csiG8h8633BCfnj3pvT1G8detfIX7B2paX8Q/2ndB8USaJ4X0fXNc/Z98EaqLfS7FbWOzE9xqXmJAg5jgGyGMJ/cjjT+CvrT4jeCrj4h+E5tLj13WfDn2hlL3OnJbmdkyd8f7+KRNr9D8m76Vi3XwT0/QPhbb+F/Ctla+G4LPTYdEtJbZSLjT9PjRIdkEg+dZEgQbHO/Y+w4fGKAPH/wBu74d+G/2g/h94G1HwveeH7r4o/wBoWmvfCzVk8u4+0XcGLouX3/vNOkg/1+CR5b703z+RVz9ib46fDW1/Z7s9cbUND8L69rl/qEni621O4gtdQt/EUExGqQ3Q6b4JyUz9xI/I2fu3jr0b4AfAyT4J6Be6PcXkesWcGsXt1oUr2kcc+l2tzJ5/2b5FCYjlkmCCNERI/Ljx8mTkftB/ssJ8YJdNuNFubLwvqGlw3htNUs4DHe2l3MYdj/L+7mt/kfz7W4R4rj93v+5QB7TRRRQAUUVwnxm/aD8F/s96BBqPjDXbXR11CT7PZWwR7i91Of8A54WtrCHnup/+mcCO/tQB3dedfG/9pnwX+zxZ2P8AwlGtRW2o6s2zTdItIJL7VtZf+5a2UIeed+OkaPXnSeJPjR+0uy/2DZy/A/wXO2f7W1a3gvvF1/GcE+RZfvLTT/Z7v7RJ2e1jfpi3fxD/AGZf+Cb2oapeeKviJ4J8MeMNQtxPqeqeKfEyXfijWo9/G955Hu5o9/3IEzGmcIidKAN7/i9H7S6f8tPgT4NuP+vXU/Gd+n/kSx07/wAm5Of+WD16B8E/2ZvBH7PNnff8IrocdnqWrOkuq6xcyyXmrazJj/WXV7MXnun95JHNeSy/8FONB8bX2n2/w5+GPxy+KZ1F5US70XwTc6ZpaPHn/mIav9itXjfBUPHI6e4qqfix+1p8U0hPh/4Q/Cn4X2X2iHzJ/GvjObWtQEOz95/oWnQeR5iP/wBP/O33oA+qq+Uf2jvAGheH/wBs3wne+IoFbwn8YNKk8OanJ572jWmtaR5uq6RdRzI6PBIIE1f9+jo+be1G/wCQV8OfHD9gf9pL4GftweJfjJ4m/aY1jwb8L9b1LRIL208ITT+HdL1rW9QvoLDy49PnuruO1tY98M9xdSO8j4n2J+83x+2fHzwZ8N/jd+x78UPG82m2vjvUvgD4xe/1DUtU1y68S2N9a2V1Y6zdpD9qnnj+zz6a4jeEfJB5s8aAYzQB9hWX7Rnwn+E7f8Ito3iDR5ry1vb2J9J0V31XUGvUR766R4YPMne6feZHDjzJJJx995OZbD9pDVPFs1lH4c+GfxCvbWe50xXv9RtoNFht7W6TzJLgx3Ukdxm3QJ5kPkeZ5kiJs/1hj9O0HRtP0OxWHTbO1sbX+CO2iSOP8l4rQoA8Tgf47eN9Nj3H4Z/Dm6uNLQui/bfFj2F79uzt3f6CjxvYpj/pnPL/AMtI4x59y9/Zm1LxXcXX/CR/Ez4kata3E2pYtNP1FNBjjtbrYkduklikNwPIjT93P5/nh5JH8z/VhPYK+ff2rPix4l+AHxp+E/ihtamt/hnq2sv4V8Uaf9lh2W9zers0y+eZozIiC6RLVxv2H7ZG/GzNAHaeGP2Sfhv4U16PVrfwZodxq0dxHdpqN9B9uvUnjh8hJPPmLybxB8m/fXpMMKWsSRxqFRPlVVH3a89/Z11HWvFHw6/t/WNSvr//AISS+utV01LiGGIWWnTTubKEJGiHi18lnEm997yfOeAPR6APnj9opv8AhB/23f2f/FWVWHXH174e3Ten22yj1WEt/wBtNC2D3nx/HX0PXz3/AMFM/wDiQfso3vjSMrHJ8Ldb0jx1JL/zztNN1GC6vv8Avuxju4/+2lfQlAHP/ENSngPWtrXELfYJ9jQu0ckeI+NrpymMdq+Rf2FvGOqS+OPD3jjxUPE0ltqX7Png2fUfEN/Y3UlvPdw/2hdXW+6KeW8+y6R3G8v8/Svrzx38PNE+KGif2b4g0qx1jT/OSf7NdxeZH5ico+PaqfjT4f2PjrwmuiyvcWOlxy20jwWqpHHcRwyxyeRIjKQYHCBJE/jjLp0NAHiv7ROq6b+2l8B/Cfh3QbPxBDdfEIQatpHiGPSp/wDih54P36XskyDy4L63kTYkLvkz/I4Kb65/9nX9r1fhb8GPB/hfxf4H8V6T46jnvtHlsksns4tevbWT99dWk+ovB9q+2b/tSJ5klxJ5km/e6SPXvnwh+Dml/A/QtS03Q5LxdN1DVrrWI7NynkWEl1MZ5khVETZH5ju+z1kfrmq3xk+AeifHXRl0rxHJqFxo1xazWl9psbr5Goo7wv8AvAV+V0aBCk0eySM8o6E0Aeg0UUUAFFFFABRRRQAUUUUAeD/tFf8ABQ/4O/sp6v8A2L4p8aaa/i/ZHJH4Y06T7drjCTJjY2sZLwxv/wA9p9kXPzOK8y/4ay8SftDj/kpXwx+Afhebv/wkWla74wuU/wC+5NNsX/8AA7/gBr0r9pn/AIJs/A/9r7WZNW8c/DvRL3xNJHGg8SWIk03X4xHxGg1G0eO62J/c8zZ7V4ov/BOjxx+zzIkngRvhN8YtCt1/d6B8TfCllYatjdykWtada4HyZA+0WM7njfJQB6X8GtK/Zv8Agl4pfxFY+OvBOt+MrhBDdeKdf8XwatrlwneM3U8zyJH38iPZAnOyNBxXrP8Aw1p8K/8AopXw/wD/AAobT/45XzLB8dvgf8L7iOz+N3wB0/4G3ayiAarrvhWxvPC8h5/eJrVqj2kMf/X4bWT/AKZ19CeEf2evgv478OWWr6H4I+F+saPqMHnWt9Y6NYz292h6OkiJsdPpQBrf8NafCv8A6KV8P/8AwobT/wCOUf8ADWnwr/6KV8P/APwobT/45R/wyX8K/wDomvw//wDCetP/AI3R/wAMl/Cv/omvw/8A/CetP/jdAEcX7XPwplL7Pib8PW8s7X/4qS0+T/yJXg8P7UXw1t/+Cnd9eRfETwH9lvPhdbw3U39vWnll49Wn8hN+/wD6bT1xfwf8DfCnw7+1b8bNNX4Z+Edeu/EXjyHSPD9gmjWUcbvY+FtNuL3YXXYkccj7PTz3PA+d69++Cfwk+B/x3+FXh3xpoHw5+H02k+LNMt9Ssmfw5YiXy5FLhJAE4dC53p/A+8daAOy/4a0+Ff8A0Ur4f/8AhQ2n/wAco/4a0+Ff/RSvh/8A+FDaf/HKP+GS/hX/ANE1+H//AIT1p/8AG6P+GS/hX/0TX4f/APhPWn/xugD5v+JOq+DdS/bM0vxb4f8AiZ8M08EeMtJgsvH1s/iSyjkuJtMuPtelzx/P+83vJPBOCMPBgdkx9If8NafCv/opXw//APChtP8A45R/wyX8K/8Aomvw/wD/AAnrT/43Xkvi34NeCdI/bM8B+D4Ph98NV8O694R1/W72F/C9obgzWV3pEEflvs+RCNTcv3/cx+tAFX9pX/gsT+z3+yV4t8F6b41+Iei2th44nubS11exuo7/AE/T5oPL+S6eB3kh8zzPkcp5f7uTe6cZ+iPA3jrQ/ih4Us9c8N6zpOv6LqEfmW1/pt6l3Z3Cf3kkjJR/wr8+/wDgsT+wl8E/Eeq/s/6xr3gfwvDpEPxCXRLuxj0pItOlgubKeaS4mhtQkkzwfYvkR38vEk++OT5Nnpn7JH7KnhX9oP4EaX4+i8K23wm8R3ktzb6L4g+G/neEm1zSIZ3j0u+ktEfY8c9osEiWt2J0QOMfwbAD7Wr5U8JW3/DRf/BVPxL4hkt1uPD/AOzv4cTwppb3Fj93X9YSC/1GSGb/AKZ6amlR4H/P5N0/j+S/jNrv7d37Lv8AwUMvPiFp1i3xA/Zx8AeHvsWv6j4h1DSdIuPEWnQeZd3V79mtpv8Aj7g+dI5hawCQceXscvX27/wTX+EWsfCr9lHR7vxVaw2njrx9d3fjnxcsMbxouq6pO93PCN/z4g8xbdM/wW6UAfQVFFFABRRRQAUUUUAfKv8AwUJ/4KS2X7D+seGvD8fh/WtV8QeLIZ57fUX0XVbvQ9HjR44990+n2l1O8n7zKQRx/OUw8kAdHPz3o37a/wCzf441q11z4xfEL4jfFjWreeO5tNNu/hJ4ns/C+j3GSUktdL/s90Lpxsmu5LmePnZImcV+l1FAHyd/w+z/AGdf+hh+IH/hsPFX/wArqX/h9p+zr/0MPxA/8Nf4q/8AldX1hRQB8n/8PtP2df8AoYfiB/4a/wAVf/K6j/h9p+zr/wBDD8QP/DX+Kv8A5XV9YUUAfJ//AA+0/Z1/6GH4gf8Ahr/FX/yurj/j5/wVg/Zt+OXwJ8aeCbzxD48Fn4w0G+0Kfd8L/FX3LqB4H/5h3+3X3BXC/tG67qXhD4AeNdX0a7bT9U0jQr29s5wiSeXLDA8ifI42Hle9AHwN4j/4OG/hz8Av+Cf+g+NtR0nxxr/xG0jQdHl17w5eeEdc0kG7k+zx3yHUJrH7Ikke+Z/9YUkePYJPnD17N+y9/wAF0fgN+1n8I7PxZ4ek+JNrDcDZNbS+AdZu5LOT/nm81rbTwOf+ucj17P4a+Gei/tbfsf8AhPSfidpun+ONP8SaVpeqatZ6lbI1nfzjybtPMgT926JOkZ2fc+TnOK9U0fQrLw1o9rY6fa29jY2caQw21vD5ccCL91UReFAoA8Q/4ecfCP8A5+vH/wD4bnxH/wDINedftPftX/A/9qP4M6h4R1TWviho5nmgvrLVNN+H/iO3v9IvrW4jntruB/sPySRzxxuP6V9jUUAfnz+25/wXT+FX7AnwO8O+IdI8K+MvE/h+21e00W+05PDGq6FJp+ntDJ++ge+tY4HkjdI0EDyR71kPz/Jz618G/wDgsb8D/jZ8NNH8U6LdfEY6brduk8Bf4da++Qcfxx2bxuP9uN3Tj7/evVPEXgv4X/tq+E9Ml1jS/DXxH0Twvr73Vsl5ALuztdUtPNgc7H+R5IHeZPnH7uQHo6cal1+0l8P9G8dSeF5vF2g2Ov2moWukyadPdpBJHdTp5kFthv8AlpJH80adZBjZmgD5I/b7/wCC+/wz/Yk+HPh3xhB4d8ceMNMvfEEGkaxD/wAI5quiz6faPDPIbqB721jt53DxxoITIm/zD842GvQf+Cb3xy0v9q/4q/Fj4v8AhXT/ABND4I8fQ6DNol7q+jXWmfbfJsnjmCJPGnmbH+QvGXTjhzXv3xd/Z/8ABfx5XQ08a+F9E8VWvhfVE1vTLbVbNLuC0vUSREuBG+U8xEkkCOeU38YrvKACiiigAooooAKKKKAPj/8A4KH/ABS/a40rxFa+F/2cfhX4X1jTr+wSe+8ba54ntbQ6fMZHV7eCzkjfMgRUcTOjx/vMeWcV8t/Db9mD9t7w34qj8R3Oj+HdD8SXmY9V8Q6TJpup+LNUg/54NqerzXUEcfmfOkEFjDBH/wA86/WSigD82R+xR488Zxv/AMLI+Fnxq+LhaSGcReJvj35dgZI/uP8A2dp/2Sw/8gV6x8F/Aev/ALN0274ffsUeAfBMzL5Zm0LXtEsJHj9HkjhDtX2dRQB89/8ADRfx4/6Nz/8AL/07/wCIo/4aL+PH/Ruf/l/6d/8AEV9CUUAfIP7QWv8Axr+PXw4TQ5v2f5NNurPVNP13T7xfHGnSC1vrG9t761fZszInnwJvQlPMj8xN6b81y/hHw78aoPhL8TtA1j4Cx6zefFu61C+8Q3a+MNPtoJ5Lq1jsdiQHfsjjtIII/vvvMZf+OvuavGf28tXvdF/Ya+MmqabqGoaTqOleB9ZvrO9sLt7S4tJ4bGeSN45oyro6OgOQf60Aea/Aj4wftHeCvgh4M0XxB+z7HqGvaRoVjY6ncp4/07ZcXUcEaTuPk/56BzXWf8NF/Hj/AKNz/wDL/wBO/wDiK9c+Gs8Nt4F8O2JvHmuH0yJ0NxcvcXFwqJHvfe/zyffXL+riuooA+e/+Gi/jx/0bn/5f+nf/ABFcz8YfE3xS+Pvw01jwh4w/Zds9e8N69AbTULC68fWPlXEZ/wCAV9VUUAfmj/wVM/4KQ/tSfsofDPwFrHgf4ErDr+s+MrbSI9FOqQ+JJPE0T213I9pHbWqefG/7vf5yH5PL+feHwPor4YftG/tL/Fr4d6Let+zv4d8A63fWizajB4t+IKCPT3P/ADySxtLqSb/ck8g/jX1F5fz7v4qdQB+VHxE/4Jm/tgfHv/gov4km1j46TeEfgN408PQnxdpWhRyT6XdvPHJaXOmWNlqEl1GJHghjea68uFM3XyRu/mCv1B8L6BD4U8MadpNvNPNb6ZbJapJcP5kjqiBBvf8Aveprg/2cPjlqfxyTxsuoaHa6Gvg/xXe+Gofs+pvff2hHa+X+/ffBH5Zff9wb/wDfNeR/tK/8FE9S/Zz+Jfj/AEtvA9nq2i/D3TvD2p3c0fiB4dT1X+17q7t44LKz+ylJ50eyf5DcJ5m/t3APq6iiigAooooAKKKKACiiigAooooAKKKKACiiigCCe3S6gaORVkSRdjqw+/Xzn4p/4Jk/DdPE914i8BjxF8EvFt5Oby41f4fah/YseoThCge7sQHsL3+//pVvJ+r5+k6KAPlm0v8A9qf9niO3jvbHwT+0ZoEAhie5sHTwf4sT/npI8Mjvpt1J/sJJYpWH4i/4LE/DfQbO20C+07xd4P8Aivq0kFppHgjx1pr+Hby9uZ9/kp9qm/0R4R5b+ZPbzzhNmPncpG/2FXgH7UF63i346fCz4b61ofgnxN4J8dtqL6vY+INC/tLL2UCTxmPdMI0P+/HJQBxll/wT6uPD8vwm1wyab4t8Y+C7nV7/AMSXF5cT2Fv4gu9YjMl9co6JIY8XccBjQhwkCCP+BK9e/Yy/Z+T9lb9ljwF8PVvP7QfwrpMVpNcj/VzzffmdMgYTez7B2XArx8f8Eu4fgzAj/s//ABR8efA9bcIkegwXH/CQ+FNnnb5MaTel0g38jNo9v1r5n/4KXf8ABXD9pL/gmF4K8K6f4u+G/gPx14q8Sauj6RqPgrUZhba1awXUZurWbTJ45Lq1ke0f/XxyTxxySIOejgH6mUV4r+xd+2r4F/bd+C+j+MPB+pTRyaor/adF1KM2uq6POhQzWs8DkOkkfmJz9wiSN1JR0J9qoAK8n+LfgC30f4j2fxba68VXmreB/DmqaRZaFptuk8eoJdyWs8yCNIJJ3kkksbXBR/k8vpy+fWKKAPlvwf8AAzX/ANoOOx0L4pap4rHib4M+P/8AhItL1ixs0tbPXy8LzWsiPNbbJIIY72a1dI+j25JIylWvHnwY139m/wCGeveHPgzcavBdatd3nijStNuYN+j6J5H+lvY2rwwfuIbu6dI/Ikf/AFc915GzZgfTVFAHg/xl8dx/GPS/hv4Rsjqei3PxFu4dWu7K5up9E1mx0uy8u7un2bN+/wA82VrJH8nF43z17xXjvwivm+Jfx+8ceKlmupNN0ER+DtMEOtW93YzvCfPvp1giQva3HnyfZZEmk3/8S9P3aD55PYqACiiigAooooAKKKKACiiigAooooAKKKKACuZ+JvgG3+J3gHWvDl5dXdnZa/ZTWF3NaOqTrHInlvs3o4ztJ7GumooA+b7i28YfB7x/8PbHwzB4h1XwD4Jkg8H6pDNFNJeX1tNa4jvdkcPlzLBIlkPP8xNifbxskd46+kKKKACk+4KWigD5h/Zj+J2m/AX9nbU77xZFrvhtNR+KHiWGBdR0ue0mlGqeKtRntZgk0aHyDb3Mc/mcoke93/1b4+f/AIz/AAT8Z+J/2o/jrrVx4Z8X6x8Oh438Ia5reh22jTx3Hi/TtOsbT95YzeSfOe1v4EneCA+ZPHbvGnLx+Z9ufG74AaT+0Do99pPiC51CTR77SL3SWsoxD5I+1IENyu9HxcRpuSN/4BJJx89dR4b0mbw/oNjYz6jfatNZwpC95deX9ouii43v5aJHvbvsRB/KgDF8PfGPQde+JD+FYbqdNdTR4NZa1nheBzA7lPuuM+YhMfmJ9+Pz4N4HmJXaV5jF+zlpUfxN0vxgmqa4PEGl3eoXD3iraxvfwXYRHsZ9kA8yCPyLXZn95/ocGXfZXp1ABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABWH4w8HaT498M3+h65pNjrukapA1re2F/bJcW93E/DJIj5R0PdT2FblFAHg/jf4BeIr74teFfE3h7+xdN/4Qq/gsdK01b2S3s5NEeB476J40hOx97pIkaHyy9jY79uw494oooAKKKKACiiigD5Z8VWnib9jvwD47Xw3qOk+MPFfizxNqvj2100W6WDpYx+XPdW58yd/MzsjtfP8Ak2Pdo+z5MGv4s/Yz0n9pv4j698XtB8aWi3PjDRfDt54G1i00nfP4YudON/PBexyPN++Scai6TweXH5kG+Nz85NfV1FAHz637T2reGv2jvC/h7Vr7w/deFdQkk8H6hqdugtzJ4pFql9HDGjTybIDbpOmzLyCeSOPe5zX0FRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFeZ/Ez4PW/iX4s+DfHt1qWpQzfDmLUZI7G1tvPF8t1D5b70VfMkIjX5Ej/AI/7/Ar0yigDxn9mz4geMtZ8Y+MdI8Z6frkPz2niDRbm50sQW9vYXsf/ACDvOjHlyXFpPDOkn8flvbu4/eV7NRRQBwvxX/Z+8HfHGzWPxPoVrqM32Z7SK+RntNRtI5PviC7hKTw7+5jkSuZv/hF8QvAs08/g/wAdf25Z+Ze3Z0LxjB9rjkL2wS0tYNQg2T28EdwgkeS4S9kdJJE4/dmP2CigDx2D9pW88ESiH4heDfEHhDbKkH9q2SHWdDkf7KZ55PtUC77a3jdXj8+/gtQ52YHzgD0LwL4+0T4oeFtP1zw5rGl69oeqwrPaX+nXKXNvdo6hkdJEOx0Kng/SugrzPxH+zH4L17xvJ4kt9Jfw94mmv7G9utX0K7k0q81Z7JJI4Eu3t3Q3kEcc0ieTceZHjHyfImAD0yvNvGn7RvhvR/hB4w8V6DqWl+MF8ILdQTWOmalA8lzqMGYxpxffsjuHnAhCSEHzHGcVxHj3wz8ffhb8L9UtvBOteGPilq1vowtdJfxU39i6k99+8zdXVzawvazLzD+5jtIPuP8AvDv4+JrXwV8L4vEH7PvgnxN8K9a+DfizwFqmk6l4w8V+M9OtdP8AtVjpT/uPM1eGZ7W9N5rSWKJHJcO7+e8nl52ZAP0a/Z3+HNx8KPg3oWh315JqGsW9v5+q38kENvJqF9MfOurp0h+TfJO7yNjjLnr37+iigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACivN/wBp79ojS/2V/g3f+ONcs7++03TrqytJIrJU+0Mbq9gtI8B3Qf6ydO9b3xK+LPhX4MeH49W8YeJNB8L6W0yQC81jUIbGCSZ/uRh5HVN5xwO9AHVUV5nrX7W/wr8O6Foeqal8Tvh9p2k+KoftGi3lz4itI7fV4/ky9vI0gSZPnj5Qn749ade/tY/C3T/Gtj4fm+JngGHX9U+y/Y9NfxBaLeXRutgtfLh8ze/n+Ynl4Hz702ZzQB6VRXjui/tr/DGWy8Of254+8C+FdX8U2Vtf2Wj6j4o077ZIlwdkWzZO6Tb3OxHjd0kx8hNdFc/tO/Dmx+JLeDZvH3geHxf5qQf2C+uWv9qeY3l7E+zeZ5m8+ZHjj+NeuRQB6BRXhvxZ/ay1jwR8d5vAPhn4W+MPiBrFjodpr96+k6hpdpDaQXU91BHn7bdQb332snCeoqP4Z/8ABQz4R/Ev4feEfEV1428P+Dz40RjpemeJ9TttM1N5EujaTQeQ8nzyR3S+QfLLoX+47gjIB7tRXJWnxW8L6jq2n2lv4m0Ga71q4vbHT7VdQhaS+uLJ3S7giTdmSS3eORJET/VmN9+DWJpH7UXw18Q+LNJ0Gx+Inge81zxBCl5penW+vWsl5qEEke9HgjD75EdFZw6dhnmgD0ivC/gr4f0z4y+O/ib421LSrDUrfWtSfwbZfa9Nkjkl0zS3kgkgnE37uSP+0pNRkR0QB45Izl8ZHb+Bf2i/AnxW8P6xqXhDxh4Z8XWvh9T/AGh/YerQX/2T5N+yTy5Pkcpzh8V5v+zL+2tq/wC0L4N0PxdffCvxd4E8CeIPD8fiS28Ra7q2jfY4rSSBLiN5EgvZJY8xv3T5MfPigD6DjiESbV+7Tq8usf2wPhRrXgjVvFFl8Tvh5deHdDlSDUdWg8S2Uljp0km3y0mmEnlxs+9Noc5O4etY3h79uz4S+J/iTqnh6z8eeFbqXSfDEfi+41GPWLWTT10157iDzxNvx8hhfzDwkYkjyfnoA9qoryvUP20vg7pXw+g8WXXxY+G9t4WuL3+z4dal8T2UenyXWzf5In8zy/M2c7M5xXqlABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQB4T/wUU+BniT9pH9kHxJ4P8ILpsniLUbrSrmzTUrt7S2f7LqVrduryKjlMpA44Q8kV538bPCv7Qnxti8K3DeDfCvg7/hHdZee5j0TxpHdancQTWs8HmQXt1pf+i+W8g8zy4/MkjZ9knHlyfXVFAH5I/FP4aeLv2G/gT488I6ta/D/XfF/xC+GOteH00y/1jUfNk8/XPEF1DHpcxspBqk8/9rwRyWo8mffHal/kk8yPdk8P658M/Fnhv4FWcfgfxHq6fFzwf4rvQ95dw+I7NLWTSZ7p47F7XZJBBBZP/psc/keR+7/1n7uvtD/goh+0bq37Mvwj8P6tpfiTwv4O/tjxVp+i3uueILP7Xp+l20+/zJpE8+Dps/56V8/eAf8AgpF8Rl+I+i6darpPxu8J6l4wsdAsvEXgzw8+mjXjPoeu309na/ar027yWk2n2TyT/aPL8u4kR9kiGgCz4Q/4Jm+NtG/ZX+IPg28bwjPrnir4PaD4EspTM7pFfWUeped5jmEHyN91DsbBP7vtXHTQarr37U/gH4VaTb+DdWj8PfHnV/HN7eJdXUfiSzhf+1r55LrTntY/JgT7VHax33nvHPHJaeXv8z5PpDxR/wAFKNC8I/CRfG83gP4ivp6Lq51eORNLtR4ffSr2SxuoJ5576O0ef7RBMiR288zPs3j5NpM2gf8ABTHwP4o+K+oeGdN0nxNeWujJbT6prES2Jt9Ihn06PUY557X7V9vSA280f7/7L5G/jfQAfFL9g/S/jt+1zrHjjxb/AGjN4fk8G6b4fsYdN8TalpM5nhvdSnn85bWaHzI9l1Djez/x8Vw3xw/Yb8TaJL8QvD/wv8H/AA/m8H/Ez4a2vw6tYr7UHsI/CCQf2n8/kxwSefav/aG8pHIknmR/7fmR9B4k/wCCqvhXwR4Is9a8QeAfiloCavpFvrnh20utPspbzxRaTX1nZb7WOC6fZJHJqFk7w3HkyBLjOw7JAnX/ALUnxx8ZeE/2d/DureH9NXwV4o8VeKNB8Pi18RW0OpSaONR1S3s3aSO0uvLkdEnL4jnxx9+gD5l+Kv8AwSe+JkXijxFrHgTxVodnrPhmRLr4Z6lfzTmbS7rVIbe08Sz3WI/vzpDJOmzfvkuJP9XWhoH/AASv8V/Df4zzaf4f3P8ADuTx3o/i/TnPi2eC00610/8As/Zbz6eIN893H9iCQP8AaPL8sJv2eX5cnoWq/tb/ABC/Z4+PTfDf4ja74Z8QXWqweHtU0TXNA8MTWuYL3xHY6Pc2s9rJeuAd97DsnSf92kjv5MnlCOTqvFX/AAU88F/D3xlqmleKvDnjTwtHpmlaxrVveajFY51C00wb55EtUunvo96KXj+0W8PmAetAHWfskfs7337P/wCw/wCDvhrdR6THrGieG0027NlJ/ob3TJ+8k+5/HKzvu2dzxXj3wo/4Jo2P7P37AMPhPwH4L+GOifGWf4dWvhbUNXGnwSWmoXf2WCO68x3gk3xySR7/AN5A6E7HeOTGyuj8T/8ABUrSfBXiy48N658J/jFpviz/AIkn2XQZLLSpLy//ALXnu4LTy3j1B4P9ZZTpJ5kieXgb+vHU6l+31o/hH4t+HfB+u+CPHfhmfxNqcOh2V3qX9mx2730lr9oMAhS9e7kRCPJM8MDweZ9yR4/3lAHgXhL9iL4x6P8AGy6+KF5Z6drmpWOteHddstH8QeKTfXmqfZLHXbG7jmnjtY4IZI/7XSeARx+R5lun+r/1lavjn9iL4t+O/EviTXJPDfwh02bxNZaXePpWn3txDZxXWl+KrjXUtbr/AEU/avt6TpHdXXyfvHnfyJP+WnY6D/wVl0bxV4MsdZtfhD8Z1s9c8Hv4/wBNWS00dZb/AEWMR+ddRj+0f+WfnQfu3xI/noY0kQ5r6m8J+KLPxt4W03WNOl+0afq1tHe2r7dvmRyKHT9DQB8keEf2OPHXjL9s/S/jL4osPDnh8yeJoNUuvDkF+999it7bQNT02K684woj3kk96m/YMJBbwfvH6V9m0UUAFFFFABRRRQAV4b+2p42v/AUPwqksNVudJi1T4kaJpl68Fx5H2iCeSRPIf++kj+Wmzvmvcq434yfCLw/8efAGoeGfFWlw6xol9sea2d3j/eRuskbo6YdJEkRHR0IdHQEEGgD5k/aU/ad8dfBP9sTxRZ+G4rbXIrjw34C0rTtJ1W9ng0u1vdX8TatYSXb7A+x/LSPoN8nkY6JivOv2pP24viNp3hr4padarp+g+OPh54Q8fx/2lpV5N/Z8k+m6foV/Bdx2r8/aPI1HYnmeZ5ckb/fSSvqzwJ+w78Mfhzok9jp/h24m+2avp+vXV3qWrX2p6hd3Vi8cli8l3dTSXDiB40KRu5T7/wAnzvm94i/Y8+GvjHVvEF5qHhe1urvxZBqFrq8jyzf6dFqFtaWl6rrux+9t7G1jOOnkjGPnyAebXX7ZXibQfjK3wo1TRdDl+IVx4o0eyslt5JLezv8ARbmxe+utUVWLyKI/sOrwICeZ7eAH/WVxH7aOr6xrf7cej+Hf7N+O3iLQ4/Aj6kNN+HPin+xnguf7R8vz5/8ATrTf8nyfx17F8P8A9kGHwn+0/H8Qri+s7y28O+FIPBvhS3aCea/0+yMiTXTXV7PNJJdSPIiCNvk8tA+d5kc16l/wrXR/+Fm/8Jd9h/4qH+y/7G+1+Y//AB67/O8vZ9z/AFnP9e1AHxr8Mv2oPjh8Ffgxr2i6/ouk6tr3wZ8F/wDCX+J28Va2h1TULWe71N7HTvtVsnkfao9O0/8Af3b745J5B23yUP8A8FiofDPjjw9ba14dh03w/b6rrZ8aX7ynzPDWnJapd6JMUzy9/Bd2XHTf5w7V9LfGL9kD4e/H/wATW+seK9Bl1O+jsP7NuFi1O6tINVs9/mfZL2GCSOO+td7u3kXCSR/vH+T5znk/2iPgB+z/AKR4e8aa38VLHwToWm/EiTSrHxDd6/qa6bbaxJp8nn6fC8jyIm6MpkBOWEeDuCcAHiPhX/gqf45u/GP9n6h8MdajuvDGpaD4d8UaVp3hjX9Qkjvr6xsLq9khvYLJ7GFLP+0EHkzyeZIIHz5O+Pf7R+yn8d/H37QH7OuueOPFWm+GdCs9Qivf7CttHu55riOOCWeHfM74j3v5Mbp5f3A+DmpH+FPwD+PnjjT/AIoWmoeHfEUmpatZfZ77TvFbyaPrOqWn/HqZLaCf7JdXcGxPLeSN5I/LTYRsr1r4f/Czw/8ADf4dweF9F0+Ox0G3SaNLQSu/lrI7u43P8/33fqe9AHwn+wh488QeBP2ONC+MPi7RPjFaX1n8MLXxK+uePviobrw5r99JYwP/AMeyXt28Hnu5dC9p+7z9zzCEPb+Bv+Ck3jrxp8QJfh9aeF9MbxdqOvaPpWl6rqWl6x4e0/y73TtVvp5Xsr6BLr9xHot3GhT5J3lh5j+fH0//AMM7+D7j9n62+F0ug283gO10eHw/BpbyyFIrKGNI4kWTf5nyIibHD+YuwNv381xo/wCCffwrFlqnm+HNUvr7VpNPnuNWvfEmqXWsSz6e80llP/aEk73aTwefKqTJIJNj7N5TCUAeF6p+2l8W/AXxp8ZR6rH4N1Gaz8O+HtK07QbC8kksBrmo+KrzQoLp7rHmJG+IJJoTGXg4j5dHeTa8W/tz/FbSvjvafBmy8O+A5viNJ4igsJNUlvbpNEfT59Hv9Sjn2J+/jnzp88PkfP0jfzMP8nrNz/wT2+Ds+ntayeDIfs9xpM2hXYOp3n+n2011Jdv5/wC+/fTfa5pJ0nk3zJPI7o6Od9b3gn9kLwD8PdT0/VNM0O4k1jTdTbWYdT1DVLrUtQe9e0exeea5uJpJpmFrI8I8132JwmMcAHiX/BQ7XtUm/aW+Dvh+3tfi/q2i6roviW6vtH+HniF9Fv7ueCTSRBK7/a7XfHH50/8Ay0/5aV5f8GfEn7Rfwx+OGjaHcXVyttdeGPF+v6VpHj3Wvt97YaVBqOk/YY76S1d0nvh5k6eZ57+XBcfPI7p5cn3fqXw40XWfiNo/im6sUm17QbO60/T7rzHzBBdGB50C/d+f7NBnP9wUzXPhZoOveOrfxHfabHNrNvpN3oUdyzN8lndSQSTw/wDA3ghPr+7FAHyBq3/BVrUrlPCmraLoeizaTrC+EJb/AEmC31bUrzTv7eNof9KvYLb7DZPGl6jxxzyb5wm792JEqXUP+CpHirwHrHjiPxh4R03Q77QdL1e70nw5fQ6hpmoajPa30draiG9ng+w3sE8c0ckk9pI/kZ+5JXtDf8E5/g9JLbxx+F7yG0t4tPQ6fDr2pJp8jadDBBYzvbLP5D3EEdtbok7xmcC3j+f5BWnZfsF/CewutWk/4RNLy11i1v7CbTr6+u7zTLWC+k33qWtnNI9vaic/6z7PHHvoA8W+Jn7bXxe+F/xo0b4WS+GPh/qfj/XtQ0RLa9ivrqHSFstRtdakkeRHQyJJbz6LPxz58ckYHlvnZ9g6L9q/sm1+3fZ/tvkJ5/kf6vfgb9uf4c15h4D/AGLvhz8Pr2zvtP0G6uNWsdVj1qDU9T1a+1PUftMVtcWsG+6upnmeOKC7njjhkcxxiZ9iJXr1ABRRRQAUUUUAcD+1P/ybH8Rv+xW1T/0lkr5B0n9tVfhB/wAEh/hfqPgPxB4d1jxdb+E/CGm3McOoWVxcaOl1Jp1hPdPHNPHGjwefnfcOkCSeX5nyb6+87yzh1K0khmijmgmTY6Mu9HWuT8P/AAD8DeEWu20nwb4U037davY3Qs9Jgg+0W7/fhfYnzof7h44oA+GtC/b8+IFxdXHgzV9Y8YWOsQ+Kr6106bT28J3Gu6hY2ulWl3PDdXrTf2NayW890m/EfmSQSQbI/MSeSvNfi9+2h42/an/YA+KEfiD4m6P4N+wfA6TWDFDZ2WzxtPdT6tZXXzyf9M7KGD/RPL8ue/D/APPOCv0Q+Kng34U/CL4BX1x4n8M+EbP4c+CIX1iSzfQUuLDTRBl/Pjto43w6fOcxpvznFeb2/wC1P+zp8VbhdO1W30kXeitHd22n+JPBl1ptxB/aF2lj58EF9axyMkt1dxwPJGh+efD430AeVeD/AIifET4gftXnwD4Z8YW/gDRtX8WeObjVrzSdC09ry4TTjoqW2zz4Hj8/zLxt7yRv5kfmfx+XInlXjL/gpL8SL79kLxN441D4qaD8N/FXhf4TaR4p0Wxm0yx8vxfqN1aTvPNsnR5Hj8+HyI47fZ5c4/eb0+Sv0utvCWm2Gq/bIdPsILrMj+bHbIkmZNnmfNjPz+Wm/nnYnoK8W+Of7Anhn4/eJIW1TXPFdh4bWyh0658L2clodHubVOGRBNbPPZ+ZHmGT7DPb+ZHjfk80AcF/wU38ASfE/wCJH7POir4G8B/Eb7b431DdoPjG58jR7zZ4d1aT94/2W75TZ5if6O/zoOU61wPwz+HHjD9lH4laT8PpvE/g34E+H/ipqPiLxmln4QWC60zw8LG00mCHR7GTULVIE8/ffajPi0TPkT+Wkf7ySvuy90m2vr2zlmt4JJLGUy2zPHuaF/LKb0/ufI7r/wAD9+eT+Px8D2Xwm1vWviJp+i6h4P8AC9nPrWojVbBL22sobaN5JJzGUfmONXPAz1oA/O8f8FSfjRp3gPSbq6m0W+v9W0+1+IUM0OmGO3vPCmlpqX9tSWiYzif+y7J0dy7x/wDCRQ7M7Exf+JH/AAUW+MBnubzSr64tNHv/AAXd/Enw/eQXOgWFvLYz6pfpp0d2+qSR77SOwtrF5/sn78Pf/PJH+73/AGB4c/bc+DfxD1jUrNdSuIdY0Xw9e6m9hrfhPUdM1CXS4zGbp4Ibq1jkuIfkh8xIEf8A5Z8H5K9N1P4R+D/Glhoq6h4V8O6hbaKUl0lLvTIZBpnyAKYVdP3JGABs9KAPCv2EPij8SPj78QPiZ4n8YeJHtdH0jVbTRtM8HwafbJb6U76NpN9JI9yE8+aTz7qdPv8Al7MV41+wj+y7b658VvHHxE1T4c/Au90yx+LHjW6k8R3fh7zvGFu8Gv6hsdLry+NkiJs7+WK++bDSbfTbq8lt7aGGS+n8+6dU2faH2JHvf+82xETP+x9BSaTo9toVvJBa28FvHNPJcMsSbA0kjmSRz/tO7u2e+aAPzJtv+CnPxM0jSYtWs/FV1qOm+K/h5P4rt73xDp2iQ2+lj+2NGtk1WCy06aS7gsEtdTupvI1CR5/9Ew/KTV03x8+O+v8Aw4/aD8MzaP8AG7Uvihd/D+LxDfQaQunWVqdRvRoEd3Bp11NBD5F1JI/+r+yxpJGl3s5fY5+9PD3wV8I+EI7r+yfCvh3S2vDMbj7HpcMAuPOKGfeEX5vM2Jv/AL+wZ6U7SPgx4R8P6TZafY+FvDtjp+m3f9oWVtb6ZDHDaXXP7+NAmEk/2xzQB8I+Ov2tPiVoGneF9B8I/GnR/Hl98QtD8O6mPEa6NYyDwxd3vinQtLHlxwpHGbS6g1O68uOffOPsEn7x6+/PB2kXXhvw3ptjqGr3viK+tLZIZtSureCO4vpOjzOsCRxqXIJ+REQelZ+j/CHwr4WtbuHS/DegaZHf30epXS2unQ2/2q6RxIk8mxRvkR0Rt5ycoD2rrqACiiigAooooAKKKKACiiigAoqIW37xW3fd7ADke5PP5YqWgAooooAKKKKAOH+LvwWsPjJ/wjP9pXN5b/8ACK6/a+IbX7MyfvJ4N+xH3Kfk+c9Oal+I/wAI7H4j+MfAWs3dzd283gDXpNdskiK+XcTSabf6cUk9V2ahI/8AvxpXZ0UAfI3jv/glF4V8c+J5NRj8T+ILBr5Ndt70vp+nXrpBqus3eqz/AGR54HNnOJ7yRPPjG8xxx78uiSCfXv8AglH4W8a+JPCk3iTxV4i8SaL4VWx+y2F/a2MlxG9tax2pjhvBCLq1tJxHvmtoJER3eT7iSSRn6yooA+Wbf/gmdpeuaV4ft/E3jzxt4uh8FWVjpXhdryOyhl0iytdR0y/Kb4YI/Omnk0m0SSeTny48IIy8jyeuftLfAGP9pH4bw6A+uav4ZubHVtO1yy1PTY4JLi0urK6ju4X2TpJG+JIU4dDXpVFAHzjbf8E8tM1bWrrX/Fnjjxh428aXF5oMq67qcdlbyWltpGsQatBZQw2tvDBHBJcQJ5n7syPnl/kj2eV6p/wR38N+GPh9qtnYazrXiY22ja9p+maROun6QNT/ALRtZ43S91CC1M805d+Lp97ofn2OTJ5n3FRQB8R/s8/sSeLvHPx21b4jfFPUvHcV5B/wjY0eLX7/AEeTUfN0ufU7hw40uH7L9kd9QRE6Tu8c7vsDpGOyX/gmB4ft/jvceNY/FmvR/aPGSeNxBHp+mi4lvvM3vDNefZftU1ps/dpCZP3aD7/yR7PqqigDwXwx+wN4X8MeDPB+iLquvy23g/4Zz/C21dzB5lxp0yWKPPJ+7/1/+gx/7Hzv8nNet/DvwZa/Dr4faH4fsXmmttB0+DToHl/1jpDGI0Lf981v0UAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFfMP/AAUj8YeHPhze/AXX/F99pel+GdL+JkUmo3epMiWlsh0PWURn38f6x0r6eooA/OHUfiDp+u/th6j46+E8DH4aeIPEfgnSb3UNM0ry7PxHqkD6y91Jany8TlLWTToXnj/55pHv/d/u/NfA/wC2r8UPGOnzXnhnxrrF9Hrnw7uda1X7NrieJNY0adNY0RJ7qeySySDTNSt9NvdRk/s63ecfuxvjzGm/9aK5L4o/CvR/jP4L1Hw34itri40fUkRZo4bqezlGyQSI6TwOkkbo6K6PG6uhAIINAH53+Dfivrvx5/a/k8C+BfjZ8SNU+GVx4w0HT7XXbO53sLf/AIRrxRfXdvBfPGfPR57a03zfPIh2Jv8A3aYi8Wftk+N7j46XX9ieMNSt2l8R+MdH1LTLnxQk+qWVrZaPrL2Xn6MlkI9PjF3Y2vkT/a/PuBh8See+z7++DH7PXh34Ax6x/Ya6tc33iK7jvdS1HVdVudT1DUJESOFd887vIUjjRERMhEGePncn0SgD8z/EV98U/Bvwi+IOox/F74nXl94X+A2n/Eq0aea3/wBI8Q7NTkd8eT/x7kWkaPa/c/eZ+/sev0woooAKKKKACiiigAooooAKKKKACiiigAooooA8P/4KMeENU+In7B/xe0DQ9PvdU1rWfCl/aWNpaQ+ZcXMzwOESNP4nz2rwn9sf/gnvr3jf4dSa1rPj74nfFLxZb3ekaNpoaGxsRo9lN4i0W6vZ4E0+2gkE/l2KP5zu+xIM/Jzn7mooA/O34yfCPxN8M/GHinwrpPhHxBH8Nbj4k213Y3M2ja54k0zS7f8A4Rq0/wCYXp80dxewSX3nfx+RBPH5j/PXlC/DT4vaF8MPBs2o+HfiZ4j8WaTpWo2GkaDqvh3WJLO5ng8Rak9qlrqFje+ZoN39kjsR9qu5HtZIPsmx38t6/WmigD89Nb+GfjT/AIWpM2j6D8TLX4xx/E/VNS1TxE6Xv9j3fhN57iSGFLr/AI9ZIf7NeygS1jPnx3ce/wAv93JJXb6F+zTqHgX/AIIf+KPCGl+HPEMnjbxN8IrttT025ee71TUdcuNB8udHSQu/nvN8mzH3+iev2pRQB8Bftw6t4p/bc0m1m+H3gL4laf8A8K+8N+K9Um1TWfD95oNzcXV14dv9OtNOsoZ0juJ55J7mOb5E8tPs6fPvKCuU8f8Ahf4peIP2stN1W18OeLNJ1PR/iJ4Y89o9B1u+uLjRM6fBc3cetfak02CxeN7vz9Ojgnf95I8mz55I/wBKKKAPxt8d6P4m8VeBvA/hvwnofxV/4WdqXwh8Xz+L9XhvZ3t/F2sfZLRPtdlJ5kkeo+ZdXryQTwb4447iNPk/1cfrv7fnwO8XeDNW8VeF/hj4Q8WaWnhjwfayeC7qw0fX/EE9/dfaru7nexvYbpLTS7pJNm97jzJ5/k2JJ+7jk+8fht+zB8O/gz4ovtb8I+B/CXhnVNRi+z3N5pukwWs8sfmb/L3omdnmZfZ03816JQB8CeGf2Mr7xJ8SPDWu65pPjeW71r42+K/+EiebU76O3fw0YNektLd49+wabJOmnP5ePLkkkH9/FfR/7BHh3XvBv7Mml6P4ij1iG+0fV9bsLVNUkkluE0+PWLxLH55PnZPsiW/lk/8ALPy69sooAKKKKACiiigAooooAKKKKACiiigAooooAKjf/WfgKKKAexJRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFAH/2Q==)

**Question 4**

**For ; Write an expression for P and Q respectively with units in W and VAR. What does P and Q represent.**



From the power triangle, using Pythagoras theorem;

P= IV\*cosθ

Q= IV\*sinθ

**Question 5**

**Justify the need for power factor correction to ABUAD and PHCN or an IPP**.

. saving electricity bill, as ABUAD is charged for reactive power when the power factor drops below a certain level

. There will be improved voltage and reduced voltage drops.

. Electric cables will carry less load.

. Sustainable development is achieved as the carbon footprint is minimized.

. increase available power

. reduce installation size and maintains electric cables

**Question 6**

**Why is Q needed in an industrial complex with numerous induction motors?**

The reactive power drawn by the motor is needed because it is the energy needed to maintain the motor's internal magnetic field. It also damages such as overheating. Without the reactive power the system will fail.

**SECTION B**

**8} An industrial load absorbs 5 MVA at a pf of 40% capacitive at 6kV. To improve the pf up to 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.**

Sold= 5MVA

P.Fold= 0.4 leading

P.Fold= P/S Therefore; P= 0.4\*(5\*10^6)= 2MW

Qold= √(5\*10^6)2-(2\*10^6)2= 4.58MVAR

P.Fnew=0.85

Snew= (2\*10^6)/0.85= 2.35MVA

Qnew=√(2.35\*10^6)2-(2\*10^6)2=1.23MVAR

Qcap= QOLD-QNEW=4.58-1.23=3.35MVAR

XC=V2/Q

XC=(6\*10^3)2/3.35\*10^6

XC= 10.75H

C=1/2ΠfXc= 1/(2\*3.142\*50\*10.75)= 29.6mF

This type of PF correction is Static.

**8b)**

From the question, it is stated that the industrial power network is operating on an inductive load, it can be concluded that it will have a lagging (inductive) power factor; which means that the correcting equipment (capacitor of the appropriate size (29.6mF) which will be integrated in parallel to the industrial power network

**Question 9**

**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.**

P= 100KW, V=415V, P.FOLD= 0.85 lagging

SOLD=P/ P.FOLD= (100\*10^3)/0.85=1.18\*10^5 VA

QOLD= √(1.18\*10^5)2-(100\*10^3)2 =62.6\*10^3VAR

AT 0.95 P.F

SNEW=1.05\*10^5VA

QNEW=√(1.05\*10^5)2-(100\*10^3)2=32.02KVAR

Qcap= QOLD-QNEW=62.6-32.02=30.58KVAR

XC=V2/Q

XC=(415)2/30.58\*10^3

XC= 5.63H

C=1/2ΠfXc= 1/(2\*3.142\*50\*5.63)= 56.5Mf

.

The facility manager should advice the NUC management to improve the power factor of the system to at least 0.95 PF to prevent reactive power charges and save electric bills.

**Question 10**

**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.**

As an electrical power management consultant I would advise the client to buy Motor M2 because of the low reactive power {for my calculations below} compared to motor M1 and also due to the high power factor of (0.95).

Also when the rates for the reactive power are to be paid, the client pays less if he uses the motor M2. He saves on the electricity bill

P= 20KW, P.FM1=0.85

SM1=P/P.F= (20\*10^3)/0.85= 23.5KVA

QM1=√(23.5\*10^3)2-(20\*10^3)2= 12.3Kvar

P.FM2=0.95

SM2= P/P.FM2= (20\*10^3)/0.95= 21.1KVA

QM2=√(21.1\*10^3)2-(20\*10^3)2 =0.67Kvar