UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA *ENGINEERING: ELECTRICAL* *ENGINEERING: COMPUTER SYSTEMS*
SUBJECT	:	**ELECTRICAL ENGINEERING II**
CODE	:	**AEI2211**
DATE	:	SUMMER SSA EXAMINATION 2015 8 DECEMBER 2015
DURATION	:	(SESSION 1) 08:00 - 11:00
WEIGHT	:	40 : 60
TOTAL MARKS	:	100

EXAMINER	:	DR. A HASAN
MODERATOR	:	Mr. PITHOU BOKORO
NUMBER OF PAGES	:	4

INSTRUCTIONS

1. THE ANSWER SHEET MUST BE HANDED IN TOGETHER WITH THE SCRIPT
2. POCKET CALCULATORS PERMITTED.
3. ATTEMPT ALL THE QUESTIONS.

INSTRUCTIONS TO CANDIDATES:

1. TEAR OFF ANSWER SHEET AND SUBMIT IT WITH YOUR SCRIPT.
2. POCKET CALCULATORS PERMITTED.
3. ANSWERS WITH NO UNITS ARE ASSUMED TO BE INCORRECT THEREFORE NO UNITS, NO MARKS.
4. GIVE FINAL COMPLEX NUMBER ANSWER IN POLAR FORM.
5. QUESTIONS THAT ARE NOT CLEARLY NUMBERED WILL NOT BE MARKED.
6. ALL STUDENTS MUST ANSWER ALL QUESTIONS
7. KEEP PARTS OF THE QUESTION TOGETHER AND WORK FROM TOP TO BOTTOM AND NOT ALL OVER THE PAGE.
8. START EACH STEP ON A NEW LINE
9. ANY ROUGH WORK NOT TO BE MARKED MUST BE CANCELLED WITH A SINGLE DIAGONAL LINE.
10. ONE MARK EQUALS ONE PERCENT
11. WRITE YOUR SUBJECT CODE AND SUBJECT NAME ON YOUR ANSWER SHEET

QUESTION 1 - TRUE OR FALSE STATEMENTS (20 marks)

Answer true for a statement which you agree with and false to statements that you disagree with.

1.1. Power factor correction is a technique used to improve the energy efficiency of inductive machinery at large factories. T/F

1.2. In a parallel resonant circuit the voltage across the reactive components may be considerably higher than the supply voltage. T/F

1.3. Transmission lines have resistance and inductance and this needs to be factored into the design of a power system as this represents a power loss. T/F

1.4. If the inductance is increased from 0,2H to 0,3H, the inductive reactance has decreased. T/F

1.5. A circuit with a current that is leading the voltage can be assumed to be inductive. T/F

1.6. The total power dissipated in an ideal inductor is measured in VARs. T/F

1.7. The formula used for calculating the apparent power is $S=I.V^*$ T/F

1.8. The bandwidth of a circuit is obtained directly from the quarter power points. The frequency at these points are added and then divided by two. T/F

1.9 Harmonics is an alternating voltage that is not sinusoidal, also called a complex wave. T/F

1.10 At Resonance, the supply current and the supply voltage are not in phase. T/F

QUESTION 2 (20 marks)

A factory supplied with a 380V, 50 Hz, 3-phase system has a maximum load of 1.825MW at a power factor of 0.76 lagging.

a. Draw the power triangle. (8)

b. Find the capacitance value required to improve the power factor to 0.95 lagging. The capacitance are connected in delta. (12)

QUESTION 3 (20 marks)

For the circuit shown in Figure 1, determine V_{th} , Z_{th} external to R_L, and sketch Thevenin's equivalent circuit.

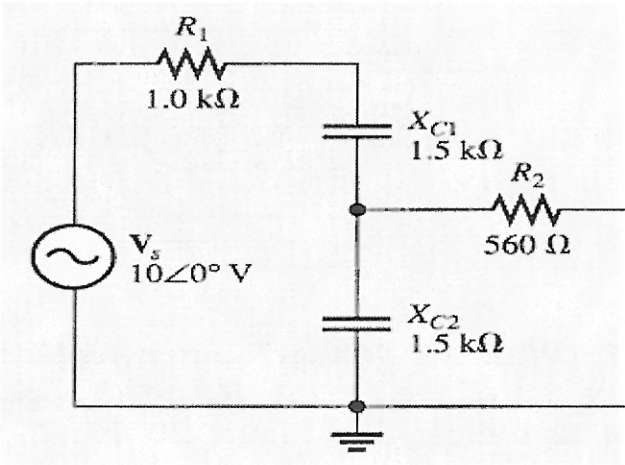

Figure 1

QUESTION 4 (20 marks)

For the circuit shown in Figure 2, determine the current in the neutral line.

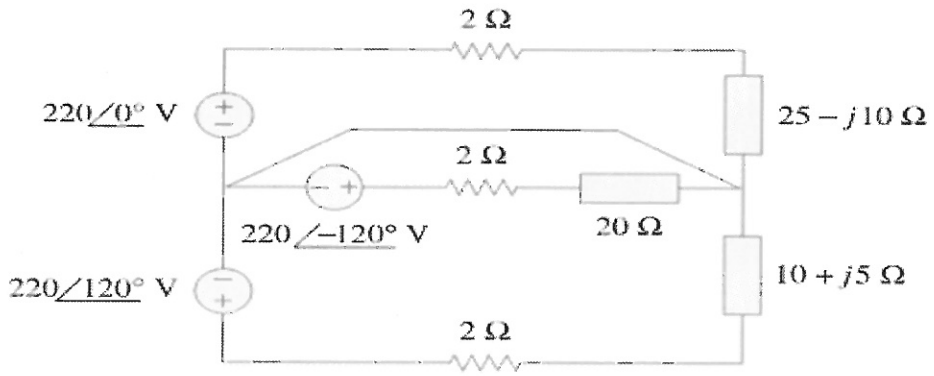

Figure 2

QUESTION 5 **(20 marks)**

For the ideal transformer circuit of Figure 3, $R_p = 18\ \Omega$, $R_L = 6\ \Omega$, and $X_t = 0.5\ \Omega$. If $\bar{V}_2 = 120\angle 0°$ V and $P_S = 5600$ W.

(*a*) Determine the turns ratio *a*, (7)

(*b*) The source voltage $\bar{V}_S$, (7)

(*c*) The input power factor PF_S. (6)

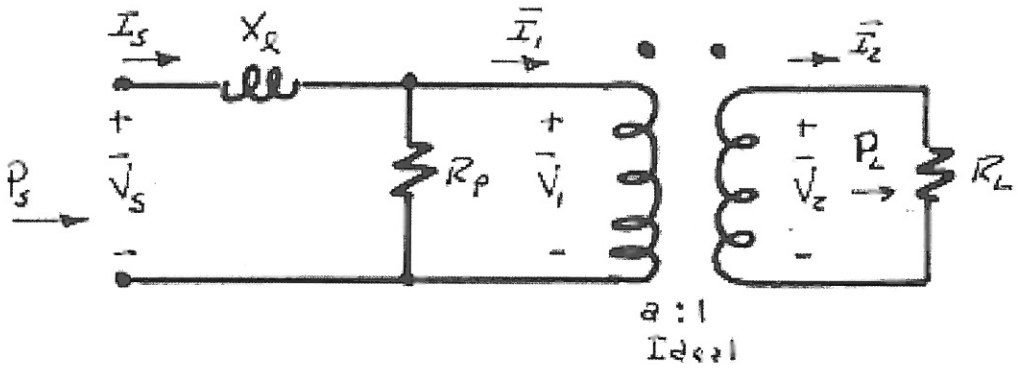

Figure 3

EXAM END