FNU FIJI NATIONAL UNIVERSITY

**COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)**

**SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING**

**CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 3**

# EEE 391 ELECTRICAL PRINCIPLES (TRADE) 2

## FINAL EXAMINATION – PENSTER 1, 2013

**DAY/DATE: As per Timetable.**

***INSTRUCTIONS TO STUDENTS***

1. *You are allowed 10 minutes Extra reading time during which you are NOT to write.*
2. *Begin each answer on a fresh page and use both sides of the sheet.*
3. *Write your candidate-number at the top of each attached sheet*
4. *Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with string*
5. *For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to you answer scripts.*
6. *Write clearly the number(s) of the question(s) attempted on the top of each sheet.*
7. *ANSWER ALL QUESTIONS.*
8. *Show all workings where necessary.*
9. *Do not use programmable calculators, especially the ones that does the conversions of number systems.*
10. ***ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

**SECTION A** **[25 Marks]**

1. A man doing no or very little physical work needs about 2,000 kcal (or less) of energy in his daily food. The body converts this energy almost entirely into heat. How much heat is produced by a human body?

(2marks)

2. Energy can exist in various forms. List four (4) examples of it. (4marks)

3. What is the phase relationship between V and I in the circuits?

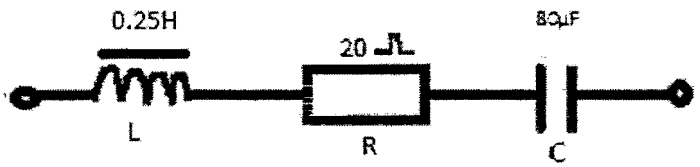
a) Purely Resistive
b) Purely Capacitive
c) Purely Inductive (3 marks)

4. Draw the circuit and phasor diagram for the following:

a) Series R-L circuits
b) Series R-C circuits
c) Series R-L-C circuits

(6 marks)

5. The circuit shown below is connected to a 240V, 50Hz supply. Determine the impedance of the circuit, the current flowing and the phase angle. (5 marks)




6.A coil has an inductance of 0.05H. What would be the inductive reactance at a frequency of?

a) 25 Hz (1mark)
b) 50Hz (1mark)
c) At which frequency would it have a reactance of 10Ω. (1mark)

7.A 230V, 50Hz supply is applied to a choke coil of negligible resistance and the current through the coil is 2.5A. Determine the inductance of the coil. (2 marks)

**SECTION B** **[25 Marks]**

1. Explain what series resonance circuit. (2 marks)

2. State dangers if resonance occurs in electrical installation. (2 marks)

3. A resistor of 8Ω and an inductor of 0.12H are connected in parallel to a 240V, 50Hz supply. Calculate:

   a) The current flowing in the resistor (2 marks)
   b) The current flowing in the inductor (2 marks)
   c) The total current supply (2 marks)
   d) The total impedance of the circuit (2 marks)
   e) The Power factor (3 marks)

4. For an R-L-C series circuit, which of the following quantities should be increased and which decreased to produce resonance if $V_L$ is greater than $V_c$?

   a) Frequency (1 mark)
   b) Inductance (1 mark)
   c) Capacitance (1 mark)
   d) Capacitive reactance (2 marks)

5. If a 1 kW load is connected to a 250 V a.c supply, find the current flowing at:

   a) Unity power factor (1 mark)
   b) Power factor= 0.8 (1 mark)
   c) Power factor= 0.4 (1 mark)
   d) Sketch the phasor (2 marks)

**SECTION C** **[25 MARKS]**

1. Compare the two types of Three Phase Connections and mention at least Five (5) points in each case.

(5 Marks)

2. Show with diagrams Two Wattmeter method of power measurement in Three Phase Four way system and also give four Advantages of this method. (7marks)

3. Three Identical Coils, each with resistance of 10Ω and inductance of42mH are connected in Star to a 415 volts, 50Hz Three phase supply, Calculate the following:

i) Inductances Reactance of each Coil
ii) Impedance of each phase
iii) Phase current
iv) Line current
v) Power (5 marks)

4. In a Two Wattmeter method of power measurements, W1 = 11.5KW, and W2 = -2.5KW, calculate

a) Total Power
b) Power factor, assuming balance load. (4 marks)

5. A 415 volts Three phase Motor has a power output of 12.75KW and operates at a power factor of 0.77 lagging and Efficiency of 85%. If the motor is Delta connected, calculate

a) Input Power
b) Line Power
c) Phase Power
d) Apparent Power (4 marks)

**SECTION D** **[25 Marks]**

1. Give Five (5) serious effects of low power factor on A.C. supply system. (5marks)

2. List Five (5) advantages of power factor improvement. (5marks)

3. The power being supplied to a factory is 800Kw and the apparent power is 1000KVA, calculate the power factor.

(3marks)

4. A single phase 200 volts A.C. generator delivers a power of 3KW. Calculate the current when:

a) The power factor is 0.5
b) The power factor is unity.

(5marks)

5. The power factor of a 115volts, 60Hz motor when taking full load current of 80 Amps is 0.707, calculate:

a) The supply current when power factor is improved to unity. (1 mark)
b) Capacitor current to improve power factor to unity. (2marks)
c) Reactance of the capacitor (2marks)
d) Capacitance of the capacitor. (2marks)

THE END