FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

CERTIFICATE IV IN ELECTRONICS ENGINEERING-STAGE 4

EEE444- ELECTRICAL PRINCIPLES (TRADE 3)

FINAL EXAMINATION – PENSTER 4, 2013

DATE/DAY: **TIME:** **ROOM**: 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 a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and ATTACH these to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Use of programmable calculator(s) is prohibited.
8. Attempt **ALL** questions in all Sections

SECTION A (45 MARKS)

THREE PHASE CIRCUITS

1. Draw the three phase wave form from 0 – 360 degrees. (5 marks)

2. Name and explain two types of alternator rotor construction. (3 marks)

3. Compare the two types of three phase connections. Mention at least five (5) points in each case. (5 marks)

4. Show with diagrams two wattmeter method of power measurement in three phase system. Also give four advantages of this method. (7 marks)

5. Give two functions of neutral conductor in a three phase four wire system. (3 marks)

6. Three identical coils, each with resistance of 10 ohms and inductance of 42 milli henry are connected in star to a 415 volts 50 hertz three phase supply, calculate
   A) Inductive reactance of each coil
   B) Impedance of each phase
   C) Phase current
   D) Line current
   E) Power (10 marks)

7. In a two wattmeter method of power measurements, W1=11-5 KW, and W2=-2.5KW, Calculate
   A) Total power
   B) Power factor, assuming balance load. (4 marks)

8. A 415 volts three phase motor has 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 current
   C) Phase current
   D) Apparent power (8 marks)

SECTION B (35 MARKS)

POWER FACTOR IMPROVEMENT

1. Explain why A.C machines are rated in K.V.A and not in K.W. (5 marks)

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

3. Give five advantages of power factor improvement. (5 marks)

4. The power being supplied to a factory is 800KW and apparent power is 1000KVA, calculate the power factor. (3 marks)

5. A single phase 200volts 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 (5 marks)

6. Power factor of a 115 volts, 60 hertz motor when taking full load current of 80 amps is 0.707, calculate
   a) The supply current when power factor is improved to unity.
   b) Capacitor current to improve power factor to unity.
   c) Reactance of a capacitor
   d) Capacitance of a capacitor (12 marks)

SECTION C (20 MARKS)

RECTIFIERS

1) Draw the circuit diagram of the following rectifier circuits, giving the input and output waveforms.
   a) Single phase half wave
   b) Single phase bridge
   c) Three phase half wave (12 marks)
2) In a single phase half wave rectification, the AC voltage is 24 volts at 50 hertz and load resistance of one kilo ohms,
   Calculate,
   a) D.C output voltage
   b) Load current
   c) PIV
   d) Ripple Frequency (8 marks)