



FIJI NATIONAL UNIVERSITY

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

SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 3

UNIT CODE: EEE391

TITLE: ELECTRICAL PRINCIPLES (TRADE) 2

FINAL EXAMINATION – PENSTER 4, 2017

Total Marks-100

ROOM: AS PER TIMETABLE

TIME: 2 HOURS 10 MINUTES

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes extra reading time during which you are NOT to write.
2. Begin each SECTION 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. **ANSWER ALL QUESTIONS**
9. Show all working where necessary.
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE EXAM ROOM.**

SECTION A

[40 MARKS]

1. The instantaneous value in an ac sinusoidal waveform is given by $I = 40 \sin \phi$.
 - a. For the angle ϕ between values $0^\circ, 90^\circ, 180^\circ, 270^\circ, 360^\circ$ sketch the waveform;
 - b. Indicate the r.m.s value
 - c. Indicate the average value
 - d. Peak value (8 marks)

2. What is the phase relationship between I and V in the circuits?
 - a. Purely Resistive (3 marks)
 - b. Purely Capacitive
 - c. Purely Inductive

3.
 - a. Calculate the reactance of a coil of inductance 0.32H when it is connected to a 50 Hz supply. (2.5 marks)
 - b. A coil has a reactance of 124Ω in a circuit with a supply of frequency 5 kHz. Determine the inductance of the coil. (2.5marks)

4. 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 (3 marks)
 - e. The power factor (3 marks)

5. A coil has a resistance of 4Ω and an inductance of 9.55 mH. Calculate
 - a. the reactance, (2 marks)
 - b. the impedance, (2 marks)
 - c. the current taken from a 240V, 50 Hz supply. (2 marks)
 - d. Determine also the phase angle between the supply voltage and current. (3 marks)

6. Give one danger if resonance occurs in electrical installation. (1mark)

7. Explain why A.C machines are rated in K.V.A and not in K.W. (2 marks)

SECTION B

[30 MARKS]

1. Give two advantages of power factor improvement. (2 marks)
2. State two causes of low power factor. (2 marks)
3. Draw and label the 'Power Triangle' and state the formula for true power, apparent power and reactive power. (5 marks)
4. The power being supplied to a factory is 1060kW and apparent power is 1200KVA, calculate the power factor. (2 marks)
5. If a 1Kw load is connected to a 250 V a.c supply, find the current flowing at:
 - a. The power factor is 0.9 (2 marks)
 - b. The power factor is 0.45 (2 marks)
 - c. The power factor is unity (2 marks)
6. When connected to a three phase motor, two wattmeter's gave readings of 5 KW, and -1 KW, Calculate
 - a. Total power (3 marks)
 - b. Power factor, assuming balance load. (3 marks)
7. A welding plant set draws 60A from a 600V AC supply at a pf of 0.65 lagging. Calculate:
 - a. the kVA of the plant (2 marks)
 - b. the power in kW (2 marks)
 - c. If the power factor is improved to 0.9 , calculate the power in kW (3 marks)

SECTION C

[30 MARKS]

1. Draw the three phase wave form from 0 – 360 degrees. (4 marks)
2. Compare the two types of three phase connections. Mention at least five (5) points in each case. (5 marks)
3. State the national standard phase sequence for a three-phase supply (2 marks)
4. Give two functions of neutral conductor in a three phase four wire system. (2 marks)
5. Three loads, each of resistance 30ohms , are connected in star to a 415V, 3-phase supply
Determine (a) the system phase voltage,
(b) the phase current and
(c) the line current. (6marks)
6. Three identical coils, each with resistance of 12 ohms and inductance of 38mH are connected in star to a 415 volts 50 hertz three phase supply, calculate
 - a) Inductive reactance of each coil (2marks)
 - b) Impedance of each phase (2marks)
 - c) Phase current (2marks)
 - d) Line current (2marks)
 - e) Determine the power factor (3marks)

*****THEEND*****