



**SCHOOL OF ELECTRICAL AND ELECTRONIC
ENGINEERING**

CERTIFICATE IV IN ELECTRICAL ENGINEERING – STAGE 4

EEE447-ELECTRICAL MACHINES

FINAL EXAMINATION PAPER – PENSTER 1 -2016

DAY/DATE: As per TT TIME: As per TT ROOM: As per TT
DURATION: 2 Hours 10 Mins

INSTRUCTIONS TO STUDENTS:

1. You are allowed 10 minutes extra reading time during which you are not allowed 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 answer sheet.
4. Insert all 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 through and you must attach to the answer booklet.
6. Write clearly the number(s) of the question(s) attempted on top of each sheet.
7. **ATTEMPT ALL QUESTIONS**

QUESTION 1**(25 MARKS)**

- 1.1 Give one function for each of the parts of the DC generator listed below
- a) commutator
 - b) shaft
 - c) brushes
 - d) bearings
- (4 marks)
- 1.2 Draw the circuit diagram of the following machines
- a) separately excited would field (3 marks)
 - b) shunt generator-self excited (3 marks)
 - c) series generator with voltage control (3 marks)
 - d) compound generator with voltage control (3 marks)
- 1.3 In order to have self-excitation in generators there are factors that needs to be considered. List four (4) factors.
- (4 marks)
- 1.4 The armature of a 4-pole Lap-wound generator contains 300 active conductors. If the magnetic flux is 20 milli-webers and the speed of rotation is 1200r/min, find:
- (a) the value of the generated voltage (3 marks)
 - (b) the full load voltage of the machine if it has a voltage regulation of 8%. (2 marks)

QUESTION 2**(25 MARKS)**

- 2.1 Outline five (5) factors that determine the selection of a particular type of motor starter.
- (5 marks)
- 2.2 Draw the diagram, graphs and explain a three phase waveform, indicating the rotation and phase sequence.
- (5 Marks)
- 2.3 A shunt motor has the following data:
Armature resistance, $R_a = 1.5\Omega$
Shunt field resistance, $R_f = 75 \Omega$
- a) Calculate the initial current flow when connected directly into a line of 240V.
- (5 marks)

- b) Find the current flow when the motor runs at full load if a back emf of 200V is generated. (5 marks)

2.4 A 4-pole DC motor has a Lap wound armature of 600 conductors. If the Flux is 30 milli-Webers and armature current is 23 amps, find:

- a) the Torque produced (3 marks)
b) the output power if the motor is rotating at 1200r/min (2 marks)

QUESTION 3 (25 MARKS)

3.1 Explain with the aid of diagram/s the production of torque in an induction motor. (7 marks)

3.2 The rotor speed of a 11kw, 415V, three phase, 4-pole motor is 1440 r/min when is operates from a source of 50Hz. Calculate:

- a) the synchronous speed (2.5 marks)
b) the slip speed (2.5 marks)
c) the frequency of the rotor (3 marks)

3.3 Draw the circuit diagram of a D.O. L motor starter

(10 marks)

QUESTION 4 (25 MARKS)

4.1 With the aid of diagram/s explain the operating principle of the single phase split phase motor.

(10 marks)

4.2 Draw the circuit connections and label your diagram of the following single phase motors:

- a) capacitor motor (3 marks)
b) capacitor start, capacitor run motor (3 marks)
c) series motor (3 marks)

4.3 Describe the following type of motors:

- a) Squirrel cage rotor (3 marks)
b) Wound rotor motor (3 marks)

%%%%%%%%%% **END OF PAPER** %%%%%%%%%%



EQP RECEIPT CHECKLIST FORM

Particulars	Details/Comments (To be filled by Unit Lecturer)	Tick if present on EQP (To be filled by exams staff)
Cover Page	✓	
Fiji National University with Logo	✓	
College	✓	
School	✓	
Program	✓	
Unit Code	✓	
Unit Name	✓	
Examination Period	Apr - Sep 97	
Duration of Examination	✓	
Instructions	✓	
Total Number of Pages	✓	
Other Pages		
Footer	✓	
Page Number	✓	
Unit Code	✓	
Examination Period	✓	
Last Page		
The End	✓	
Overall		
Proper Print	✓	
Examination Requirements (FNU/E-1)	✓	
Moderator's Report (FNU/E-3)		
ERRS (Class List)		
Unit Coordinator/Principal Lecturer's Name	Surendra Lal.	

DISPATCHED BY (SCHOOL REP)

NAME: Surendra Lal.

SIGN: [Signature]

DATE: 19/02/2010

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NAME: _____

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Class Listing

School of Electrical & Electronics Engineering

Ba campus

Penster1

2016

EEE447 Electrical Machines NL

StudentID	Name	Status	Mon	Sponsor	Outstanding Fee
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Certificate IV in Electrical Engineering 0

2013112911	Adesh Shivneel Sharma	EA			
2011001720	Elvish Richelle Chand	EA			
2012010335	Izaz Azizz Ali	EA		- Full	
2013114616	Kavinesh Kartik Pillay	EA		- Full	
2013117599	Krishan Kamit Reddy	EA			
2012010863	Mohammed Shahil	EA			
2013113125	Mohammed Shahir	EA		- Full	
2007004827	Muni Krishn Chandiran	EA		- Full	
2013117399	Sahil Shafran Ali	EA			

9

Total Owing: 0.00

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