



FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY

SCHOOL OF ELECTRICAL & ELECTRONIC ENGINEERING

TRADES CERTIFICATE IN ELECTRONIC ENGINEERING STAGE 3

UNIT CODE: EEE411

UNIT NAME: ELECTRICAL PRINCIPLES

FINAL EXAMINATION – PENSTER II 2016

DAY/DATE:

TIME:

ROOM:

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes extra time during which you are not to write.
2. Write your candidate number on the top of each sheet of the answer booklet.
3. Write all your answers in the answer booklet provided.
4. For all sheets of paper on which rough/draft work has been done, cross it through and attach these to your answer script.
5. Remove the section A answer sheet from the examination paper and insert it in the answer script then secure with a string
6. Attempt all the Questions.

SECTION A

MULTIPLE CHOICE

20 MARKS

Write the **Alphabet** of the **best choice** in the Answer Sheet attached at the back of the question paper. When you have completed this section, remove the answer sheet, insert it into the answer booklet and tie with a string.

- 1) Frequency response refers to:
 - A) How frequencies react to each other
 - B) Band of frequencies that the circuit/equipment was designed to operate in
 - C) The frequency at which resonance occurs
 - D) Frequencies being utilized efficiently

- 2) The Bandwidth of an amplifier can be calculated from:
 - A) $BW = f_2/f_1$
 - B) $BW = f_2 + f_1$
 - C) $BW = f_2 - f_1$
 - D) $BW = (f_2 - f_1) \div 2$

- 3) The total reactance at resonant frequency in a series resonance circuit is:
 - A) 0Ω
 - B) X_L
 - C) X_C
 - D) 1Ω

- 4) The current flowing in series resonance circuit is:
 - A) Fluctuating
 - B) Maximum
 - C) Minimum
 - D) Almost zero

- 5) What is the wavelength of a 150MHz sine wave?
 - A) 0.5m
 - B) 1m
 - C) 1.5m
 - D) 2m

- 6) The tendency for high frequency electric current to flow mostly near the surface of the conductor is called:
- A) Surface Wave
 - B) Skin Wave
 - C) Skin Effect
 - D) Surface Conductance
- 7) Which of is correct about a step down transformer:
- A) $V_p < V_s$
 - B) $N_p < N_s$
 - C) $I_p < I_s$
 - D) $I_p > I_s$
- 8) Torque in a motor is made from
- A) I_f and Φ
 - B) V_g and I_a
 - C) I_a and Φ
 - D) R_a and Φ
- 9) An inverter in a motor control circuit can control:
- A) Motor synchronisation
 - B) Eddy currents
 - C) Motor speed
 - D) Power factor
- 10) The brushes in modern motors are mainly made of
- A) Copper
 - B) Zinc
 - C) Iron
 - D) Carbon
- 11) A device that converts electrical energy into mechanical energy is called:
- A) Regulator
 - B) Motor
 - C) Engine
 - D) Generator

- 12) A filter which allows the higher frequency components of the applied voltage to develop output voltage across the load resistance, while the lower frequency components are attenuated or reduced, in the output.
- A) Low Pass Filter
 - B) High Pass Filter
 - C) Band Pass Filter
 - D) Band Stop Filter
- 13) The rate of attenuation of a transmission line is dependent on the physical construction of the line and the _____
- A) It's impedance
 - B) Frequency
 - C) Transmitter design
 - D) The 75 Ω terminator
- 14) The amount of voltage induced in the transformer secondary depends on:
- A) Self Inductance
 - B) Length of Core
 - C) Input Voltage
 - D) Mutual Inductance
- 15) There is no voltage gain in a parallel-resonant circuit because:
- A) $X_L = X_C$
 - B) There is no amplifying device
 - C) Voltage is the same across all parts of a parallel circuit.
 - D) Current is too low
- 16) The cut-off frequencies at the two sides of resonance which determine the BW of the circuit is about _____ of the maximum output.
- A) 90%
 - B) 70%
 - C) 50%
 - D) 75%

17) The ratio of smallest RMS voltage value to the largest is called the:

- A) VSWR
- B) ISWR
- C) Characteristic Impedance
- D) Reflection Coefficient

18) A transformer with a turn's ratio of 1:3 has what current ratio?

- A) 3:1
- B) 1:1
- C) 1:3
- D) $\sqrt{2} = 1$

19) Resonance occurs when

- A) $X_L = R$
- B) $X_L = X_C$
- C) $L = C$
- D) $F_r = f_c$

20) Resonant tuned circuits are used in

- A) Logic circuits
- B) Radio receivers
- C) Power distribution control
- D) Motor speed regulation

SECTION B

FREQUENCY RESPONSE

20 MARKS

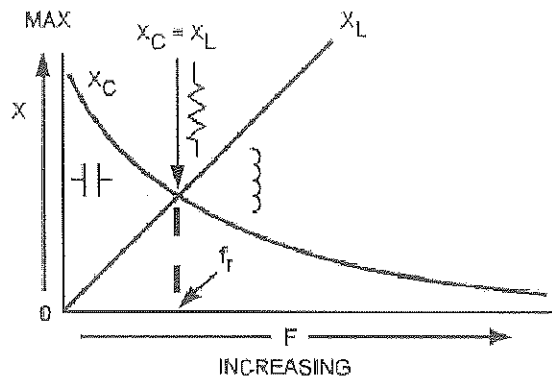
1. Define the following terms:

i). High Pass Filter

ii). 3dB power point

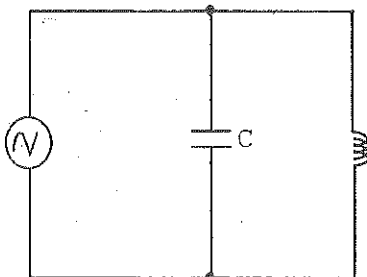
(4 marks)

2. Explain the important parameters indicated in the diagram below and how they relate to each other.



(4 marks)

3. An LC tank circuit is shown below:



A). When the capacitor is completely discharged, where is the energy of the tank circuit stored?
(2 marks)

B). When the magnetic field of the inductor is completely collapsed, where is the energy of the tank circuit stored?
(2 marks)

4. With the aid of a diagram, clearly explain how you would perform a frequency response measurement of an audio amplifier. What components will you most likely be testing out if the frequency response is not up to specifications and why?
(8 marks)

SECTION C

RESONANCE

15 MARKS

1. A). Sketch the impedance (Z) curve in a *parallel* resonant circuit.

(4 marks)

2). Find out the frequency at which resonance occurs in the circuit of Figure 1:0 below.

(5 marks)

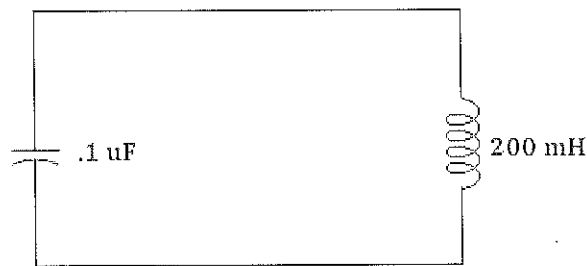


Figure 1:0

3). In a parallel-resonant circuit, what is the relationship between impedance and current?

(2 marks)

4). When is line current minimum in a parallel-LC circuit?

(2 marks)

5). In a series-RLC circuit, what is the condition of the circuit if there is high impedance, low current, and low reactance voltages? **(2 mark)**

SECTION D

TRANSMISSION LINES

15 MARKS

1.

Determine the wavelengths for electromagnetic waves in free space with the following frequencies:

- a). 100 Hz
- b). 100 KHz
- c) 100 MHz

(6 marks)

2.

State the main function of transmission line.

(1 mark)

3.

Define the following terms:

- a). Velocity of propagation
- b). Characteristic Impedance
- c). Standing wave ratio (SWR)

(3 marks)

4.

You have received a call to attend to a fault at a radio base station. You suspect the fault to be at the transmission line. What condition of the line will you be testing for, list down the tools you will need and the procedure you will undertake to carry out the test. **(5 marks)**

SECTION E:

TRANSFORMERS

15 MARKS

1.
Briefly explain what a transformer is and list down 3 of it's common applications.
(5 marks)

2.
State the *two* purposes of the core in the construction of a transformer.
(2 marks)

3.
Use schematic diagrams to illustrate the *three* core materials used.
(3 marks)

4.
List 5 types of routine transformer tests that a maintenance technician should carry out.
(5 marks)

SECTION F

DC MACHINES

15 MARKS

1.
Briefly describe the principle of operation of a motor stating any relevant formula or rule used.
(3 marks)

2.
List down the 4 main parts of a dc motor and briefly describe their functions.
(4 marks)

3.
List two causes of losses in a motor.
(2 marks)

4.
You are handed a capacitor start fan motor that is not running when turned on but does run when the blades are turned swiftly by hand. Draw the schematic diagram of this motor and explain the procedures for isolating the fault and then rectifying it.
(6 marks)

END of EXAMINATION.

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	/	/
Duration of Examination	/	/
Instructions	/	/
Total Number of Pages	/	/
Other Pages		
Footer		
Page Number	/	/
Unit Code	/	/
Examination Period	/	/
Last Page		
The End	/	/
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Examination Requirements (FNU/E-1)	/	/
Moderator's Report (FNU/E-3)	/	/
ERRS (Class List)		/
Unit Coordinator/Principal Lecturer's Name	Paulla Tui	/

DISPATCHED BY (SCHOOL REP)

NAME: WILLY M

SIGN: [Signature]

DATE: 10/05/16

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NAME: _____

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DATE: _____

SECTION A**MULTIPLE CHOICE****20 MARKS****ANSWER SHEET.**

Circle the Alphabet of the best choice in the table below. When you have completed this section, remove the answer sheet, insert it into the answer booklet and tie with a string.

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D