



FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

TRADE DIPLOMA IN ELECTRICAL & ELECTRONIC ENGINEERING - Stage 1

EEE402- ELECTRICAL PRINCIPLES 2A

FINAL EXAMINATION – SEMESTER-1, 2017

Total Marks---100

Day/Date: As per timetable Time: As per timetable(2Hrs) Room: As per timetable

INSTRUCTIONS TO CANDIDATES

1. You are allowed 10 minutes extra time during which you are not to write.
2. Write all your answers in the allocated Answer Booklet.
3. Begin each answer on a fresh new page and use both sides of each sheet.
4. Write your identification number on the top of each attached sheet.
5. Insert all written foolscaps, graph paper, drawing paper, etc in their correct sequence and secure with the string provided.
6. For all sheets of paper in which Rough/Draft work has been done, cross each one through and you must attach these to your answer script.
7. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
8. No GSM mobiles or smartphones allowed during the examination. Calculators with Digital Numbering systems conversions are prohibited during this examination.
9. There are 5 Sections in this Exam Paper that are compulsory, so attempt all questions.

SECTION A

MULTIPLE CHOICE

(20 Marks)

In each question there is only one right answer. Write the identifying letter of the correct answer in your answer booklet.

1. If doubling the voltage across a resistor doubles the current through the resistor then
 - a) The resistor value decreased
 - b) The resistor value did not change
 - c) The resistor value increased
 - d) It is impossible to determine the change in the resistor value

2. Energy is defined as the ability to
 - a) To produce heat
 - b) To produce light
 - c) To produce sound
 - d) All of the above

3. If the peak of the sinewave is 26V, the peak to peak value is
 - a) 13V
 - b) 26V
 - c) 52V
 - d) none of the above

4. Which band in a four band resistor do you find the tolerance band?
 - e) 1st
 - f) 2nd
 - g) 3rd
 - h) 4th

5. A voltmeter is connected:
 - a) To measure current.
 - b) In series with the element or component in the circuit.
 - c) In parallel with the element or component in the circuit
 - d) To measure the coulombs.

6. If the resistance of a material increases with an increase in temperature the Material is said to have:
 - a) Temperature coefficient
 - b) Negative temperature coefficient of resistance
 - c) Positive temperature coefficient of resistance
 - d) Neutral temperature coefficient of resistance

7. If an electric current passes through a coil of (insulated) wire, it will be found that this coil shows all the characteristics of a :
- Solenoid
 - Motor
 - Magnet
 - Specific heat capacity
8. If one should pick the type of transformer needed to be in Fiji for an electronic equipment brought from a United States of America, he or she must choose a
- Isolation transformer with a ratio of 1:1
 - Step down transformer from $240 V_{AC}$ to $110V_{AC}$
 - Step up transformer from $110 V_{AC}$ to $240 V_{AC}$
 - Centre tapped transformer from $110 V_{AC}$ to $40V_{AC}$ center-tapped.
9. What is the total resistance of a circuit when R_1 ($7 k \Omega$) is in series with a parallel combination of R_2 ($20 k \Omega$), R_3 ($36 k \Omega$), and R_4 ($45 k \Omega$)?
- $4 k\Omega$
 - $17 k\Omega$
 - $41 k\Omega$
 - $108 k\Omega$
10. The property of a solenoid to oppose changes in current is called:
- Solenoid
 - Capacitance
 - Inductance
 - Reactance.
11. Which of the following terms is associated with the flow of electrons?
- Resistance.
 - Voltage.
 - Inductance.
 - Current.
12. Calculate the inductance of this arrangement.



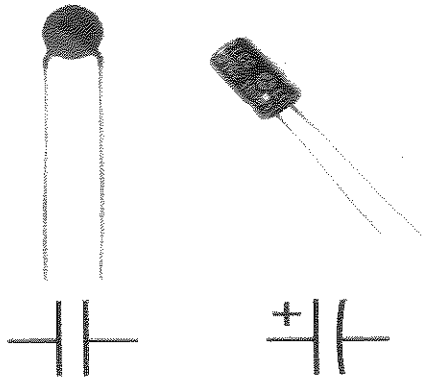
- 2 mH
- 20 mH
- 90 mH
- 120 mH

13. The unit of inductance is:
a) Volts.
b) Hertz.
c) Hendry.
d) Lux.
14. What type of cells can be recharged?
a) Primary cells
b) Resistance cells
c) Carbon-zinc
d) Secondary cells
15. One kilo-watt-hour is equal to:
a) 3.6 MJ
b) 1000 Watts
c) 1 Watt
d) 1 MJ
16. The value of an alternating current at any given instant is called:
a) Maximum value
b) peak value
c) instantaneous value.
d) r.m.s value
17. Calculate the effective resistance of the following combination.



- a) 12Ω
b) 52Ω
c) 39Ω
d) 49Ω

18. Which capacitor below is an example of a non-polarised capacitor? (C)



- a) Both
 - b) The right capacitor
 - c) The left capacitor
 - d) None
19. The DC voltage in a circuit is 550mV and the current is 7.2mA. What is the resistance?
- a) 0.76 Ω
 - b) 76 Ω
 - c) 39.6 Ω
 - d) 42 Ω
20. What is the total resistance of a circuit when R_1 (7 k Ω) is in series with a parallel combination of R_2 (20 k Ω), R_3 (36 k Ω), and R_4 (45 k Ω)?
- a) 4 k Ω
 - b) 17 k Ω
 - c) 41 k Ω
 - d) 108 k Ω

Section B Short Answer







(20 Marks)

1. Your colleague has received an electric shock while working with you. Describe the steps that you will take to rescue and revive the victim. (5 marks)
2. Name six type of personal protective equipment in the workplace. (3 marks)
3. State Kirchhoff's Current Law and Kirchhoff's Voltage Law (2 marks)

PART B --

Question 1: Circuit Concepts

Match the component name to its component symbol by writing the appropriate alphabet to the number:

#	Component Name	Alphabet	Component Symbol
2.1	Earth	A	
2.2	Battery	B	
2.3	Resistor	C	
2.5	Diode	D	
2.6	SPST Switch	E	
2.7	Capacitor	F	

(6 marks)

Question 2: Meter Connections

Match the electrical connection criteria to the correct circuit diagram by writing the appropriate alphabet to the number:

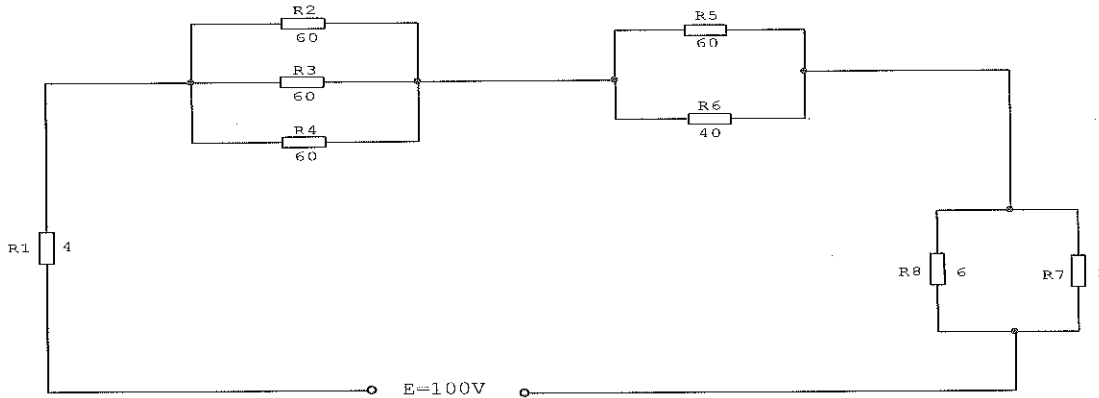
#	Meter Connection	Alphabet	Circuit Diagram
2.1	Measure Voltage	A	
2.2	Measure Current	B	
2.3	Opened circuit	C	
2.4	Closed circuit	D	

(4 marks)

SECTION C

(30 Marks)

1. For the circuit shown below calculate:



- a) Total resistance of the circuit (3 marks)
- b) Total current of the circuit (2 marks)
- c) Total power consumption by the circuit (2 marks)
- d) Current through R₂ (2 marks)
- e) Current through R₃ (2 marks)
- f) Power dissipated through R₂ (2 marks)

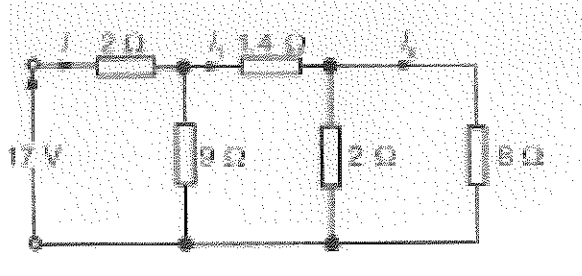
2. Determine the value of the resistor 4-band color codes:

- a) Brown, black, red, gold. (2 marks)
- b) Violet, green, black, silver (2 marks)
- c) Red, violet, orange, silver. (2 marks)
- d) Yellow, black, yellow, gold. (2 marks)

3. Find the resistance of a copper cable 95m in length if it has a diameter of 2mm.
The resistivity of copper is $1.72 \times 10^{-8} \Omega\text{m}$. (4marks)

4. For the given circuit diagrams find the current I_x

(5 marks)



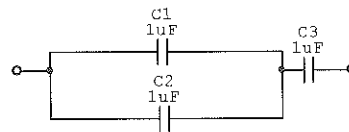
SECTION D

(30 Marks)

1. From the given circuit, determine:

a) total capacitance, C_T

(3 marks)



b) Outline one characteristic for each of the following;

(3 marks)

- i) Conductors.
- ii) Insulators.
- iii) Permanent Magnet.

2. Explain what is capacitive reactance (X_c).

(2marks)

3. When the maximum value of an alternating current is 20A, determine:

- a. Average value? (2 marks)
- b. R.M.S. value? (2 marks)
- c. Peak value? (2 marks)
- d. Peak – to – peak value? (2 marks)

4. Draw the magnetic field lines and show the direction with the indication of an arrow head of two bar magnets.



(3 marks)

5. What is the essential difference between a primary and a secondary cell?
(3 marks)
6. Name four factors that affect the resistance of a conductor.
(4 marks)
7. Draw a phasor diagram representing the AC Current (I) and Voltage of the following circuit
(5marks)
- a) RL Circuit
b) RC circuit

.....THE END.....

Appendix 1

Colour codes:

Color	Digit	Multiplier	Tolerance (%)
Black	0	10^0 (1)	
Brown	1	10^1	1
Red	2	10^2	2
Orange	3	10^3	
Yellow	4	10^4	
Green	5	10^5	0.5
Blue	6	10^6	0.25
Violet	7	10^7	0.1
Grey	8	10^8	
White	9	10^9	
Gold		10^{-1}	5
Silver		10^{-2}	10
(none)			20