FNU FIJI NATIONAL UNIVERSITY

**COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLGY**

# SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

## CERTIFICATE IV IN ELECTRICAL ENGINEERING – STAGE 2

## EEE329 - ELECTRICAL PRINCIPLES (TRADE) 1

**FINAL EXAMINATION– 2015**
**DAY / DATE/TIME: As per TT**

**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**
8. Show all workings where necessary.
9. You may use non-programmable calculators.

**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 one 3 ohm and one 6 ohm resistor are connected in parallel, the total resistance will equal to:
   a) 1 ohm
   b) 2 ohms
   c) 3 ohms
   d) 4 ohms

2. One of the factors that reduce or destroy the magnetic powers of a magnet is:
   a) Age
   a) Make
   b) Color
   c) Size

3. The capacitor whose dielectric consists of one or more layers of paper like the cigarette paper:
   a) Mica capacitors
   b) Air insulated and vacuum capacitors
   c) Plastic film capacitors
   d) Paper-insulated capacitors

4. Which band in a four band resistor do you find the tolerance band?
   a) $1^{st}$
   b) $2^{nd}$
   c) $3^{rd}$
   d) $4^{th}$

5. The two types of secondary cells are:
   a) Lead acid and car battery
   b) Carbon zinc and mercury cell
   c) Lead acid and Alkaline cell
   d) Lithium cell and silver oxide cell

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 if a :
   a) Solenoid
   b) Motor
   c) Magnet
   d) Specific heat capacity

8. It has been found that the emf of a thermocouple increases in a linear fashion with:
   a) Increase of heat
   b) Decrease of heat
   c) Increase of temperature.
   d) Decrease of temperature.

9. One of the three types of thermostats is the:
   a) Temperature controlled type
   b) Positive temperature coefficient
   c) Bimetallic strip type
   d) Negative temperature coefficient

10. The property of a solenoid to oppose changes in current is called:
   a) Solenoid
   b) Capacitance
   c) Inductance
   d) Reactance.

11. An alternator provides 10A current to a 10 ohms load.How much heat power is delivered to the load?
   a) 10W
   b) 100W
   c) 1W
   d) 1000W

12. A current of 3Amps will flow thorugh a 6 ohms resistor if the applied voltage is:
   a) 3V
   b) 9V
   c) 6V
   d) 18V

13. Battery capacity of a secondary cell is rated in:
   a) kWh
   b) Wh
   c) Ampere-hour
   d) Volt-hour.

14. If a resistor does not have any fourth band, its tolerance would be plus or minus:
    a) 5%
    b) 10%
    c) 15%
    d) 20%

15.In Flemings right-hand rule the thumb indicates the direction:
    a) The induced current will flow
    b) The direction of flux
    c) North pole
    d) The conductor is moving.

16. Two conductors carrying current in the same direction will have a force of:
    a) Repulsion
    b) Attraction
    c) No effect
    d) Electromotive force

17. The separating medium of the two plates of a capacitor is called:
    a) Dielectric
    b) Farad
    c) Capacitance
    d) Electrolytes

18. Name the device that converts heat to electro-motive force.
    a) Voltmeter
    b) Ammeter
    c) Multimeter
    d) Thermocouple.

19. In Flemings right hand rule for generators ,the thumb points to the direction of:
    a) Current
    b) Force
    c) Magnetic Flux
    d) North

20. The measure of the ability of a capacitor to hold an electric charge is known as:
    a) Capacitors
    b) Charge
    c) Capacitance
    d) Farad

**SECTION B** **FILL IN THE BLANKS** **(10 MARKS)**

1. ..... can be generated by passing conductors through a magnetic field by a method called induction.

2. ..... is that property of a material which opposes the flow of electrons.

3. ..... is the property of a circuit that enables an e.m.f. to be induced in it.

4. ..... lines of force existing outside the desired magnetic path are called the leakage flux.

5. The ..... of a magnetic material indicates the ease with which magnetic induction can occur in a material.

6. A ..... is the capacitance of the capacitor which stores a charge of one coulomb at a potential difference of one volt.

7. A cell is a device in which chemical energy is converted to electrical energy. This process is called ..... action.

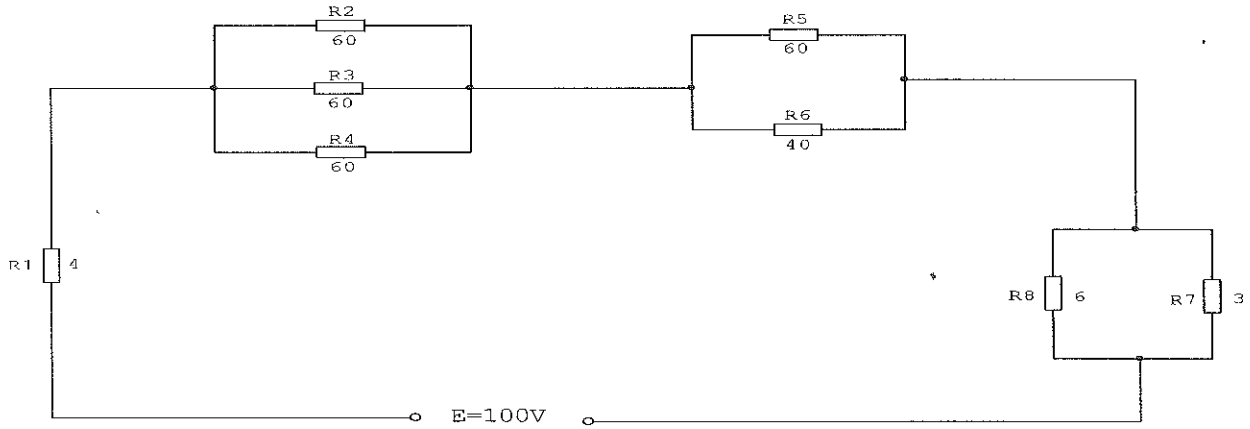
8. In a ..... connected circuit there is more than one path for the current to flow between the higher and lower potential terminals.

9. In resistor colour coding the first band indicates the first significant figure, the second band the second significant figure, the third band the multiplier and the fourth band the .....

10. The two main means of evaluating the performance of a thermostat are sensitivity and .....

**SECTION C** **(35 Marks)**

1. For the circuit shown below calculate:




a) Total resistance of the circuit **(2 marks)**

b) Total current of the circuit **(2 marks)**

c) Total power consumption by the circuit **(2 marks)**

d) Current through $R_2$ **(2 marks)**

e) Current through $R_3$ **(2 marks)**

f) Power dissipated through $R_2$ **(2 marks)**

2. List the indicated values and tolerance for the following resistors:

a) brown, green, orange, gold **(2 marks)**
b) red, violet, yellow, silver **(2 marks)**
c) green, black, yellow **(2 marks)**

3. Find the resistance of a copper cable 80m in length if it has a cross sectional area of $2mm^2$.
( The resistivity of copper is $1.72 \times 10^{-8}$ Ωm). **(3 marks)**

4. List three effects of electricity. **(3 marks)**

5. Draw graphs of charge and discharge curves of a capacitor clearly indicating the current and voltage and also draw circuits to show charging and discharging period clearly indicating the direction of current.

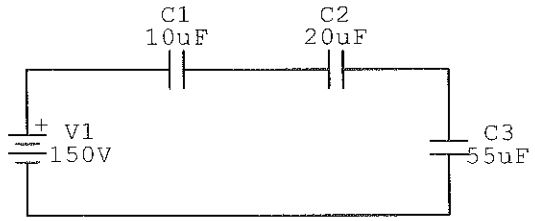
**(6 marks)**

6 .List five safety precautions to be taken when working with secondary cells.

**(5 marks)**

**SECTION D** **(35 Marks)**

1. For the capacitive circuit shown below




Calculate:

a) Effective capacitance
b) Voltage across each capacitors **(10 marks)**

2. Explain in terms of electron theory the following term:
   a) Conductors **(2 marks)**
   b) Insulators **(2 marks)**

3. What is the essential difference between a primary and a secondary cell?

**(3 marks)**

4. a) What is a Thermostat and what is it used for? **(3 marks)**
   b) What is a Thermistor and what is it used for? **(3 marks)**
   c) What are Thermocouples and what are they used for? **(3 marks)**

5. Name the three factors which are required to produce an induced voltage.

**(3 marks)**

6. List three factors that affect the resistance of a conductor.

**(3 marks)**

7. List two advantages of Lead - acid cells. **(3 marks)**

**.....End of Examination Paper.....**