



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-2, 2016

Total Marks---100

Day/Date: As per timetable Time: As per timetable(3Hrs) Room: As per timetable

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes Extra reading time during which you are NOT to write.
2. Begin each answer 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 string
5. For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. ANSWER ALL QUESTIONS.
8. Show all workings where necessary.
9. Do not use programmable calculators, especially the ones that does the conversions of number systems.

SECTION A-----Multiple Choice-----(15 Marks)

1. The unit of inductance is:
 - a) Volts.
 - b) Hertz.
 - c) Hendry.
 - d) Lux.

2. What type of cells can be recharged?
 - a) Primary cells
 - b) Resistance cells
 - c) Carbon-zinc
 - d) Secondary cells

3. If one 3 ohm and one 6 ohm resistor are connected in parallel, the total resistance is
 - a) 1 ohm
 - b) 2 ohms
 - c) 3 ohms
 - d) 4 ohms

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

- 5 . 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

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

7. 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

8. 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
9. 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
10. 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.
11. 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
12. The property of a solenoid to oppose changes in current is called:
- a) Solenoid
 - b) Capacitance
 - c) Inductance
 - d) Reactance.
13. Which of the following terms is associated with the flow of electrons?
- a) Resistance.
 - b) Voltage.
 - c) Inductance.
 - d) Current.
- 14 . One of the characteristic of magnetic lines of force:
- a) Cross each other
 - b) Line each other
 - c) Never cross each other
 - d) Crisscross

15. One kilo-watt-hour is equal to:

- a) 3.6 MJ
- b) 1000 Watts
- c) 1 Watt
- d) 1 MJ

SECTION B-----Short Answers-----40 (Marks)

- 1. What does 'SI units' mean? (1 mark)
- 2. State the units for the following (4 marks)

| Quantity | unit |
|------------------|------|
| length | |
| mass | |
| time | |
| Electric current | |

- 3. Write down a formula for calculating the power in a d.c. circuit (1 mark)
- 4. Name the symbols given below (3 marks)



- 5. State Ohm's law (2 marks)
- 6. What is a conductor? Give two examples (2 marks)
- 7. What is an insulator? Give two examples (2 marks)
- 8. What is electromotive force? (1 mark)
- 9. Write down the symbols for the following quantities: (2 marks)
(a) electric charge (b) work (c) e.m.f. (d) p.d.

10. What is a capacitor? (1 mark)

11. What is the phase relationship between V and I in Purely Resistive, Purely Capacitive and Purely Inductive circuits (6 marks)

12. Sketch the pattern of the magnetic field associated with a bar magnet. Mark the direction of the field. (2 marks)

13. To measure the following quantities: [Voltage, resistance and Current] draw the circuit diagram. (3 marks)

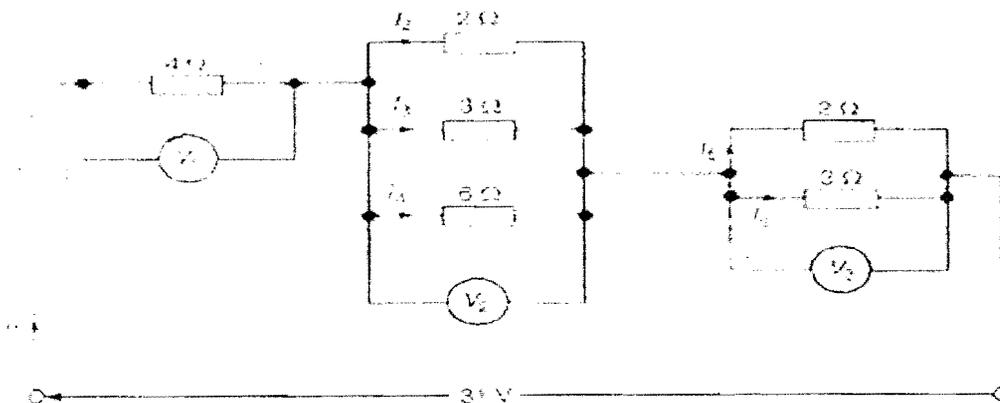
14. What is the essential difference between a primary and a secondary cell? (1 mark)

15. List four factors that affect the resistance of a conductor. (4 marks)

16. List five safety precautions to be taken when working with secondary cells. (5 marks)

SECTION C-----Calculations-----45 (Marks)

1. If a current of 5A flows for 2 minutes, find the quantity of electricity transferred. (2 marks)
2. Electrical equipment in an office takes a current of 13A from a 240V supply. Estimate the cost per week of electricity if the equipment is used for 30 hours each week and 1 kWh of energy costs 12.5cents. (4 marks)
3. A 100V battery is connected across a resistor and causes a current of 5mA to flow. Determine the resistance of the resistor and If the voltage is now reduced to 25V, what will be the new value of the current flowing? (3 marks)
4. A 50W electric light bulb is connected to a 240V supply. Determine (a) the current flowing in the bulb, and (b) the resistance of the bulb. (4 marks)
5. When the maximum value of an alternating current is 12A, determine: (2 marks)
 - a. Average value? (2 marks)
 - b. R.M.S. value? (2 marks)
 - c. Peak value? (2 marks)
 - d. Peak – to – peak value? (2 marks)
6. For the circuit shown below calculate: (2 marks)
 - 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)



7. Capacitance's of $1 \mu\text{F}$, $3 \mu\text{F}$, $5 \mu\text{F}$ and $6 \mu\text{F}$ are connected in parallel to a direct voltage supply of 100V . Determine (a) the equivalent circuit capacitance, (b) the total charge and (c) the charge on each capacitor.

(3 marks)

8. (a) Determine the p.d. across a $4 \mu\text{F}$ capacitor when charged with 5mC (b) Find the charge on a 50pF capacitor when the voltage applied to it is 2kV .

(3 marks)

9. Determine the value and tolerance of a resistor having a colour coding of:

a) orange-orange-silver-brown. (2 marks)

b) orange-green-red-yellow-brown. (2 marks)

c) Determine the color coding for a $47 \text{k}\Omega$ having a tolerance of $\pm 5\%$. (3 marks)

10. Find the resistance of a copper cable 85m in length if it has a diameter of 2mm .

The resistivity of copper is $1.72 \times 10^{-8} \Omega\text{m}$.

(3marks)

| Colour | Significant Figures | Multipplier | Tolerance |
|--------|---------------------|-------------|--------------|
| Silver | 1 | 10^{-2} | $\pm 10\%$ |
| Gold | 2 | 10^{-1} | $\pm 5\%$ |
| Black | 0 | 1 | — |
| Brown | 1 | 10 | $\pm 1\%$ |
| Red | 2 | 10^2 | $\pm 2\%$ |
| Orange | 3 | 10^3 | — |
| Yellow | 4 | 10^4 | — |
| Green | 5 | 10^5 | $\pm 0.5\%$ |
| Blue | 6 | 10^6 | $\pm 0.25\%$ |
| Violet | 7 | 10^7 | $\pm 0.1\%$ |
| Grey | 8 | 10^8 | — |
| White | 9 | 10^9 | — |
| None | — | — | $\pm 20\%$ |

-----The End-----