



**COLLEGE: COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)**

**SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING**

**PROGRAMME: CERTIFICATE IN ELECTRICAL SERVICEMANS COURSE- STAGE 1**

**UNIT CODE: EEE211**

**TITLE: APPLIED ELECTRICITY 1**

### **FINAL EXAMINATION – PENSTER 1, 2016**

**ROOM: AS PER TIMETABLE  
TIME: 2 HOURS 10 MINUTES**

#### **INSTRUCTIONS TO STUDENTS**

1. You are allowed 10 minutes extra reading time during which you are NOT 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 attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and ATTACH these to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Use of programmable calculator(s) is prohibited.
8. **ANSWER ALL QUESTIONS**
9. Show all working where necessary.
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE EXAM ROOM.**

**SECTION A – MULTIPLE CHOICE****(25 MARKS)**

1. Which of the following atomic part contains negative charges ?
  - (a) neutrons
  - (b) electrons
  - (c) protons
  
2. How many electrons does the first shell of any atom structure can accommodate?
  - (a) 2
  - (b) 8
  - (c) 16
  
3. A material has an atomic number of 29. Which of the following would best describe its property?
  - (a) good conductor
  - (b) good insulator
  - (c) semi conductor
  
4. What will happen in a situation where we have a difference in electrical potential of two points?
  - (a) No voltage is established between the points
  - (b) Current will flow if a resistor is connected between them
  - (c) Nothing will happen.
  
5. What happens when positive charges are brought closer to positive charges?
  - (a) they will attract
  - (b) they will repel
  - (c) nothing will happen
  
6. An electrical measuring instrument establishes a reading of 50 Ohms. What is this instrument called?
  - (a) ohmmeter
  - (b) voltmeter
  - (c) ammeter
  
7. A circuit consists of a 24V battery, three  $5\Omega$  resistors in series. What would be the current flowing in the circuit ?
  - (a) 4.8 A
  - (b) 8 A
  - (c) 1.6 A

8. An electrical circuit consist of an open switch which connects all the loads in the circuit to the source. What do we call this circuit ?
- (a) closed circuit
  - (b) open circuit
  - (c) switched circuit
9. Which of the following is true concerning series circuits :
- (a) adding the voltage drops across each resistors equals the supply voltage
  - (b) the current through each resistors add up to the total current
  - (c) the supply voltage is always equal to the total current
10. Which of the following is not a factor that determines the resistance of a material
- (a) Outside temperature
  - (b) Thickness of material
  - (c) Country where material is made from
11. When current passes through a resistor, what is given off as a direct result of this?
- (a) light
  - (b) heat
  - (c) smoke
12. What do you call the part that controls the temperature in an air conditioning unit?
- (a) element
  - (b) regulator
  - (c) thermostat
13. What is the correct relationship between Power, Voltage and Resistance ?
- (a)  $P = I^2 \times R$
  - (b)  $P = V / R$
  - (c)  $P = V^2 / R$
14. An electrical appliance is rated at 600 Watts. What electrical quantity is of concern here?
- (a) current
  - (b) energy
  - (c) power

15. An 800W electric heater is used for 3 hours. How much electrical energy does it consume ?

- (a) 3.75 mWh
- (b) 266.67 Wh
- (c) 2400 Wh

16. What type of heat transfer happens when an element heats up liquid?

- (a) radiation
- (b) convection
- (c) electrolysis

17. Which of the following produces a voltage upon a change in temperature?

- (a) thermostat
- (b) thermocouple
- (c) thermos

18. Which of the following are factors that affect the shelf life of a cell ?

- (a) high environmental temperatures
- (b) humid conditions due to outside influence
- (c) both of the above.

19. What is the instrument called hydrometer, used for ?

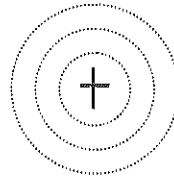
- (a) testing the density of the electrolyte in a cell
- (b) testing the voltage of the cell
- (c) charging up the cell

20. How can your mobile phone battery be best described as?

- (a) primary cell
- (b) secondary cell
- (c) temporary cell

21. A current carrying conductor is represented as follows. What would be the direction of the magnetic fields around the conductor ?

- (a) clockwise
- (b) anti clockwise
- (c) no direction



22. Two conductors carrying current in the same direction are brought closer to each other. What would be the effect of this?

- (a) they attract each other
- (b) they will repel each other
- (c) nothing will happen

23. Which statement correctly defines a capacitor?

- (a) a switching device that keeps temperature in a set point
- (b) a component that resist the flow of current
- (c) a component that stores charge

24. One of the characteristics of magnet force

- (a) Cross each other
- (b) Never cross other
- (c) Line each other

25. One kilowatt-hour is equal to

- (a) 3.6MJ
- (b) 1000W
- (c) 1MJ

**SECTION B – FILLING BLANKS & MATCHING**

**(20 MARKS)**

**(A) Fill in the Blanks (10 marks)**

**Wordlist** – Repel, 0.6371, Total current, Seebeck, Dielectric, Chemical, 120 W, Directly Proportional, Resistance, Positively-charged

1. Protons are .....particles that can be found inside the nucleus of an atom.
2. Two magnetic poles of the same polarity will.....each other.
3. Increase in cross section area also means decrease in ..... of a conductor.
4. Average Current is equal to Maximum Current x .....
5. Ohm's Law states that the current flowing in a circuit is..... to the voltage when the resistance is the kept constant.
6. In a parallel circuit the current flowing to all the branches equals.....
7. The power rating of a 240V appliance if it draws a current 0.5 A is.....
8. When any metal is subjected to a thermal potential ( 2 different temperatures at the same time), a voltage is produced across the conductor. This is known as.....effect.
9. A battery is a device that converts ..... energy to electrical energy.
10. The insulating material between the plates of a capacitor is called .....

**(B) Matching (10 marks)**

Match the items on the left to the items on the right

1	Kilowatt-hour meter	A	50 cycles of wave in one second
2	Wax pellet	B	Expression for Coulomb's Law.
3	$\mu\text{F}$	C	Unit for strength of the magnetic field
4	$R_1 = R_1 + R_2 + R_3 \dots\dots\dots$	D	Less resistance to current flow
5	Lithium cell	E	Series Circuit
6	Tesla	F	Single phase voltage
7	50 Hz	G	$\times 10^{-6}$ farads
8	$F = \frac{kQ_1Q_2}{d^2}$	H	Coin shaped used in powering watches
9	240 V	I	Measures electrical energy used
10	Copper	J	Thermostat sensor

**SECTION C – DEFINITIONS & CALCULATION (55 MARKS)**

1. Three materials A, B, and C have their Atomic Numbers as follows :

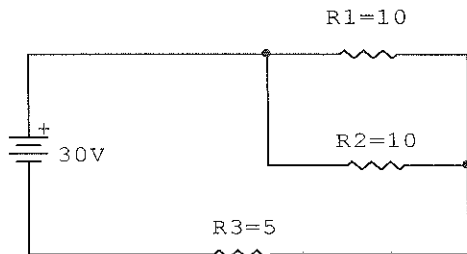
$$A = 31, \quad B = 13 \quad \text{and} \quad C = 35$$

(a) Draw the atomic structure of material A (3 marks)

(b) What type of materials are B and C (Conductor, Insulator or Semiconductor)? (2 marks)

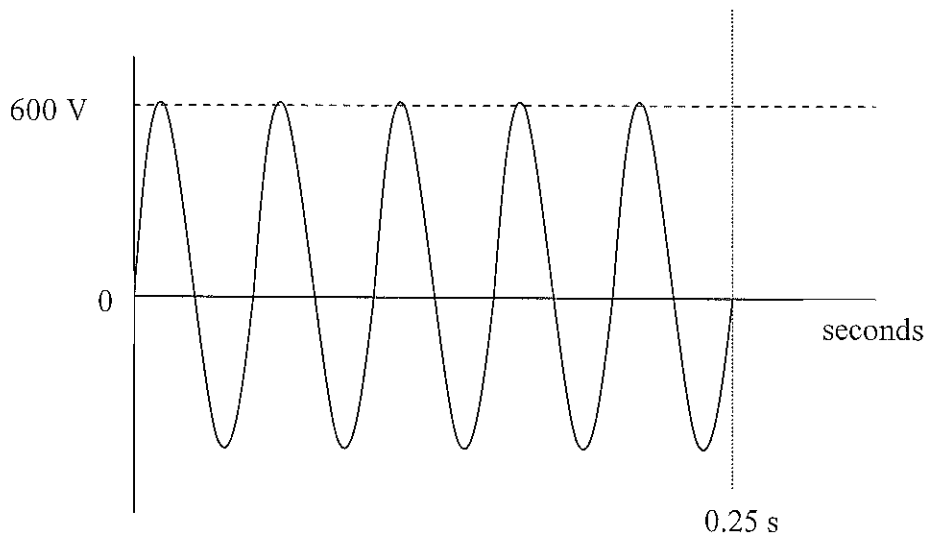
2.

(a) Study the circuit below and answer the questions that follow :



- (i) Calculate the total resistance of the circuit. (3 marks)
- (ii) Calculate the total current flowing in the circuit. (1.5 marks)
- (iii) Calculate the voltage drop across the R1 (1.5 marks)

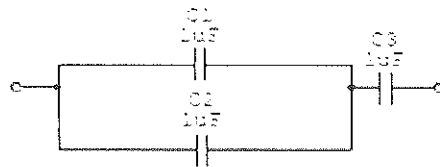
3 Study the AC waveform represented by the diagram below :



Calculate the following :

- (a) The peak voltage (1 mark)
- (b) The Period of the waveform (1.5 marks)
- (c) The Average voltage (1.5 marks)
- (d) The frequency of the supply (1.5 marks)

4. (a) For the given circuit below, determine total capacitance ,  $C_T$



(3 marks)

5. (a) A typical car battery is rated at 120 Ampere-hours. How long will the battery last if it is made to power a device that uses a current of 2.5 Amps?

(2 marks)

- (b) Give three points in caring and maintaining of lead-acid batteries.

(3 marks)

6. A television set has a current rating of 2.5A / 240 V. Calculate the following :

- (a) Power used by the set when switched on (1.5 marks)
- (b) Energy used in kWh if you are watching the Hong Kong 7s tournament for 8 hours (1.5 marks)
- (c) Cost of watching the Hong Kong 7s if FEA charges \$0.22 for every kWh of energy used. (1.5 marks)

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

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



8. List four factors that affect the resistance of any conductor and explain the relationship the relationship of each with respect to resistance. (8 marks)
9. Name three factors that determine capacitance. (3 marks)
10. Find the total voltage if four batteries are connected in series, and all have the same voltage of 1.5Volts? Also draw the electrical symbol to indicate all the four batteries. (2 marks)
11. Draw the circuit diagram of a fluorescent light and label all its components (5 marks)

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Table 1

Resistor Colour Code			
Colour	Significant Figures	Multiplier	Tolerance
Black	0	$1(10^0)$	
Brown	1	$10(10^0)$	1%
Red	2	$100(10^0)$	2%
Orange	3	$1000(10^0)$	*
Yellow	4	$10,000(10^0)$	*
Green	5	$100,000(10^0)$	*
Blue	6	$1000,000(10^0)$	*
Violet	7	*	*
Grey	8	*	*
White	9	*	*
Gold	*	0.1	5%
Silver	*	0.01	10%
None	*	*	20%

**EQP RECEIPT CHECKLIST FORM**

Particulars	Details/Comments (To be filled by Unit Lecturer)	Tick if present on EQP (To be filled by exams staff)
<b>Cover Page</b>		
Fiji National University with Logo	✓	
College	✓	
School	✓	
Program	✓	
Unit Code	✓	
Unit Name	✓	
Examination Period	✓	
Duration of Examination	✓	
Instructions		
Total Number of Pages	✓	
<b>Other Pages</b>		
Footer	Page Number	✓
	Unit Code	✓
	Examination Period	✓
<b>Last Page</b>		
The End	✓	
<b>Overall</b>		
Proper Print	✓	
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Moderator's Report (FNU/E-3)	✓	
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