



COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLOGY
SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

CERTIFICATE IV IN ELECTRICAL ENGINEERING (STAGE 2)

EEE329 ELECTRICAL PRINCIPLES (TRADE) 1

FINAL EXAMINATION (PENSTER 3, 2017)

DATE/TIME/ROOM – Refer to Exam Timetable

Instructions to Students

1. You are allowed an extra ten (10) minutes of reading time during which you are NOT allowed to write.
2. Write your answers in the answer booklet provided
3. Write your Student ID number at the top of each attached sheet
4. You may use calculators provided they are non-programmable.
5. Clearly number the questions in your answer paper in their correct sequence and write legibly. Show all working.
6. Attach any extra sheets used to your answer booklet securely with the string provided
7. There are Two (2) Sections' in this paper - **Answer all Sections.**

SECTION A – SHORT ANSWERS**(40 marks)**

1. Determine the value of the following resistors using color code (4 marks)
 - a) Red, Red, Black, Gold
 - b) Green, Green, Black, Yellow, Brown
 - c) Blue, Red, Black, Brown, Gold
 - d) Grey, Red, Black, Orange, Silver

2. Determine the color code for these resistors (6 marks)
 - a) $4.7 \text{ k}\Omega \pm 2\%$ (5 band)
 - b) $4.9 \text{ }\Omega \pm 5\%$ (4 band)
 - c) $1.5 \text{ M}\Omega \pm 10\%$ (4 band)
 - d) $56 \text{ k}\Omega \pm 10\%$ (4 band)

3. Describe how a hydrometer correctly used for measurement ? (2 marks)

4. Briefly explain what happens to the total voltage and current if resistors were to be connected in series and in parallel? (3 marks)

5. (a) Draw 2 current carrying conductors, indicate one in which the current is pointing away from you and the other where the current is coming towards you. (2 marks)

- (b) Using your right hand screw rule as a guide, indicate the direction of the magnetic field around the conductors you drew in (a) above. (2 marks)

6. Explain with the aid of diagram how a force is created between two conductors carrying current in the same direction. Would it be attractive or repulsive ? (4 marks)

7. Show the discharge cycle graph of a battery (4 marks)

8. Complete the following table by filling in the blanks: (4 marks)

Element	Atomic Number	No. of electrons in the valence shell	Property of element (Conductor, semiconductor or insulator)
Aluminium	13	(a)	(b)
Silicon	14	(c)	(d)
Phosphorus	15	(e)	(f)
Copper	29	(g)	(h)

9. Find the capacitance of a capacitor if the plates have an area of 100mm^2 and the distance between plates are 5mm. Take dielectric constant as 1. (3 marks)

10. Determine the value of the following capacitors marked with :

- (a) 473J (2 marks)
 (b) 475E (2 marks)
 (c) What does the letters "J" and "E" above mean? (2 marks)

SECTION B – LONG ANSWERS

(60 marks)

1. Explain the following terms:

- a. Shelf life of a cell (2 marks)
 b. Cycle of a wave (2 marks)
 c. Secondary Cells (2 marks)
 d. Insulators (2 marks)
 e. Resistivity (2 marks)

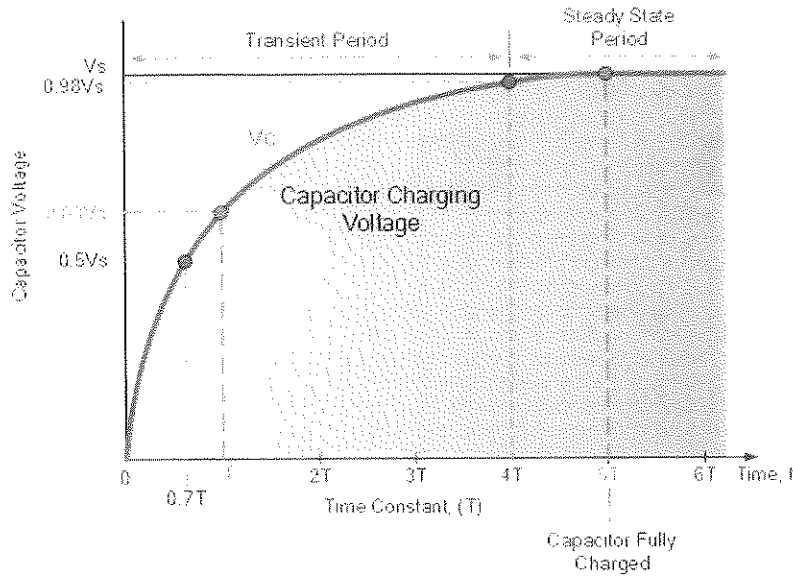
2. The following table details the energy usage of Mr Kumar. Use initial cost of energy as 34.84cents/kWh

Device (AC)	Ratings	Duty Cycle per month
Stereo	800 watts	100 hour
Microwave	1000 watts	15 hour
Fridge	150 watts	720 hour
42" ceiling fan on low speed	24 watts	120 hours
Energy saver	8 watts	200 hours
Fluorescent light	25 watts	100 hours
Toaster	600 watts	80 hours

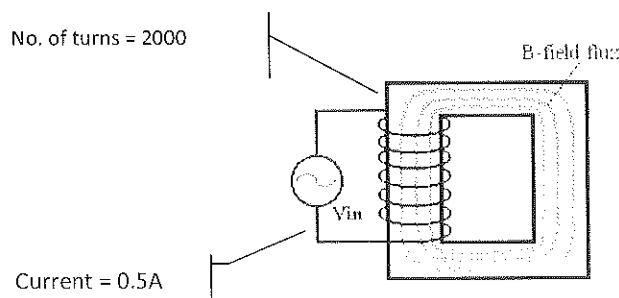
- (a) Calculate the total energy usage in kWh for a month (4 marks)
 (b) Calculate the cost of energy in a month using the rate of \$0.34c per kWh. (2 marks)
 (c) If the usage is less than 3000kWh then a discount of 15% is given per kWh. Calculate the final cost on this condition. Use the same rate as in (b) above. (3 marks)

3. Relate to the capacitor charging diagram below and explain how capacitor charging happens.

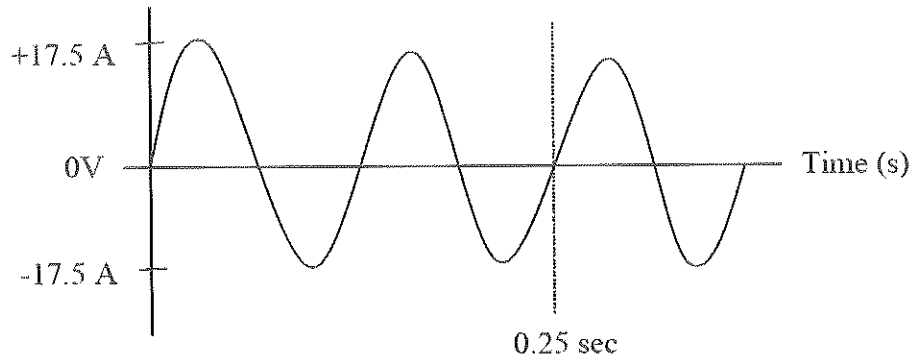
(4 marks)



4. Four capacitors of $150\mu\text{F}$, $200\mu\text{F}$, $100\mu\text{F}$ and $47\mu\text{F}$ are connected in series across a 12 V supply. Find the
- Total capacitance (2 marks)
 - Total Charge (2 marks)
 - Voltage across the $200\mu\text{F}$ and $100\mu\text{F}$ capacitor (2 marks)
5. Show whether the total capacitance value of a $10\mu\text{F}$, $680\mu\text{F}$, $100\mu\text{F}$ and $220\mu\text{F}$ capacitors will be more when connected in series or parallel. (5 marks)
6. Describe five (5) precautions when working with lead acid batteries. (5 marks)
7. With the aid of a diagram, fully explain how a voltaic cell which uses copper sulphate and zinc sulphate works. (10 marks)
8. For the following transformer core window, its dimensions and values are given. Calculate its magnetic field strength, H in At/m. (2 marks)



10. Consider the following waveform and calculate :



- | | |
|---|-------------|
| (a) The Period, T | (2 marks) |
| (b) The Frequency, f of the waveform. | (1.5 marks) |
| (c) Average current value | (1.5 marks) |
| (d) RMS value of current | (1.5 marks) |
| (e) Peak to peak current | (1.5 marks) |
| (f) Which value is more useful – rms or peak value? | (1 mark) |

End

ATTACHMENT 1 – RESISTOR COLOUR CODING TABLE

COLOUR	1 ST , 2 ND OR 3 RD DIGIT	MULTIPLIER	TOLERANCE
BLACK	0	X 1	1 %
BROWN	1	X 10	2 %
RED	2	X 100	
ORANGE	3	X 1,000	
YELLOW	4	X 10,000	
GREEN	5	X 100,000	
BLUE	6	X 1,000,000	
VIOLET	7	X 10,000,000	
GREY	8	X 100,000,000	
WHITE	9	X 1,000,000,000	
GOLD		÷ 10	5%
SILVER		÷ 101	10%