UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION
JANUARY 2016 SESSION

SUBJECT CODE	:	LEB10303
SUBJECT TITLE	:	PRINCIPLE ELECTRIC AND ELECTRONICS
LEVEL	:	BACHELOR
TIME / DURATION	:	2.00 pm – 5.00 pm / 3 HOURS
DATE	:	24 MAY 2016

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of FIVE (5) questions. Answer only FOUR(4) questions.
6. Answer all questions in English.

THERE ARE 10 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FOUR questions only
Please use the answer booklet provided.

Question 1

a) Describe the definition of
   i. Kirchoff's Voltage Law and it's formula
   ii. Kirchoff's Current Law and it's formula
   iii. Ohm's Law

[9 marks]

b) **Figure 1** show the combination of series and parallel of resistance connection. $V_s = 50V$

   i) Determine the total resistance

[4 marks]

   ii) Evaluate the current I_1, I_2, I_3 and I_4

[12 marks]

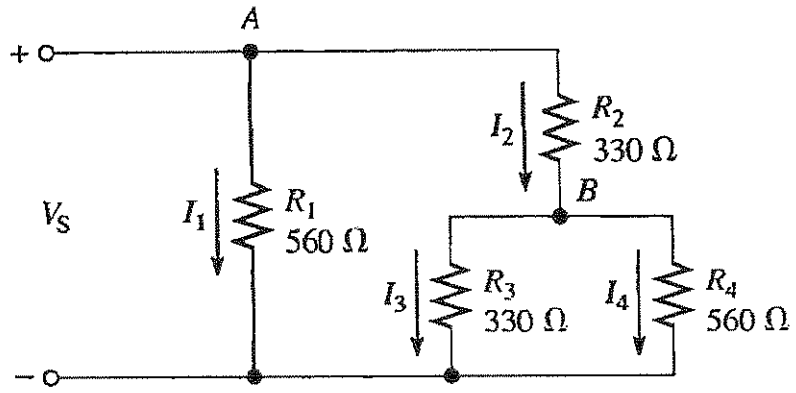

Figure 1

Questions 2

a) State the differences between Conductor, Insulator and Semiconductor

[9 marks]

b) **Figure 2** shows the movement of charge in intrinsic silicon. Describe the electron movement based on this figure.

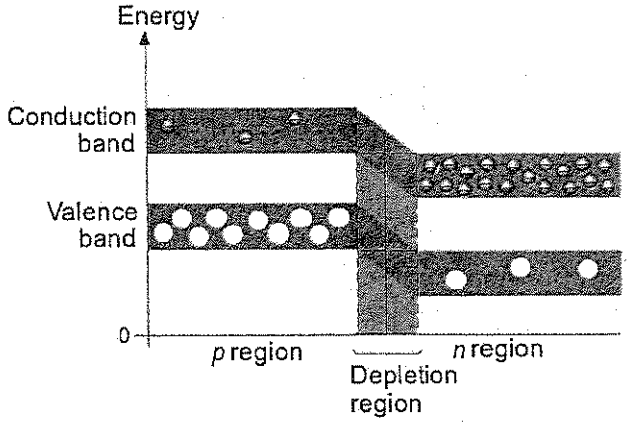

Figure 2

[6 marks]

c) Forward bias is the condition which allows current in the diode. The bias voltage must be greater than the barrier potential. By using the practical model to determine the current in the **Figure 3**.

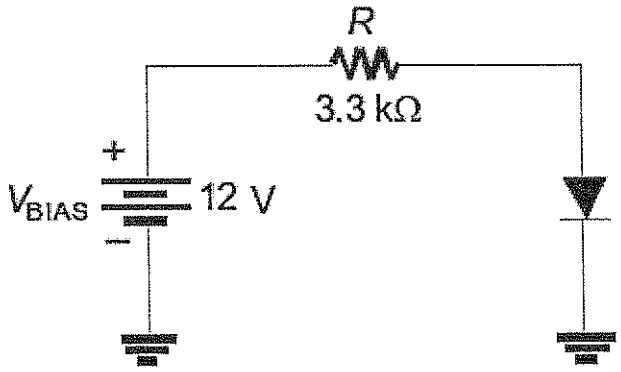

Figure 3

[6 marks]

d) Describe the reverse bias condition for the diode.

[4 marks]

Question 3

a) A power supply is an electronic device that supplies electric energy to an electrical load. Describe the function for each electrical component as shown in **Figure 4**.

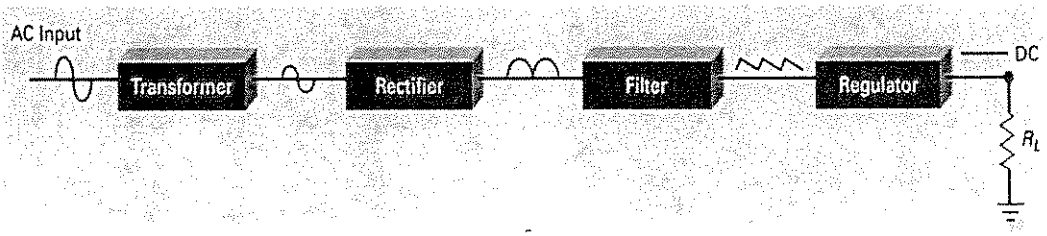

Figure 4

[8 marks]

b) Refer to **Figure 5**, it shows the practical diode model.

i) Determine the peak output voltage

[5 marks]

ii) Determine the current of this practical diode model

[3 marks]

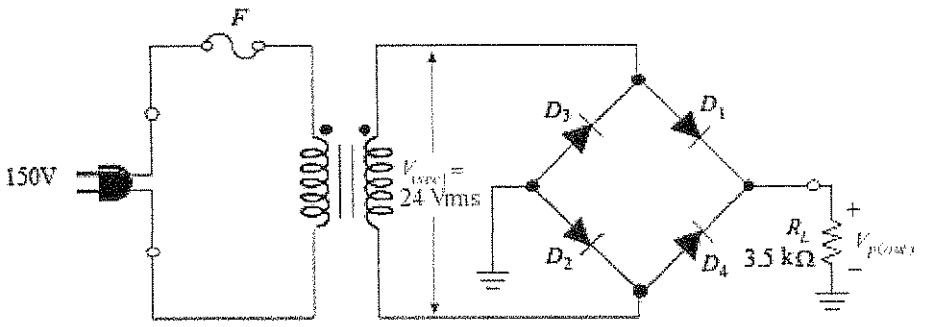

Figure 5

c) Assume the DC input to a regulator changes by 1.0V due to a change in the ac line voltage. If the output changes by 2.0 mV due to change, what is the line regulation?

[4 marks]

d) What is the function of practical model in **Figure 6** and sketch the output signal the practical model

[5 marks]

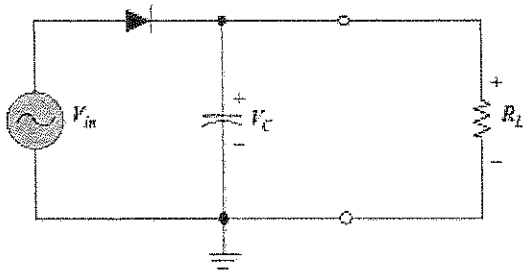

Figure 6

Question 4

a) Zener diode is designed to operate in reverse breakdown region. Draw zener diode symbol and describe its operation by using characteristic curve.

[4 marks]

b) What is the zener impedance if the zener diode voltage changes from 4.79 V to 4.94 V when the current changes from 6.00 mA to 10.0 mA?

[4 marks]

c) Refer to **Figure 7**, what are the maximum positive and negative voltages if the Zener breakdown voltage is 6.3 V?

[4 marks]

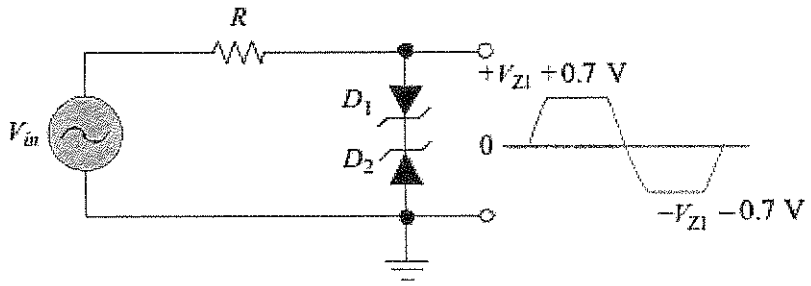

Figure 7

d) There are several types of diode for electronic applications. State the principle and application and sketch their symbols for:

i) Varactor Diodes
ii) Light emitting Diodes
iii) Laser Diodes

[6 marks]

e) LEDs emit a specific range of wavelengths which depend on the construction and dye material as shown in **Figure 8,** what is the peak wavelength of a green LED and red LED

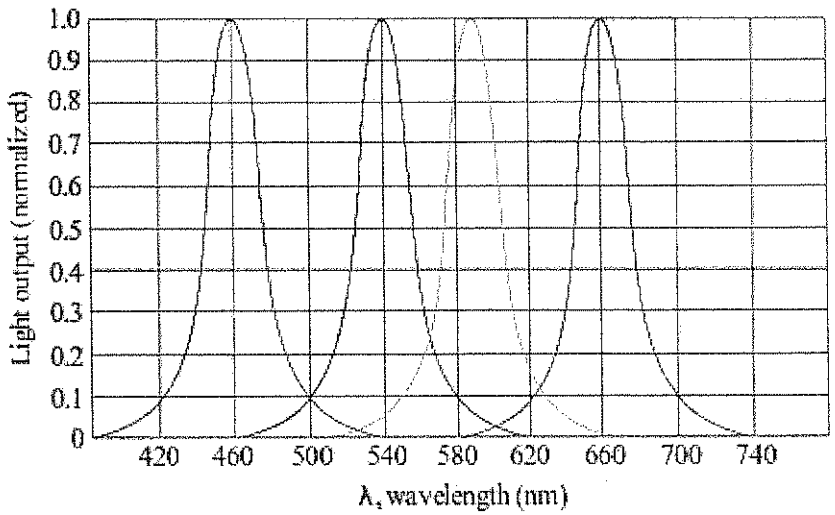

Figure 8

[4 marks]

f) A certain bright red LED drops 2.2 V at a maximum current of 20 mA. What series resistor is required to limit the current to 20 mA from a 5.0 V source?

[3 marks]

Question 5

a) Compare the flux and flux density in the two magnetic cores shown in **Figure 9** below. The diagram represents the cross section of a magnetized material. Assume that each dot represents 100 lines or 1 μWb.

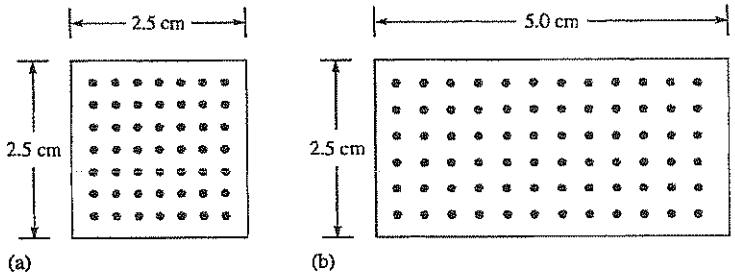

Figure 9

[6 marks]

b) Assume the conductor in figure below is 10 cm long and the pole face of the magnet is 5.0 cm wide. The flux density is 0.5 T, and the conductor is moved upward at a velocity of 0.8 m/s. What voltage is induced in the conductor?

[4 marks]

a) Michael Faraday discovered the principal of electromagnetic induction in 1831. The key idea behind Faraday 's Law that a changing magnetic field can induce a voltage in a conductor

i) State the Faraday's law which is includes the experimental procedure and law's formula

[7 marks]

ii) Determine the induced voltage across a coil with 450 turns that is located in a magnetic field that is changing at rate of 8500μ Wb/s.

[4 marks]

iii) Give four (4) examples of useful device using electromagnetism application

[4 marks]

END OF QUESTIONS