



Fiji National University
College of Engineering, Science & Technology

SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

FINAL EXAMINATION PAPER-PENSTER 1 - 2013

CERTIFICATE IN RADIO, ELECTRONICS AND TELEVISION
SERVICEMAN

EEE101: BASIC ELECTRONICS 1

DAY: TBA DATE: TBA TIME: VENUE: TBA per time table

INSTRUCTIONS TO STUDENTS:

1. You are allowed 10 minutes Extra reading time during which are **Not to write**.
2. There are four(4) sections in this examination paper, **ATTEMPT ALL QUESTIONS**
3. Begin each question on a **fresh page and use both sides of the sheet**.
4. Write your **ID. Number** at the top of each page of your answer booklet and any other attached sheets.
5. Insert all written foolscaps, graph paper, drawing paper etc. in their correct sequence and secure with strings.
6. For all sheets of paper on which rough/ draft work has been done, cross it through and **you must attach** to your answer scripts.
7. Clearly write the number(s) of the questions(s) you attempted on top of the sheet.
8. Answers to all questions must be **written in ink** on the answer sheets.
9. Calculators with **formula programmable functions** are **Not allowed**.
10. Formula sheet is provided in page 8 – Appendix 1.

Section A (Fill in the correct word or number) (10 Marks)

1. Free electron is always in the ____ most shell.
2. Protons and neutrons can be found in the ____ of an atom.
3. The shell is also called the ____ path.
4. The unit of measuring EMF is ____.
5. A conductor allows the ____ of electricity through it.
6. The material that do not carry electricity easily is called an _____.
7. When one Henry is divided by 1000, one part of this is called ____.
8. When 1 Farad is divided by one million, one part of that is called ____.
9. Ohm's law states that the current through a conductor is directly proportional to the potential difference across the two points provided the resistance and ____ are constant.
10. When two resistors are connected in series, the total resistance should be _____ than the value of each resistor.

Section B (Multiple choice) (10 Marks)

Read the questions properly and write the best answer on the Answer script provided.

1. In colour coded resistors, a gold 4th band indicates:
 - a) 5% Tolerance
 - b) 10% Tolerance
 - c) 0% Tolerance
 - d) 25% Tolerance
2. When two resistors are connected in parallel
 - a) they must both have the same current
 - b) the voltage across each must be same
 - c) the total resistance must have bigger value
 - d) here is only one path for the current through both resistors.
3. With a $8K\Omega$ resistance in series with a $4K\Omega$, the total resistance R_T equals
 - a) $2K\Omega$
 - b) $8K\Omega$
 - c) $10K\Omega$
 - d) $12K\Omega$
4. To connect a current meter in series.
 - a) open the circuit at one point and use the meter to complete the circuit
 - b) open the circuit at the positive and negative terminals of the voltage source.
 - c) short circuit the resistance to be checked and connect the meter across it.
 - d) open the circuit at one point and connect the meter to one end.
5. A Capacitor consist of two

- a) Conductors separated by an Insulator
 - b) Insulators separated by a Conductor
 - c) Conductors alone
 - d) Insulators alone
6. A Potentiometer is a:
- a) Two terminal device used to vary the current in the circuit
 - b) Three terminal device used to vary the voltage in a circuit
 - c) Fixed resistor
 - d) Two terminal device used for varying voltage.
7. What is the negative charge in the electronic engineering?
- a) protons
 - b) neutrons
 - c) electrons
 - d) nucleus
8. A resistance of a resistor is measured in:
- a) farads
 - b) ohms
 - c) henrys
 - d) pico
9. In a simple circuit consisting of resistance $100\text{k}\Omega$ and capacitance of $100\mu\text{F}$, find out the time constant of the circuit:
- a) 100 sec
 - b) 100 min
 - c) 10 min
 - d) 10 sec
10. In Question 9 above, calculate the frequency of the circuit?
- a) 0.1 Hz
 - b) 100 Hz
 - c) 10 Hz
 - d) 0.01 Hz

Section C (True or False) (10 Marks)

Attempt all question in this section and write down your answers in your answer sheet provided. Write down the number and answer beside it.

1. Two diodes can be used as a full wave rectifier.
2. Digits used in binary number systems are 1 and 2.
3. There are two junctions on the bipolar junction transistor.

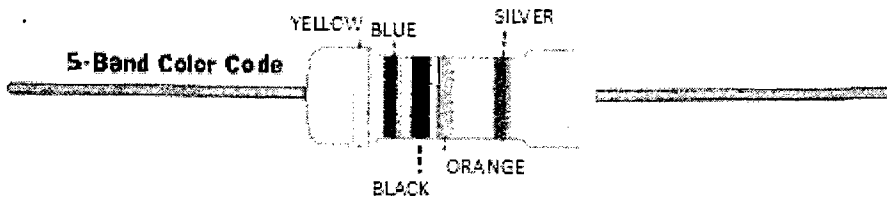
4. Testing the transistor to determine if it is good or bad can be done by physically checking the terminal leads.
5. The forward biased barrier potential for silicon diode is 0.3V.
6. For the two input OR gate, the output will be LOW only when both inputs are LOW.
7. The mathematical expression used to describe 2 input AND gate is $A + B = X$.
8. To measure voltage drop across a resistor, the voltmeter has to be placed in parallel with the resistor.
9. The binary number for decimal number: 20 is 10100
10. The decimal number for the binary number 110011 is 55

SECTION D Short Answers (30 Marks)

1. In a basic power supply circuits:
 - i) List the four major components used. (4 marks)
 - ii) Write the symbols for each component. (4 marks)
 - iii) State the function of each component. (4 marks)
 - iv) Draw the waveform at each stage of rectification. (4 marks)
2. When identifying a logic gate, it was noted that **when both inputs are on, the output is on.**
 - i) What is this logic gate? (1 marks)
 - ii) Sketch the symbol for this gate. (1 marks)
 - ii) Draw and fill in its Truth Table. (4 marks)
3. i) Find the current delivered by a 50V supply to an 150Ω resistor. (2 marks)
 - ii) Calculate the resistance of an electrical heater if it is connected to a 240V supply causing a current of 10mA to flow. (2 marks)
4. i) Convert the decimal number 11_{10} to binary? (4 marks)
 - ii) Convert the decimal number 27_{10} to binary?

Section E Calculation – Show ALL your working (40 Marks)

1. Calculate the value of the resistor given in figure below using color code.



(3 marks)

2. Consider the circuit shown in figure below.

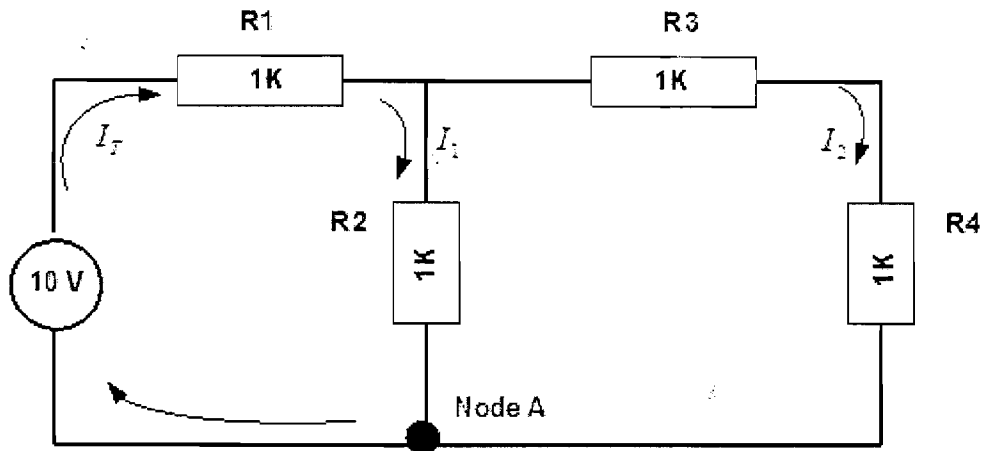
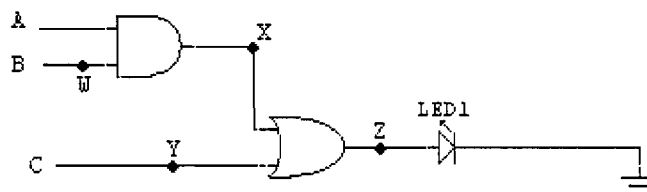


Figure 3 – Series Parallel Resistive Circuit

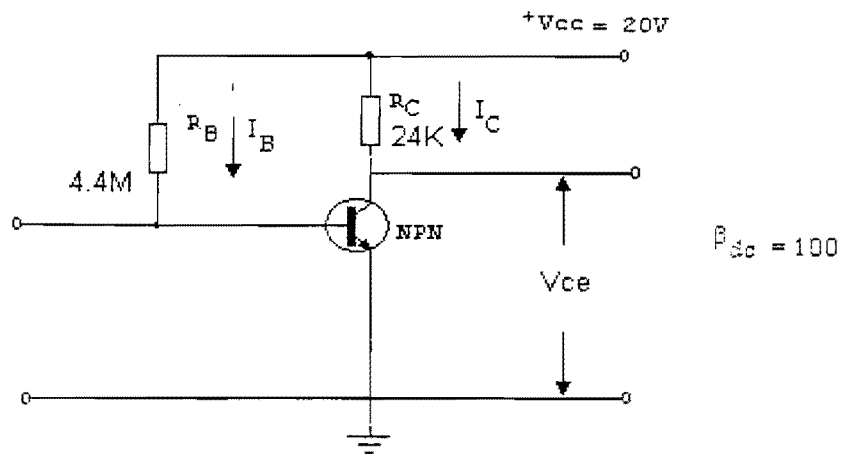
- Calculate the total Resistance (R_T) (4 marks)
- Calculate the total current (I_T). (3 marks)
- What is the voltage drop across R_1 (V_{R1}) (3 marks)
- Calculate the current through resistor R_3 . (I_{R3}) (3 marks)
- Calculate the current at node A (2 marks)

3. For the combinational logic circuit in figure below, draw the truth table to determine which inputs will cause the LED1 to light. (5 marks)



Sequential Logic Circuit

4. Refer to the circuit in **figure** below

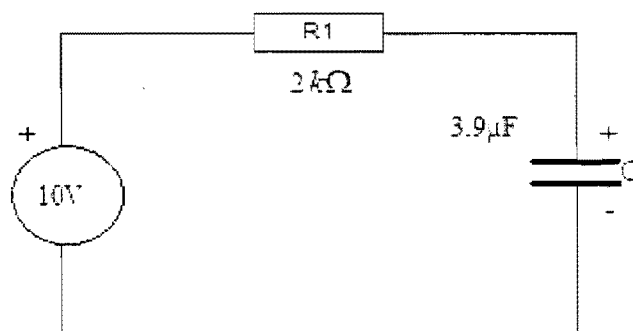


Transistor Amplifier Circuit

Calculate the values of

- | | | |
|------|--------------|-----------|
| i) | I_B | (2 marks) |
| ii) | I_C | (2 marks) |
| iii) | V_C | (2 marks) |
| iv) | V_B | (2 marks) |
| v) | Voltage gain | (1 mark) |

5. For the circuit in figure below:



shows typical RC = ζ circuit

- a) Find the time taken for capacitors to reach 100% of the supply voltage.
(3 marks).
- b) Find the value of the resistance would be required to give a full charging time of 10 sec.
(5 marks).

Total Marks = 100

Appendix – 1

FORMULAE TABLE

1. $V = IR$
2. $C_T = C_1 + C_2 + C_3$
3. $T = RC$
4. $T = L/R$
5. $V_E = V_B - 0.7$
6. $V_{BE} = 0.7V$
7. $V_{RB} = V_{CC} - 0.7$
8. $Q = CV$
9. $V_C = V_{CC} - I_C R_C$
10. $1/R_T = 1/R_1 + 1/R_2 + 1/R_3$
11. $R_T = R_1 + R_2 + R_3$
12. $V_{CE} = V_C - V_{RC}$
13. $1/C_T = 1/C_1 + 1/C_2 + 1/C_3$
14. $I_B = \frac{V_{CC} - V_{BE}}{R_B}$
15. $I_C = \beta I_B$

