FNU FIJI NATIONAL UNIVERSITY

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

SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: CERTIFICATE IN RADIO & TV SERVICING - STAGE 1

UNIT CODE: EEE201

TITLE: BASIC ELECTRONICS

FINAL EXAMINATION – PENSTER 1, 2017

TIME: 2 HOURS & 10 MINUTES
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 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 [illegible]

SECTION A MULTIPLE CHOICE [10 MARKS]

Choose the appropriate answer from each question by writing the alphabet beside the question number:

1. Atomic number is number of:
   A. proton
   B. electron
   C. nucleus
   D. neutrons

2. Smallest particle of an element which can take part in any chemical change is:
   A. nucleus
   B. atom
   C. proton
   D. neutron

3. Resistivity of a wire depends on:
   A. length
   B. material
   C. cross section area
   D. none of the above

4. Ampere second could be the unit of:
   A. power
   B. conductance
   C. energy
   D. charge

5. An electric current of 10A is same as:
   A. 10 J / C
   B. 10 V / C
   C. 5 C / sec
   D. 5 w / sec

6. If a circuit contains two un-equal resistances in parallel:
   A. current is same in both
   B. large current flows in larger resistor
   C. potential difference across each is same
   D. smaller resistance has smaller conductance

7. Capacitor plates are separated by an insulator known as:
   A. non-metal
   B. dielectric
   C. paper
   D. wood

8. The units of capacitance are:
   A. volts/coulomb
   B. coulombs/volt
   C. ohms
   D. henry/wb

9. The property of a capacitor to store electricity is called its:
   A. capacitance
   B. charge
   C. energy
   D. none of the above

10. Permittivity is expressed in:
   A. Farad/sq-m
   B Farad/m
   C. Weber/meter
   D. Weber/sq-m

SECTION B [15 MARKS]

Write either TRUE or FALSE for the correct answer.

1. Electric field is the electric force per unit charge.
2. Like charges attract and unlike charges repel.
3. The break down voltage is the voltage that when exceeded will cause the dielectric inside the capacitor to break down and conduct.
4. The invisible force of magnetism is referred to as a magnetic field.
5. Substances with high permeability are called ferromagnetic materials.
6. The two most common ferromagnetic materials are iron and ferrite.
7. Electromagnetic induction is the force that produces a magnetic field.
8. The tesla is the unit of magnetic flux.
9. Ampere-turn is the unit of magnetomotive force (mmf).
10. When a p-n diode is forward biased, current flows from the anode to the cathode.
11. The p-region has a greater concentration of electrons as compared to the n-region in a P-N junction
12. Zener diodes have a highly doped p-n junction.
13. Electrons are majority current carriers in n-type semi-conductor materials.
14. Rheostat is an electrical instrument used to control a current by varying the resistance.
15. The SCR is a silicon, unilateral four – terminal thyristor.

SECTION C [15 MARKS]

1. _____ transformers are those specifically designed for use in audio circuits to carry audio signal

2. _____ transformers are typically used to increase or decrease the voltage from one side of the transformer to the other.

3. The two basic types of signals are analog and _____.

4. _____ type of signal is represented by discrete values.

5. The output of an OR gate will be low if all inputs are _____.

6. The output of an AND gate will be high if all the inputs are _____.

7. A flip-flop is a digital circuit that has _____ stable states.

8. The _____ is a three-terminal bilateral conducting device.

9. To turn an _____ on, the anode and gate must both be positive with respect to the cathode.

10. For an SCR to turn on and remain on, the anode current must rise to the value above the _____ current.

11. The process of turning an SCR off is called _____.

12. A voltmeter is always connected in _____.

13. Neutrons have _____ electric charge.

14. Conductors have plenty of free _____.

15. Materials with high resistance are _____.

SECTION D [30 MARKS]

1. Draw the logic diagram for:
   a) Positive edge triggered D-type flip flop. (1 mark)
   b) Negative edge triggered JK flip flop. (1 mark)

2. Briefly explain the difference between asynchronous and synchronous counter. (3 marks)

3. Draw the schematic symbol for:
   a) Bipolar (NPN) transistor (1 mark)
   b) Bipolar (PNP) transistor (1 mark)
   c) Metal oxide semiconductor field-effect transistor (MOSFET). N channel (1 mark)

4. With the aid of diagrams explain the difference between analog and digital techniques and give one application of each. (5 marks)

5. Determine the logic gate symbol and the truth table for a two input:
   a) AND gate (3 marks)
   b) OR gate (3 marks)

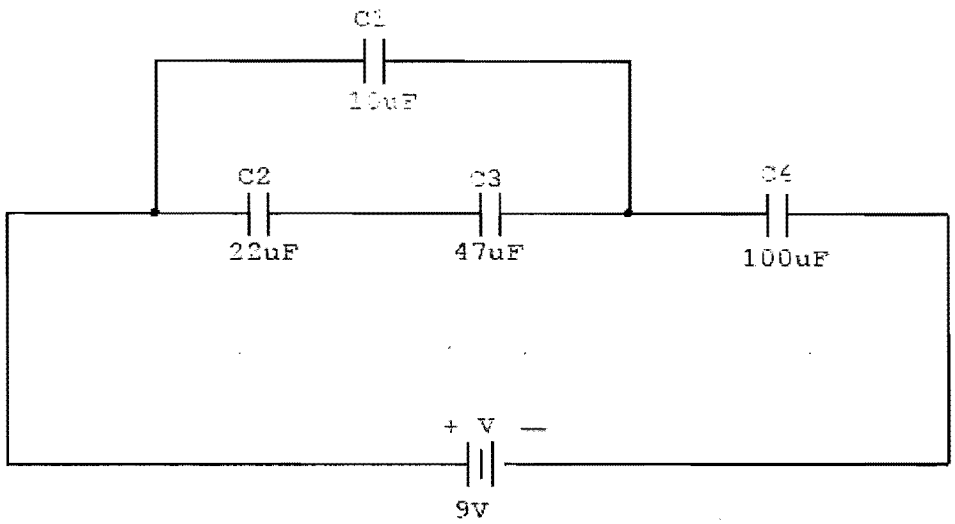
6. Explain the following terms:
   a) Self-inductance (1 mark)
   b) Mutual inductance (1 mark)
   c) Autotransformer (1 mark)
   d) Toroidal transformer (1 mark)
   e) Air core transformer (1 mark)
   f) Atomic structure (1 mark)
   g) Rectification process (1 mark)

7. The static error is defined as the difference between the true value of the variable and the value indicated by the instrument. State two reasons by which static errors may arise. (2 marks)

8. Describe the basic operation principles of electronic instruments? (2 marks)

SECTION E [30 MARKS]

1. For the circuit shown below, calculate the following:
   a) total capacitance of the circuit (4 marks)
   b) the total charge of the circuit (2 marks)



2. Three resistors of 10 Ω, 12 Ω and 15 Ω are connected in series to a generator. If the current flowing is 3A. Calculate:
   a) the generator voltage (1 mark)
   b) the total power consumed by the circuit (2 marks)
   c) the total resistance (2 marks)

3. Determine the values and tolerance range of given resistors:
   a) yellow, violet, gold, silver (1 mark)
   b) brown, black, black, silver (1 mark)

4. How much current flows in a 100 Ω resistor if there's 25V across the resistor? (1 mark)

5. State Ohm's law? (2 marks)

6. List down three precautions that a person should take when working with electricity. (1.5 marks)

7. Explain the two effects of electricity. (2 marks)

8. Draw the circuit diagram of a single phase half wave rectifier circuit. (3 marks)

9. The three terminal regulators are very simple to use and require only connection of the three terminals. Explain the three terminals of the IC voltage regulator. (3 marks)

10. Determine the maximum Zener current for a 6.3V,400mW Zener diode. (2 marks)

11. Draw the block diagram of the basic d.c. power supply. (2.5 marks)

.....End of Examination Paper.....