

KATHMANDU UNIVERSITY
End Semester Examination [C]
January 2025

Marks Scored:

Level : B.E.

Year : I

Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : EEG 103

Semester : II

F. M. : 10

Date : 12 JAN 2025

SECTION "A"

[20Q. \times 0.5 = 10 marks]

Choose and encircle the most appropriate answer. Symbols have their usual meanings.

- Which of the following elements of electrical engineering cannot be analyzed using Ohm's law?
a. Capacitors b. Inductors c. Transistors d. Resistance
- Which of the following according to fundamentals of electrical energy is incorrect about alternating current?
a. Frequency is zero
b. Magnitude changes with time
c. Can be transported to larger distances with less loss in power
d. Flows in both directions
- The minimum requirements for causing flow of current are:
a. A voltage source, a resistor and a switch
b. A voltages source and a conductor
c. A power source and a bulb
d. A voltage source, a conductor, an ammeter and a switch
- Electric pressure is also called:
a. Current b. Power c. Resistance d. Voltage
- The condition for the validity of Ohm's law is that the:
a. Temperature should remain constant b. Current should be proportional to voltage
c. Resistance must be wire wound type d. Applicable in non-linear circuits only
- When an alternating current passes through an ohmic resistance the electrical power converted into heat is:
a. Apparent power b. True power c. Reactive power
- A open switch has a resistance of:
a. 0 b. around 50-ohm
c. around 500-ohm d. Infinity
- A network consists of linear resistors and ideal voltage source. If the value of the resistors are doubled then voltage across each resistor is:
a. Halved b. Doubled
c. Increased four lines d. Not changed

9. The average value of sinusoidal waveform over one complete cycle if peak voltage is V is:
 a. $V/2$ b. V c. 0 d. $V/\sqrt{2}$
10. What is the working principle of a Transformer?
 a. Transformer works on the principle of mutual induction
 b. Transformer works on the principle of self induction
 c. Transformer works on the principle of ampere law
 d. Transformer works on the principle of coulomb law
11. The direction of induced current for a generator when a conductor attached to a circuit moves in a magnetic field is given by _____
12. How is the resistance of semiconductor classified?
 a. High resistance b. Positive temperature co-efficient
 c. Negative temperature co-efficient d. Low resistance
13. What type of material is obtained when an intrinsic semiconductor is doped with pentavalent impurity?
 a. Extrinsic semiconductor b. N-type semiconductor
 c. P-type semiconductor d. Insulator
14. Which of the following is the main application of Zener diode?
 a. Amplifier b. Multivibrator c. Voltage Regulator d. Rectifier
15. Part of a transistor is heavily doped and emits majority carriers, either electrons or hole is _____.
16. Which gate is known as the universal gate?
 a. NAND b. OR c. AND d. NOT
17. How many AND gates are required to realize $Y = CD + EF + G$?
 a. 4 b. 3 c. 2 d. 5
18. Variation of sensor measurements when the same quantity is measured several times is termed as:
 a. accuracy b. precision c. errors d. reproducibility
19. An ammeter is connected in _____ with the circuit and voltmeter is connected in _____ with the circuit.
 a. Series, Parallel b. Parallel, Series
20. What of the statement is false about data logger:
 a. It is located either with a built-in instrument or sensor via external instruments and sensors.
 b. They do not store data.
 c. Digital processor
 d. They generally are small, battery powered, portable, and equipped with a microprocessor

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End Semester Examination [C]

January 2025

12 JAN 2025

Level : B.E.
Year : I
Time : 2 hrs. 30 mins.

Course : EEG 103
Semester : II
F. M. : 40

SECTION "B"
[5Q. × 8 = 40 marks]

Attempt ALL questions. Missing data may be suitably assumed. Each symbol carries their usual meaning.

1. a. Explain Ohm law with its limitations. A 2-hp motor operates at an efficiency of 75%. What is the power input in watts? If the applied voltage is 220 V, what is the input current? [2+2]
- b. For the circuit of Fig. 1: [4]
- Find R_T .
 - Find I .
 - Find V_1 and V_2 .
 - Find the power to the 4-ohm and 6-ohm resistors.
 - Find the power delivered by the battery, and compare it to that dissipated by the 4-ohm and 6-ohm resistors combined.

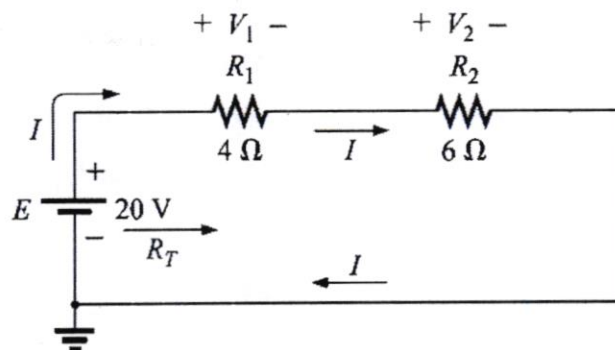


Figure 1

2. a. Explain the application of BJT as switch. [2]
- b. Mention the operation of MOSFET. Also, write a few of its applications. [3]
- c. Find the min term of: $F = A'B'C + AB'C' + ABC' + AB'C$. Also draw simplified logic diagram. [3]
- d. Construct truth table and write Boolean expression for XOR and NAND gate. [2]

P.T.O.

3. a. What are the average and rms values of the square wave of Fig. 2. [2]

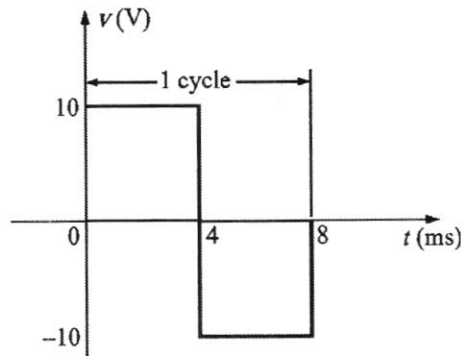


Figure 2

- b. Find the total number of watts, volt-amperes reactive, and volt-amperes, and the power factor F_p for the network of Fig. 3. [4]

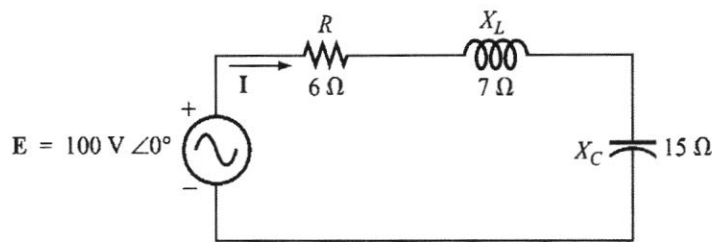


Figure 3

- c. Explain the types of practical transformers. [2]
 d. Mentioning a few applications, explain the working principle of AC generator. [3]
4. a. Explain the use of diode in full wave rectifier. [2]

OR

Explain the use of Zener diode as voltage regulator.

- b. Explain the VI characteristics of PN junction diode. Determine V_o for the circuit in figure 4. [3+2]

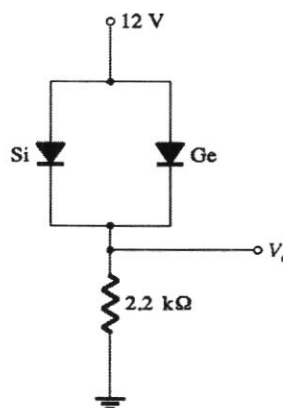


Figure 4

5. a. Construct ammeter using Galvanometer and suitable resistor. [2]
 b. Explain data acquisition with its components. [2]