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**Presidency University Bengaluru**

**SCHOOL OF ENGINEERING**

**MAKE-UP Examination – SEP 2023**

**Course Code**: ECE101

**Course Name**: EOE

**Program & Sem**: B.Tech, & 2ND

**Date**: 04.10.2023

**Time**: 9:30 AM to 12.30 PM

**Max Marks**: 100

**Weightage**: 50%

**Instructions:**

1. *Read the question properly and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and Non-programmable calculators are permitted.*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries 2 marks. (15Qx2M=30 M)**

1. The cut in voltage of ideal diode is 0. The resistance offered by ideal diode in forward bias is zero and in reverse bias is infinity. Hence conduction is possible in forward bias only. What is the value of reverse current for an ideal diode?

A) 0 B) 1 C) infinity D) None

(CO NO: 1) [Knowledge]

1. Ohm’s Law allows to determine characteristics of a circuit, such as how much current is flowing through it, if voltage of the battery in the circuit is known and how much resistance is in the circuit. State ohms law and write the equation.

A) R=VI B) I=VR C) V=IR D) None

(CO NO: 1) [Knowledge]

1. In Kirchhoff’s Voltage Law voltage drop is encountered when current flows in an element (resistance or load) from the higher-potential terminal toward the lower potential terminal. Voltage rise is encountered when current flows into an element (voltage source) from lower potential terminal (or negative terminal of voltage source) toward the higher potential terminal (or positive terminal of voltage source). What is Kirchhoff’s Voltage Law?

A) Algebraic sum of currents in a closed circuit is zero.

B) Algebraic sum of voltages in a closed circuit is zero.

C) Algebraic sum of voltages in an open circuit is zero.

D) None

(CO NO: 1) [Knowledge]

1. If elements with 5 valence electrons like phosphorus, arsenic, etc. are added to a pure semiconductor, then it becomes N type material and if elements with 3 valence electrons like boron, aluminum, etc. are added then it becomes P type material. Define Doping?

A) Adding Germanium. B) Adding Silicon C) Adding impurities D) None

(CO NO: 1) [Knowledge]

1. A p-n junction diode is two-terminal semiconductor device which allows the electric current in only one direction while blocks the electric current in opposite or reverse direction. If the diode is forward biased, it allows the electric current flow. On the other hand, if the diode is reverse biased, it blocks the electric current flow. P-N junction semiconductor diode is also called as p-n junction semiconductor device. Write the current equation for PN Diode?

A)

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B) Id=Is/Vd C) IS=Id/Vd D) None

(CO NO: 1) [Knowledge]

1. A Transistor transfers a signal from a low resistance to high resistance. A Transistor consists of two pn junctions formed by sandwiching either p-type or n type semiconductor between a pair of opposite types. In how many ways a transistor can be connected and what are they?

A) Active, Cutoff, Saturation. B) FB, RB C) CB, CE, CC D) None

(CO NO: 2) [Knowledge]

1. The transistor has two PN junctions. The junction between emitter and base may be called emitter-base diode. The junction between the base and collector may be called collector-base diode. What are the different regions present in transistor operation?

A) Active, Cutoff, Saturation. B) FB, RB C) CB, CE, CC D) None

(CO NO: 2) [Knowledge]

1. Rectification is the process of converting A.C. components into D.C components. Rectifier is a device that converts A.C. voltage into pulsating D.C. voltage. Rectifiers can be classified into three types: Half-wave rectifier, Full-wave rectifier and Bridge rectifier. What is the efficiency of full wave rectifier?

A) 10%. B) 81% C) 23% D) None

(CO NO: 2) [Knowledge]

1. There are three major components used in the circuit of rectifiers such as, transformer, diode and load resistor. The D.C. output of half-wave rectifier is discrete where as full-wave rectifier is continuous. The D.C. output of full-wave rectifier and bridge rectifier is same. Write the equation for average output current of a half wave rectifier?

A) B) Idc=Im/2 C) Idc=Im/10 D) None

(CO NO: 2) [Knowledge]

1. A transistor can be connected in a circuit in the following three ways, common base connection, common emitter connection, common collector connection. What is the input and output terminal of CE configuration?

A) Base and collector B) Collector and Base C) Emitter and Base D) None

(CO NO: 2) [Knowledge]

1. Compliments are used in digital computers to simplify subtraction operation and for logic manipulation. The complement is used for representing the negative decimal number in binary form. Different types of complement are possible in different radix system. What is the 1’s compliment of 10101010.
2. 11001100 B) 00110011 C) 01010101 D) None

(CO NO: 3) [Knowledge]

1. A logic gate is an idealized model of computation or physical electronic device implementing a Boolean function, a logical operation performed on one or more binary inputs that produces a single binary output. Name the gate for which output is 1 only if all inputs are 1.
2. OR B) AND C) NAND D) NOR

(CO NO: 3) [Knowledge]

1. A communication system serves to communicate a message or information. This information originates in the information source and hence the function of information source is to produce required message which has to be transmitted. Device which converts one form of energy in to another is called
2. Rectifier B)Converter C)Transducer D)None

(CO NO: 3) [Knowledge]

1. The process of changing some characteristics of a carrier wave in accordance with the intensity of the signal is known as modulation. The resultant wave is called modulated wave. What is the range of audio frequencies?
2. 20 Hz to 20 KHz B)20 kHz to 20 MHz C)20 Mhz to 2 GHz 4)None

(CO NO: 4) [Knowledge]

1. Accumulator is a register used to store the result of an operation. It is identified as register A. It also works as a via register for I/O accesses i.e. it reads data from input device and similarly can transfer data to output device. What is the length of the accumulator?
2. 12 bit B)8 bit C)16 bit D) None

(CO NO: 4) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries 10 marks. (3Qx10M=30 M)**

16)

i) In Kirchhoff’s Voltage Law voltage drop is encountered when current flows in an element (resistance or load) from the higher-potential terminal toward the lower potential terminal. Voltage rise is encountered when current flows into an element (voltage source) from lower potential terminal (or negative terminal of voltage source) toward the higher potential terminal (or positive terminal of voltage source).

For the circuit shown in figure, based on KVL Principle Which of the following conditions are correct and why?

Condition 1: V=V1=V2=V3

Condition 2: V>V1 >V2 >V3

Condition 3: I=I1=I2=I3

Condition 4: I=I1+I2+I3



ii) There are many different types of **Resistor** available which can be used in both electrical and electronic circuits to control the flow of current or to produce a voltage drop in many different ways. But in order to do this the actual resistor needs to have some form of “resistive” or “resistance” value. Resistors are available in a range of different resistance values from fractions of an Ohm ( Ω ) to millions of Ohms. The resistor colour code markings are always read one band at a time starting from the left to the right, with the larger width tolerance band oriented to the right side indicating its tolerance. By matching the colour of the first band with its associated number in the digit column of the colour chart below the first digit is identified and this represents the first digit of the resistance value.

A resistor is marked as follows: 1st band Brown 2nd band Red 3rd band green 4th band silver. What is its resistance and between what values does it lie? What is the significance of 4th band? (5M)

(CO NO: 1) [Comprehension]

17)

i) The transistor has three regions, namely; emitter, base and collector. The emitter is heavily doped so that it can inject a large number of charge carriers (electrons or holes) into the base. The base is lightly doped and very thin; it passes most of the emitted charge carriers to the collector. The collector is moderately doped and wider than emitter. In the symbol of npn transistor the arrow in the emitter terminal is pointing outside the device. What is the significance of arrow and the direction of arrow in emitter terminal of npn transistor?

ii) In each type of transistor there are two pn junctions. Therefore, a transistor may be regarded as a combination of two diodes connected back to back. There are three terminals, one taken from each type of semiconductor. The middle section is a very thin layer. The transistor can act as switch or inverter and amplifier. What is current amplification factor for CE configuration and how it can be calculated?

(CO NO: 2) [Comprehension]

18) A system which transmits information from one point another point is known as

Communication system. A communication system serves to communicate a message or information. “The process of changing some characteristic (e.g. amplitude, frequency or phase) of a carrier Wave in accordance with the intensity of the signal is known as modulation”. How communication of information is possible through a system? Explain with block diagram?

(CO NO: 3) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer all the Questions. Each question carries 10 marks. (4Qx10M=40 M)**

19)

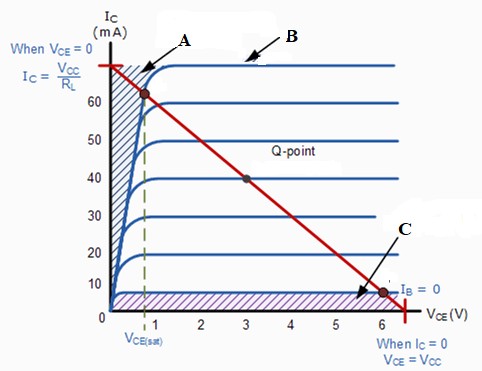
1. A Transformer is a static device which transfers energy from primary winding to secondary winding through mutual induction principle, without changing the frequency. If n1 and n2 are the turns in primary and secondary then what will be the relation between primary voltage and secondary voltage. Identify and Calculate the unknown value if v1=230v n1=10 n2=20 and frequency=50Hz.

1. KCL states that the total current entering a junction or a node is equal to the current leaving the node making net current is zero. KCL can be used to calculate the total charge accumulated in different nodes in any circuit. In the circuit shown calculate I2, I3.



(CO NO: 1 ) [Comprehension]

20) Transistor is current controlled device which can be used for amplification, oscillation and other applications. It has three terminals emitter, base and collector. Output characteristics is the plot of Output current V/s Output voltage when input current is constant. The plot of output characteristics is shown below in figure: With reference to figure, answer the following questions:



* + 1. Identify the transistor configuration from the above Plot.
    2. Identify the region marked as A, B and C:
    3. If in region A: Both Junctions are Forward Biased, then in region C:
    4. The coordinates of D.C. Load line are given as:

[1M+2M+1M+1M=5M](C.O.No.2) [Comprehension]

21) Perform the following operations. Each Question carries 1 Mark.

a. Convert (AB)16 = ( …. ) 10

b. Convert (187)10 = ( ….. ) 2

c. Convert (01110010) 2 = ( …… ) 16

d. 1’s Complement of ( 110011)2 is = …..

e. Convert (1111)2 to (………)10

f. Convert (43)10 = ( ? ) 16

g. Convert (105)10 = ( ? ) 2

h. Convert ( 0 0 1 0 1 0 1 0 1 0 ) 2 =

i. 2’s Complement of ( 010101)2 is

j. 2’s Complement of ( 1 0 1 0 1 ) 2 is

(CO NO: 3) [Comprehension]

22) A microprocessor is a controlling unit of a micro-computer, fabricated on a small chip capable of performing Arithmetic Logical Unit (ALU) operations and communicating with the other devices connected to it. 8086 is an 16-bit microprocessor designed by Intel in 1977 using NMOS technology.

The architecture of 8086 microprocessor provides the idea about what are the operations to be executed and how these are performed like Storing data, executing arithmetic and logic operations and also instructions.

1. Draw the neat Sketch of 8086 Microprocessor?
2. Identify and Differentiate between the General Purpose and Special Purpose registers available in 8086 Microprocessor?
3. List some real time applications of Microprocessor?

(CO NO: 4) [Comprehension]