Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Make Up Examinations – December 2025

Date: 26 – 12- 2025 **Time:** 1.00pm to 04.00pm

School: SOE	**Program:** B.Tech	
Course Code : EEE1007	**Course Name :** Basics of Electrical and Electronics Engineering	
Semester: MK	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks					

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1	Circuit elements can be defined as the simplest building blocks of an electrical circuit that control or influence the electric current.. Linear Elements and Non-linear Elements.	**2 Marks**	**L**	**CO1**
2	A German physicist Gustav Kirchhoff developed two laws enabling easy analysis of interconnection of any number of circuit elements. Define kirchoff voltage law.	**2 Marks**	**L**	**CO1**
3	What is static (DC) and dynamic resistance of a Diode?	**2 Marks**	**L**	**CO2**
4	Draw the VI characteristic of diode and define parameters in forward and reverse bias.	**2 Marks**	**L**	**CO2**
5	A transformer is a passive component that transfers electrical energy from one electrical circuit to another circuit, or multiple circuits. List various types of transformer based on construction.	**2 Marks**	**L**	**CO3**

6	The transformer is basically a voltage control device that is used widely in the distribution and transmission of alternating current power. A single phase, 50 Hz transformer has a turns ratio of 2 and 30 turns in the primary winding then find the number of turns in the secondary winding.	**2 Marks**	**L**	**CO3**
7	Write the EMF equation of a single-phase transformer	**2 Marks**	**L**	**CO3**
8	What is the significant difference between the construction of an enhancement type MOSFET and a depletion type MOSFET?	**2 Marks**	**L**	**CO4**
9	Write down the formula for drain current and explain each parameter. In which region does a transistor act as an amplifier? What is the function of the base in a transistor?	**2 Marks**	**L**	**CO4**
10	Explain the current gain in the Common Base (CB) and Common Emitter (CE) configuration of a BJT.	**2 Marks**	**L**	**CO4**

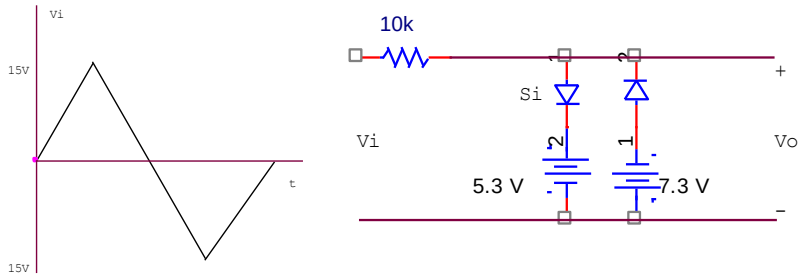
Part B

Answer the Questions **Total 80 Marks**

11.	**a.**	Center for Nanofabrication facility at IIT Bombay is planning to fabricate a pn-junction diode. To help them understand, draw the schematic of the pn-junction diode labelling each region. Explain the process that a pn-junction diode undergoes if it is connected in forward bias and reverse bias mentioning all key phenomenon that takes place.	**10 (5+5) Marks**	**L**	**CO 2**
	b	A diode is an electrical component that is used to facilitate the flow of electrical currents in one direction. When a reverse bias is applied to a germanium PN junction diode, the reverse saturation current at room temperature is 0.3μA. Determine the current flowing in the diode when 0.15V forward bias is applied at room temperature.			

or

12.	**a.**	A clipping circuit consists of linear elements like resistors and non-linear elements like diodes or transistors, but it does not contain energy-storage elements like capacitors. Draw the output waveform for clipper circuit.	**10 (5+5) Marks**	**L**	**CO 2**

		(Given Input Voltage Vi= ±15V, Diode Si Type) 			
	b.	A rectifier is a device that converts alternate current to direct current using one or more contact diodes. What is the need of converting AC into DC supply? Draw the circuit diagram of half wave rectifier with relevant input and output waveforms			

13.	**a.**	Zener diode is a special type of diode designed to reliably allow current to flow "backwards" (inverted polarity) when a certain set reverse voltage, known as the Zener voltage, is reached. Explain the V-I characteristics of a Zener diode with a neat diagram. Discuss the breakdown mechanism in Zener diodes.	**10 (5+5) Marks**	**L**	**CO 2**
	b	Zener diode is like an ordinary P-N junction diode except that it is properly doped so as to have a sharp breakdown voltage. Compare avalanche and zener break down in diode.			

or

14.	**a.**	The MOSFET transistor has become one of the most important devices used in the design and construction of integrated circuits for digital computers. Explain the working of the n-channel depletion type MOSFET with diagrams and plot the drain and transfer charateristics.	**10 Marks**	**L**	**CO 4**

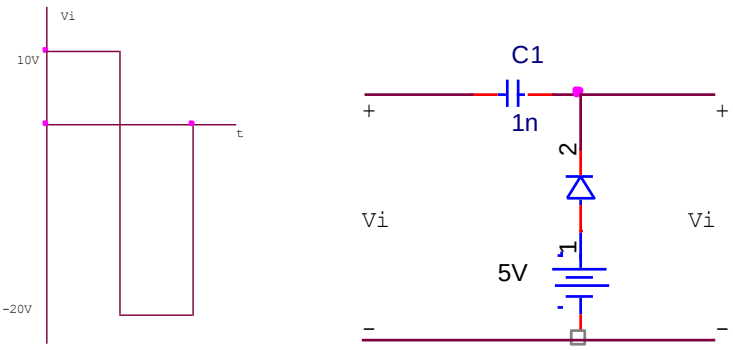
15.	**a.**	The resistor in an RLC circuit plays a similar role to friction in a mechanical system, increasing the decay of oscillations and reducing the peak resonant frequency. With the help of phasor diagram, in a series RLC circuit, obtain the relationship of voltage and current. Show the performance of power factor using impedance angle.	**10 Marks**	**L**	**CO 1**

Or

16.	**a.**	An AC circuit is an electrical circuit where the voltage and current regularly change their magnitude and direction over time. A circuit consists of a resistance of 10 Ω, an inductance of 16 mH and a capacitance of 150 μF in series. A supply of 100 V at 50 Hz is applied across the circuit. Find the power consumed by the circuit. Draw the vector diagram.	**10 Marks**	**L**	**CO 1**

17.	**a.**	When only one transistor associated with the circuit is used for amplification of a weak signal, the circuit is known as a single-stage amplifier. Draw the single stage amplifier circuit and draw with input and output signal, its advantages.	**15 (10+5) Marks**	**L**	**CO4**
	b.	The output current (I_D) of a JFET depends on applied input voltage between gate to source terminal. Express the output current (I_D) as a function of input voltage (V_GS). Draw the transfer and drain characteristics for a n-channel J FET and label the operating region in the curve properly.			

Or

18.	**a.**	A clamper is an electronic circuit that fixes either the positive or the negative peak excursions of a signal to a defined voltage by adding a variable positive or negative DC voltage to it. Draw the output wavefrom for the clamper circuit. (Given +Vi= +10V, =Vi= -20V, Ideal Diode) 	**15 (10+5) Marks**	**L**	**CO2**
	b	A full wave rectifier is defined as a rectifier that converts the complete cycle of alternating current into pulsating DC. Illustrate working of centre-tapped full wave rectifier with proper circuit diagram showing all the intermediate circuits for positive half and negative half cycle of the input signal. Also show input-output waveform			

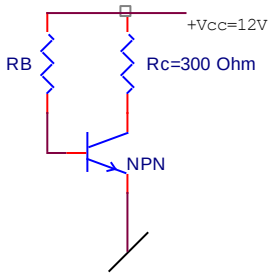
19.	**a.**	The EMF equation of transformer provides a theoretical basis to determine the magnitude of electromotive force or voltage induced in the windings of a transformer. Explain the EMF equation of Transformer. Also Explain the impact of hysteresis and eddy current losses on transformer efficiency. How can these losses be minimized?	**15(10+5) Marks**	**L**	**CO3**
	b	A 3-phase induction motor is a device that does electromechanical energy conversion. It converts three-phase electrical power input into mechanical power output. Explain the construction of 3 phase induction motors.			

Or

20.	**a.**	A DC motor is an electrical motor that uses direct current (DC) to produce mechanical force. The most common types rely on magnetic forces produced by currents in the coils. What is a DC motor? Explain its working principle.	**15 Marks**	**L**	**CO3**
	B.	A DC motor is an electrical machine that converts electrical energy into mechanical energy. Explain the relationship between the armature current and the torque produced by a DC motor			

21.	**a.**	A single phase transformer is defined as a device that operates on single-phase power to transfer electrical energy between circuits via electromagnetic induction. Explain construction and working of a single-phase transformer with proper diagram.	**20 Marks**	**L**	**CO 3**
	b.	A single phase transformer is a high-efficiency piece of electrical equipment, and its losses are very low because there isn't any mechanical friction involved in its operation. Compare core type and shell type transformer with proper diagram.			

Or

22.	**a.**	Bias voltage in a transistor circuit forces the transistor to operate at a different level of collector current with zero input signal voltage than it would without that bias voltage. A fixed bias circuit has I_B=0.3mA with β=100. Assume V_{BE}=0. Determine **(i)** Value of base resistor R_B **(ii)** voltage between collector & emitter. (Given +V_{CC} = 12V, R_C=300 Ohm, β=100) 	**20 Marks**	**L**	**CO 4**
	b.	BJTs are used to amplify current, using a small base current to control a large current between the collector and the emitter. Draw and explain the Input and output characteristics of Common Emitter Configuration			
	c.	A Bipolar Junction Transistor (BJT) is a three-terminal semiconductor device that amplifies and switches electrical signals. It is composed of two back-to-back p-n junctions and can provide voltage and/or current gain. Prove the relation between α and β. A transistor connected in the common base configuration, α=0.95, I_E =1 mA . Calculate the values of IC and IB and β.			