SRM VALLIAMMAI ENGINEERING COLLEGE

(Autonomous)

SRM Nagar, Kattankulathur -603203.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

I SEMESTER

1901107 - BASIC ELECTRICAL AND ELECTRONICS FOR AGRICULTURE ENGINEERING

Regulation–2019

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SUBJECT : 1901107 - BASIC ELECTRICAL AND ELECTRONICS FOR AGRICULTURE ENGINEERING

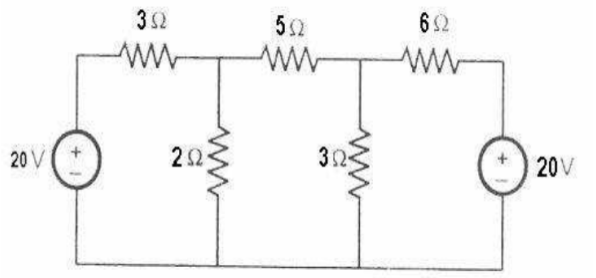
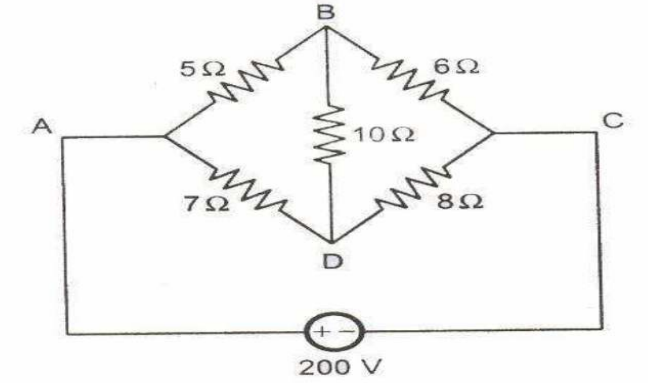
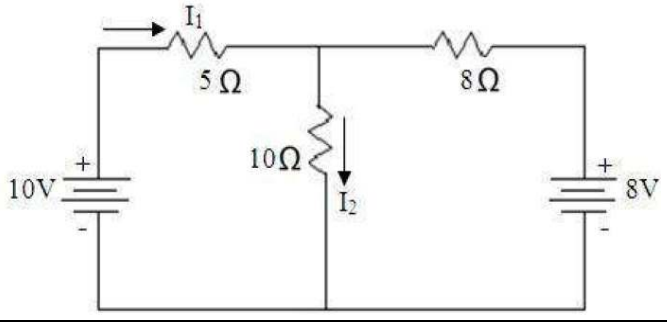
SEM / YEAR: I / 2022 - 23 (ODD)

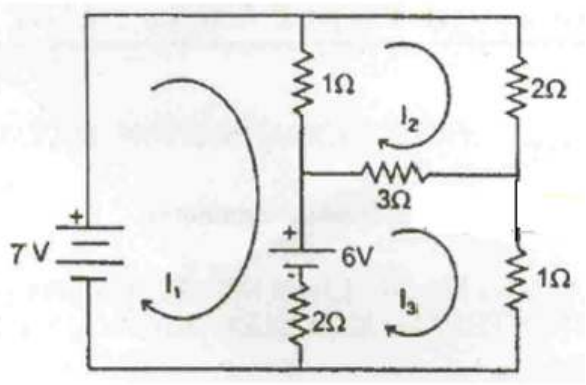
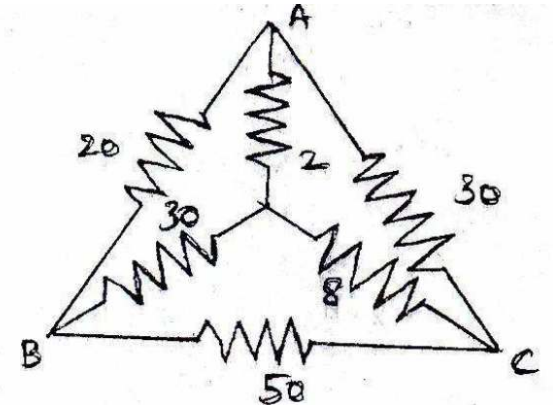
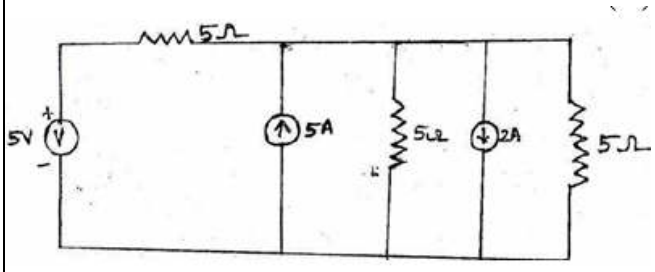
UNIT I - ELECTRICAL CIRCUITS

Fundamental laws of electric circuits – Steady State Solution of DC Circuits – Introduction to AC Circuits – Sinusoidal steady state analysis – Power and Power factor – Single Phase and Three Phase Balanced Circuits - Three phase loads - Materials of wiring, Housing wiring, Industrial wiring.

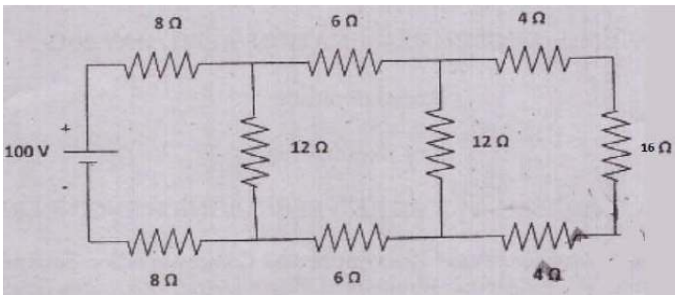
PART – A

Q.No	Questions	BT Level	Competence
1.	Illustrate Ohm's law.	BTL 3	Apply
2.	Illustrate Kirchhoff's laws.	BTL 3	Apply
3.	Define the following terms Active & Passive elements with suitable example for each.	BTL 1	Remember
4.	Distinguish Loop and Mesh analysis.	BTL 2	Understand
5.	Two resistances of 4Ω and 6Ω are connected in parallel across 10V battery. Calculate the current through 6Ω resistance.	BTL 3	Apply
6.	When a resistor is placed across the 415V supply, the current is 36A. What is the value of resistor that must be placed in parallel to increase the load to 40A?	BTL 1	Remember
7.	Define (i) Average value (ii) Effective (or) RMS value of an AC voltage signal.	BTL 1	Remember
8.	Express the following terms (i) Amplitude (ii) Phase angle with suitable expression.	BTL 2	Understand
9.	Define the terms (i) Form Factor (ii) Peak Factor.	BTL 1	Remember
10.	Distinguish between balanced and unbalanced loads.	BTL 4	Analyze
11.	Why is the neutral of the supply earthed?	BTL 4	Analyze
12.	Define (i) Apparent Power (ii) power factor.	BTL 1	Remember
13.	Explain the following terms Real (or) True (or) Average Power, Reactive Power and Apparent (or) Total Power.	BTL 4	Analyze
14.	Summarize the advantages of 3 phase circuits over single phase circuits.	BTL 5	Evaluate
15.	Compose the circuit diagram and explain the balanced load in 3-phase circuit.	BTL 6	Create
16.	Explain the term phasor and Phase angle.	BTL 5	Evaluate

17.	State the relationship between line voltage & phase voltage and line current & phase current of a 3 phase star connected system	BTL 6	Create
18.	Draw the wiring diagram for controlling one lamp from two different places.	BTL 2	Understand
19.	Compose the circuit diagram and explain the balanced load in 3-phase circuit.	BTL 1	Remember
20.	Summarize the advantages of 3 phase circuits over single phase circuits.	BTL 2	Understand
21.	What is house wiring?	BTL 1	Remember
22.	Give the type of wire is used in a house?	BTL 2	Understand
23.	Explain the industrial wiring?	BTL 5	Evaluate
24.	List out the materials used for wiring?	BTL 1	Remember
	PART – B		
1.	Find the current through 5 ohm resistance using mesh current analysis. **(13)** 	BTL 4	Analyze
2.	Find the current through 10-ohm resistance using mesh current analysis. **(13)** 	BTL 4	Analyze
3.	a) Figure shows a two D.C source network, the branch current I_1 and I_2 are marked in it. By using Kirchhoff's law, calculate and examine the current I_1. **(07)** 	BTL 4	Analyze

	(b) A series circuit has R=10Ω, L=50mH and C=100μF and is applied with 200V, 50 Hz. Find and examine the value of: (1) Impedance (2) Current (3) Power (4) Power factor (5) Phase angle (6) Voltage drop across each element. **(6)**		
4.	Use mesh analysis to determine the three mesh currents in the circuit shown below. **(13)** 	BTL 3	Apply
5.	Find the Effective resistance across the terminal A & B. **(13)** 	BTL 1	Remember
6.	(a) Derive the expression for RMS and Average value of an alternating quantity (a sine wave). **(4)** (b) Compare series and parallel circuit. **(5)** (c) Three inductive coils each with resistance of 15Ω and an inductance of 0.03H are connected in star to a 3 phase 400V, 50Hz supply. Calculate the phase voltage. **(4)**	BTL 4	Analyze
7.	Explain about Star and Delta connected three phase balanced circuits. **(13)**	BTL 1	Remember
8.	Find the total Current and total Resistance in the circuit given. **(13)** 	BTL 2	Understand
9.	A three phase, balanced delta connected load of (4+j8) Ω,		

	3- φ balanced supply. **(i)** Determine the phase currents and line currents; assume the phase sequence to be RYB. **(7)** **(ii)** Calculate the power drawn by the source. **(6)**	BTL 1 BTL 1	Remember
10.	A balanced star connected load having an impedance (15+j20) Ω per phase is connected to a three phase 440V, 50 Hz supply. Find **(i)** The line currents and **(7)** **(ii)** The power absorbed by the load. **(6)**	BTL 2	Understand
11.	**(i)** Explain with a neat sketch the staircase wiring method. **(7)** **(ii)**Explain how wiring is carried out in it industry with its Layout. **(6)**	BTL 2 BTL 2	Understand
12.	**(i)** Discuss the safety measures used in a domestic wiring. **(7)** **(ii)** Discuss the materials used for wiring. **(6)**	BTL 6	Create
13.	Obtain expression for power and power factor for three phase AC delta connected balanced load circuit. **(13)**	BTL 1	Remember
14.	An unbalanced four wire star connected load has a balanced voltage of 400V, the loads are Z_1=(4+j8)Ω, Z_2=(3+j4) and Z_3=(15+j20)Ω. Calculate the **(i)** Line currents **(5)** **(ii)** Currents in the neutral wire and **(5)** **(iii)** Total power. **(3)**	BTL 5	Evaluate
15.	Explain the various methods of electrical wiring system. **(13)**	BTL 1	Remember
16.	Explain the various methods of electrical wiring system. **(13)**	BTL 1	Remember
17.	Explain the following (i) Parallel wiring **(6)** (ii) Series wiring **(7)**	BTL 5	Evaluate
	PART C		
1	Obtain expression for power and power factor for three phase AC star connected balanced load circuit. **(15)**	BTL 6	Create
2	Three impedances Z_1=20∟30^{0}Ω, Z_2=40∟60^0 and Z_3=10∟-90^{0}Ω are delta connected to a 400V 3φ system as shown below. Determine the **(i)** Phase currents **(5)** **(ii)** Line currents and **(5)** **(iii)** Total power consumed by the load. **(5)**	BTL 6	Create
3	A balanced three phase load consists of three coils, each of résistance 8 ohms and inductive reactance of 10 ohm. Determine the line current and power absorbed when the coils are star connected, delta connected across 400 V , three phase supply. **(15)**	BTL 5	Evaluate
4	**(i)**A delta connected balanced load is supplied from 3 phase 400V supply. The line current is 20 A, total power taken by load is 10,000. Examine the impedance in each branch, the	BTL 5	Evaluate

	line current, power factor and total power consumption. **(7)** **(ii)**Unbalanced four wire star connected load has balanced supply voltage of 400V. The load impedances are ZR=(4+j8) Ω, ZY=(3+j4)Ω,ZB=(15++j10)Ω. Examine the line currents, neutral current and total power. **(8)**		
5.	Calculate (i) equivalent resistance across the terminal of the supply (ii) total current supplied by the source (iii) power delivered to 16Ω resistor in the circuit shown below **(15)** 	BTL 5	Evaluate

UNIT II - ELECTRICAL MACHINES

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single phase induction Motor.

PART – A

Q.No	Questions	BT Level	Competence
1.	List any two applications of Following DC Motors (i) DC Series Motor (ii) DC Shunt Motor.	BTL 1	Remember
2.	Define critical speed and critical resistance of a DC generator.	BTL 1	Remember
3.	Distinguish the difference between DC Motor and DC Generator.	BTL 2	Understand
4.	Explain the principle of DC Motor.	BTL 4	Analyze
5.	Define the term back EMF or Counter EMF and state its significance.	BTL 1	Remember
6.	List the different main constructional elements of DC Machine.	BTL 1	Remember
7.	Define the following terms in DC Machine (i) Commutator (ii) Brushes	BTL 1	Remember
8.	In DC Generator, 8 poles, lap wound armature rotated at 350rpm to generate 260V, the useful flux/pole is 0.05Wb. If the armature has 120 slots. Calculate the number of conductors per slot.	BTL 3	Apply
9.	Explain why DC series motor should not be started without load.	BTL 2	Understand
10.	List any two applications of Following DC Motors (i) DC Cumulative Compound Motor (ii) DC	BTL 1	Remember

	Differential Compound Motor.		
11.	Discuss the terms with appropriate formula for Faraday's law of Electromagnetic Induction and Lenz Law.	BTL 2	Understand
12.	Mention few applications of DC Generators.	BTL 2	Understand
13.	With suitable formula explain the following terms (i) Turn ratio of transformer. (ii) Voltage regulation of Transformer.	BTL 4	Analyze
14.	Explain why single phase induction motor is not self starting.	BTL 4	Analyze
15.	Discuss the terms (i) Efficiency (ii) All day efficiency of single phase transformer.	BTL 6	Create
16.	Draw the circuit diagram of single phase transformer.	BTL 3	Apply
17.	What is meant by transformer? Formulate the expression for step up and step down transformer according to transformation ratio.	BTL 6	Create
18.	Compare the following transformers (i) Core type transformer (ii) Shell type.	BTL 5	Evaluate
19.	Formulate the EMF equation for Transformer.	BTL 3	Apply
20.	In a single phase transformer, N_p= 350 turns, N_s= 1050 turns, E_p= 400V. Calculate the value of secondary voltage (E_s).	BTL 5	Evaluate
21.	List out the types of single-phase induction motors.	BTL 1	Remember
22.	List out the applications of various types of generators.	BTL 4	Analyze
23.	Give the torque equation of a DC motor.	BTL 1	Remember
24.	List out the applications of various types of synchronous motors and its applications.	BTL 1	Remember
	PART – B		
1.	With a neat sketch, explain the construction, working of DC Motor and also explain the different parts. **(13)**	BTL 4	Analyze
2.	**(i)** With a neat diagram explain the construction and working of D.C. Generator. **(8)** **(ii)** Derive the EMF equation. **(5)**	BTL 1	Remember
3.	(i) Obtain the mathematical expression for generated EMF or EMF Equation of Generator and explain each term. **(8)** (ii) Calculate the generated EMF by 4-pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm the flux per pole is 0.02Weber. **(5)**	BTL 4 BTL 3	Analyze Apply
4.	Obtain the mathematical equation for voltage or current equation and also explain for (i) DC Series Generator (ii) DC Shunt Generator (iii) DC Compound Generator with suitable diagram for each. **(13)**	BTL 5	Evaluate
5.	What is meant by DC Motor? Describe the terms such as (i) Faraday's Law of Electro Magnetic Induction (ii)	BTL 4	Analyze

	Fleming's Left-Hand rule (iii) Back or Counter emf (iv) Voltage Equation of DC Shunt Motor (v) Armature Torque of DC Motor. **(13)**		
6.	**(i)** Describe various types of self excited DC generators with their circuit layout. **(7)** **(ii)** Explain the characteristics of DC shunt motor. **(6)**	BTL 1	Remember
7.	(i) A 200V DC shunt motor takes a total current of 100A and runs at 750 rpm. The resistance of the armature winding and of shunt field winding is0.1 Ω and 40Ω respectively. Find the torque developed by the armature. **(5)** (ii) Explain the basic nature of the emf induced in the armature of a DC machine**.** **(4)** (iii)How can the alternating current waveform in the armature be converted into a DC waveform? **(4)**	BTL 3 BTL 2 BTL 2	Apply Understand Understand
8.	A 25kW, 250V, dc shunt generator has armature and field resistances of 0.06 ohm and 100 ohm respectively. Determine the total armature power developed when working (i) as a generator delivering 25 kW output and (ii) as a motor taking 25kW. **(13)**	BTL 3	Apply
9.	What is meant by Transformer? Draw the circuit diagram for Single Phase Transformer and also explain the Principle, Construction, Working of it. **(13)**	BTL 4	Analyze
10.	(i) Derive the EMF Equation of Transformer. **(7)** (ii) A single phase 2000/250 V, 50Hz transformer has the core area of 36 cm^2 and maximum flux density of 6Wb/m^2. Calculate the number of turns on primary and secondary winding. **(6)**	BTL 6 BTL 3	Create Apply
11.	Describe the following terms in single phase transformer (i) Efficiency (ii) All day efficiency (iii) Losses in transformer (iv) Regulation of Transformer. **(13)**	BTL 1	Remember
12.	(i) Distinguish the following types of transformer (i) Step up and Step down Transformer (ii) Core type or Shell type Transformer. **(8)** (ii) In core type transformer, the no load voltage is 5000/250 V, supply frequency 50Hz. Calculate the number of turns in each winding and the flux is about 0.06 Weber. **(5)**	BTL 2 BTL 3	Understand Apply
13.	i) Why do you say the single-phase Induction motor is self-starting? **(5)** ii) Describe the following types of Single-phase Induction Motor (i) Split phase Induction Motor (ii) Capacitor start type Induction Motor (iii) Shaded pole type Induction Motor. **(8)**	BTL 2 BTL 2	Understand Understand

14.	Explain the construction and working of synchronous motor. **(13)**	BTL 1	Remember
15.	How can the alternating current waveform in the armature be converted into a dc waveform in DC generators? **(13)**	BTL 2	Understand
16.	Derive the torque and speed equation of dc motor. **(13)**	BTL 1	Remember
17.	Explain the construction and working of three phase induction motor. **(13)**	BTL 1	Remember
	PART C		
1.	Draw the different characteristics of DC machine and explain them in detail. **(15)**	BTL 6	Create
2.	Formulate the expression for speed and draw the following characteristics of DC motor **(i)** Speed vs Armature current **(ii)** Speed vs torque **(15)**	BTL 6	Create
3.	Initially a D.C shunt motor having ra = 0.5 Ω and Rf = 220 Ω is running at 1000 rpm drawing 20 A from 220 V supply. If the field resistance is increased by 5%, calculate the new steady state armature current and speed of the motor. Assume the load torque to be constant. **(15)**	BTL 5	Evaluate
4	A 220 V DC series motor has armature and field resistances of 0.15Ω and 0.10 Ω respectively. It takes a current of 30 A from the supply while running at 1000 rpm. If an external resistance of 1 Ω is inserted in series with the motor, calculate the new steady state armature current and the speed. Assume the load torque i s proportional to the square of the speed i.e., TL ∝ n 2. **(15)**	BTL 5	Evaluate
5.	Discuss why starter is required for the dc motor and explain how it is working for the dc motors. **(15)**	BTL 5	Evaluate

UNIT III - SEMICONDUCTOR DEVICES AND APPLICATIONS

Introduction - Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

PART – A

Q.No	Questions	BT Level	Competence
1.	What is meant by Semiconductors? Also explain (i) n-type Semiconductor (ii) p-type semiconductor.	BTL 4	Analyze
2.	Distinguish the following semiconductors (i) Intrinsic or pure Semi Conductor (ii) Extrinsic or impure Semi conductor.	BTL 2	Understand
3.	Compare PN junction diode and Zener diode with symbolic representation.	BTL 4	Analyze
4.	Draw the V-I characteristics of PN-Junction diode.	BTL 3	Apply

5.	Draw the structure with symbolic representation of NPN and PNP Transistor.	BTL 3	Apply
6.	Define Knee voltage or Junction barrier voltage for PN Junction.	BTL 2	Understand
7.	Draw the circuit for (i) Forward Bias (ii) Reverse Bias of the PN Junction diode.	BTL 3	Apply
8.	Explain the following terms (i) Avalanche breakdown (ii) Zener breakdown of the PN junction diode.	BTL 4	Analyze
9.	Define the following terms (i) Rectifier and its types (ii) Voltage Regulation.	BTL 1	Remember
10.	What is Zener effect?	BTL 1	Remember
11.	What is doping? Also express the terms (i) Donor (ii) Acceptor.	BTL 1	Remember
12.	What is Zener diode? List its applications.	BTL 1	Remember
13.	What do you mean by biasing?	BTL 6	Create
14.	Which configuration is known as emitter follower and Why it is named so?	BTL 6	Create
15.	What is meant by Diffusion and Depletion layer?	BTL 5	Evaluate
16.	Define the terms (i) Saturation region (ii) Cut off region (iii) Break down region of a transistor in CE Configuration.	BTL 2	Understand
17.	Define Forbidden energy gap of semi conductor.	BTL 2	Understand
18.	Define Transformer Utilization Factor.	BTL 1	Remember
19.	Define α and β.	BTL 5	Evaluate
20.	Define the term Peak Inverse Voltage.	BTL 1	Remember
21.	List out the types of biasing also define biasing.	BTL 1	Remember
22.	Give the applications of Zener diode.	BTL 3	Apply
23.	List out the types of rectifiers.	BTL 1	Remember
24.	Give the reason for using filters in rectifies.	BTL 4	Analyze
	PART – B		
1.	Describe the following VI Characteristics of a PN Junction diode. (i) Forward Bias Characteristics (ii) Reverse Bias Characteristics. Also write its applications. **(13)**	BTL 1	Remember
2.	Describe the working principle of Zener diode. And explain the terms (i) Zener Breakdown (ii) Avalanche Breakdown. **(13)**	BTL 1	Remember
3.	Explain the working of PN junction diode and mention its applications. **(13)**	BTL 4	Analyze

4.	With a neat diagram explain the principle of operation, working of Full wave rectifier. And also obtain the expression for (i) RMS value of Current (ii) RMS value of Voltage (iii) Peak Inverse Voltage (PIV) (iv) Transformer Utilization Factor (TUF) (v) Efficiency (vi)	BTL 4	Analyze
5.	Explain the working of CB Configuration of NPN transistor. Also obtain the input output characteristics. **(13)**	BTL 4	Analyze
6.	Explain the performance of the transistor in three different types of configurations. **(13)**	BTL 3	Apply
7.	(i) With a neat diagram describe how a voltage regulator circuits rates the output voltage under the following conditions: (a) Load resistance increases. (b) Input voltage decreases. **(13)**	BTL 2	Understand
8.	Explain the term Bridge rectifier with suitable circuit diagram and formulate its efficiency, ripple factor, TUF and PIV. **(13)**	BTL 3	Apply
9.	(i)Explain the elementary treatment of small signal amplifier with proper design circuit. **(7)** (ii) With a neat diagram describe the construction and working principle of PN Junction diode. **(6)**	BTL 2 BTL 2	Understand Understand
10.	(i)Explain with neat diagram the construction and operation of a PNP transistor. **(8)** (ii) In a CE transistor, IB changes from 100µ A to 150µ A which causes a change in Ic 5mA to 7.5mA. If VCE is held constant at 10V, find ßdc (hfe). **(5)**	BTL 5 BTL 5	Evaluate Evaluate
11.	Explain V-I characteristics of Zener diode and applications with necessary diagram. **(13)**	BTL 2	Understand
12.	For the CE transistor configuration, draw the circuit and explain the input and output characteristics. **(13)**	BTL 6	Create
13.	Explain the working principle full wave rectifier with neat waveform. **(13)**	BTL 1	Remember
14.	Explain the various characteristics of BJT in common emitter configuration with neat diagram. **(13)**	BTL 1	Remember
15.	Compare and tabulate the different parameters in half and full wave rectifiers. **(13)**	BTL 4	Analyze
16.	With a neat diagram explain the principle of operation, working of half wave rectifier. **(13)**	BTL 1	Remember
17.	Explain the working of CC configuration of NPN transistor. And also obtain the input characteristics and Output characteristics. **(13)**	BTL 1	Remember
	PART C		
1	Develop the VI characteristics of ideal junction diode and also discuss about the diode ratings. **(15)**	BTL 5	Evaluate
2	Explain full wave controlled bridge rectifier with neat waveform. **(15)**	BTL 6	Create

3	Discuss about the working of an PNP Bipolar Junction Transistor. . **(15)**	BTL 5	Evaluate
4	Analyze how the transistor will act as a switch and as an amplifier . **(15)**	BTL 6	Create
5	Let VBB = 10V, RB = 1MΩ, β = 100, VCC = 15V, RL = 10Ω in the transistor circuit. Find I_C , I_B, I_E and V_{CE}. Neglect V_{BE}. **(15)**	BTL 5	Evaluate

UNIT IV DIGITAL ELECTRONICS

Binary Number System – Logic Gates - Boolean Algebra theorems – Digital circuits - Introduction to sequential Circuits – Flip-Flops – Registers and Counters – A/D and D/A Conversion.

PART – A

Q.No	Questions	BT Level	Competence
1.	Define Flip flop. What are the different types of flip flop?	BTL 1	Remember
2.	Which gates are called as Universal gates? What are its advantages?	BTL 1	Remember
3.	Name two types of D/ A & A/D converter.	BTL 1	Remember
4.	What is a decade counter?	BTL 1	Remember
5.	What are the basic properties of Boolean algebra?	BTL 1	Remember
6.	State and prove Distributive law.	BTL 1	Remember
7.	Demonstrate the given binary numbers in its equivalent decimal numbers with steps.	BTL 2	Understand
8.	Illustrate the excitation table of J-K flip flop.	BTL 2	Understand
9.	Give the truth table of XOR gate.	BTL 2	Understand
10.	Show the logic diagram and truth table for a half adder.	BTL 2	Understand
11.	Solve for the following binary difference: 1011010-0101110	BTL 3	Apply
12.	Identify the decimal equivalent of binary fraction 0.101	BTL 3	Apply
13.	Construct D Flip-flop from JK flip-flop.	BTL 3	Apply
14.	Distinguish between combinational logic and sequential logic.	BTL 4	Analyze
15.	Compare asynchronous and synchronous counters.	BTL 4	Analyze
16.	Construct AND and OR gates using NAND gates.	BTL 4	Analyze
17.	Prove that A + A'B = A+B	BTL 5	Evaluate
18.	Convert $(777)_8$ to decimal.	BTL 5	Evaluate
19.	State De Morgan's theorems.	BTL 6	Create
20.	Design' D' Latch using NAND gates.	BTL 6	Create
21.	List out the type of analog to digital converters.	BTL 1	Remember
22.	Convert (9B2 .1A) H to its decimal equivalent.	BTL 4	Analyze
23.	List out the types of digital to analog converters.	BTL 1	Remember

24.	What are the different number systems.	BTL 1	Remember
	PART B		
1.	**(i)** Prove the Boolean identity AB+AB'+A'B=A+B. **(4)** **(ii)** Explain the working of JK and D flip flops. **(9)**	BTL 1	Remember
2.	Write short notes on the following flip flops: **a)** RS- Flip flop. **(7)** **b)** Toggle flips flop. **(6)**	BTL 1	Remember
3.	Find the solution of following number conversion: (i) $(96.0625)_{10}$ =(?) $_2$ **(3)** (ii) $(34.67)_{10}$ =(?) $_8$ **(3)** (iii) $(1101110.110)_2$ =(?) $_{16}$ **(4)** (iv)$(257)_{10}$ =(?)$_2$ **(3)**	BTL 1	Remember
4.	(i) How can you implement XOR gate using NAND gates. **(5)** (ii) Show the operation of 4-bit synchronous UP counter with its timing diagram and its design. **(8)**	BTL 1	Remember
5.	Demonstrate the different states of SR flip flop for various input with logic diagram. Show its characteristics table. **(13)**	BTL 2	Understand
6.	Demonstrate various Boolean laws with its truth table. **(13)**	BTL 2	Understand
7.	(i) Draw the logic diagram of clocked Master – slave JK flip flop and explain its working. **(13)**	BTL 2	Understand
8.	Show how a full adder can be implemented using NAND gate. **(13)**	BTL 3	Apply
9.	Develop the following flip flops and explain its operations (i) D flip flop using NAND gates. (ii) JK flip flop using NAND gates. **(5+8)**	BTL 3	Apply
10.	Classify the types of D/A and A/D converters. Also explain the working principle of any one type in each converter. **(4+9)**	BTL 4	Analyze
11.	Show how a full adder can be implemented using NAND gate. **(13)**	BTL 4	Analyze
12.	Compare the performance features of different types of ADC and DAC. **(13)**	BTL 4	Analyze
13.	Explain the operation of successive approximation type ADC with a neat sketch. **(13)**	BTL 5	Evaluate
14.	Design a 3 bit asynchronous UP counter. **(13)**	BTL 6	Create
15.	Develop the three basic gates using universal gates. **(13)**	BTL 6	Create
16.	Draw the circuit of Binary weighted resistor Digital to analog Converter and Explain its operation. **(5)**	BTL 1	Remember
17.	Given the two binary numbers X = 1010100 and Y = 1000011, perform the subtraction (a) X -Y and (b) Y - X using 2's complements.	BTL 5	Evaluate

PART C			
1	Explain the operation of ripple counter. **(15)**	BTL 5	Evaluate
2	Develop neat diagram operation of RS flip-flop with truth table and waveforms. **(15)**	BTL 6	Create
3	Explain the basic DAC conversion technique and ADC conversion technique. **(15)**	BTL 5	Evaluate
4	Prepare neat sketch for working of binary ladder network for digital to analog conversion. **(15)**	BTL 6	Create
	(i) Given the two binary numbers X = 1010100 and Y = 1000011, perform the subtraction (a) X -Y and (b) Y - X using 1's complements. **(10)** (i) Reduce A'B'C' + A'BC' + A'BC. **(05)**	BTL 5	Evaluate

UNIT V MEASUREMENTS & INSTRUMENTATION

Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, Piezoelectric, Photoelectric, Hall effect and Mechanical. Classification of instruments -Types of indicating Instruments - Multimeters – Oscilloscopes - Three-phase power measurements – instrument transformers (CT and PT).

PART-A

Q.No	Questions	BT Level	Competence
1.	Define transducer.	BTL 4	Analyze
2.	Point out the desirable features of a transducer.	BTL 5	Evaluate
3.	Classify the types of transducers	BTL 1	Remember
4.	Point out the advantages of hall effect transducers	BTL 1	Remember
5.	Differentiate passive and active transducers. Give an example of each.	BTL 2	Understand
6.	Draw the frequency response of typical capacitor microphone.	BTL 2	Understand
7.	List different types of resistive transducers	BTL 6	Create
8.	State some of the applications of resistive transducer.	BTL 2	Understand
9.	How a capacitive transducer is used as a pressure sensor?	BTL 2	Understand
10.	Obtain the output characteristics of LVDT	BTL 2	Understand
11.	Give any one method to increase the sensitivity of capacitive transducer.	BTL 3	Apply
12.	What are instrument transformers?	BTL 3	Apply
13.	A Quartz piezo electric crystal having a thickness of 2mm and voltage sensitivity of 0.055Vm/N is subjected to a pressure of 1.5 MN/ m. Calculate the voltage output. If	BTL 3	Apply

	the permittivity of quartz is 40.6 x 10^{-12}F/ m, Calculate the charge sensitivity.		
14.	What is the principle of photoelectric transducer?	BTL 4	Analyze
15.	Write the principle of thermoelectric transducer	BTL 4	Analyze
16.	Predict the basic requirements of any measuring instruments.	BTL 4	Analyze
17.	Contrast the advantages of instrument transformers over ammeter shunts and voltmeter multipliers.	BTL 5	Evaluate
18.	Predict how power can be measured in a 3 phase circuit?	BTL 5	Evaluate
19.	Conclude the reasons why current transformers must never be operated on open circuit.	BTL 6	Create
20.	Differentiate C.T. and P.T.	BTL 6	Create
21.	List out the applications of resistive transducers.	BTL 1	Remember
22.	Give the classifications of measuring instruments.	BTL 1	Remember
23.	List the main parts of a CRO.	BTL 1	Remember
24	Point out the torques required for the operation of an indicating instrument.	BTL 2	Understand
	PART B		
1.	**(i)** Describe the construction and working principle of resistive potentiometer. **(8)** **(ii)** What is loading effect? Explain its problem on potentiometers. **(5)**	BTL 1	Remember
2.	Discuss about the classification of transducers based on different characteristics. **(13)**	BTL 1	Remember
3.	Two resistors of 470 Ω ±10% and 330 Ω ± 5% are connected in parallel. Evaluate (a) Effective resistance neglecting errors and (b) Effective resistance taking errors in to account. **(13)**	BTL 1	Remember
4.	**(i)** Explain LVDT with equivalent circuit for different mode of operation. Also explain its characteristic. **(8)** (ii) List the merits, demerits and typical applications for inductive transducer. **(5)**	BTL 2	Understand
5.	**(i)** Describe the principle of operation of capacitive transducer and how pressure is measured using capacitive transducer. **(7)** **(ii)** Describe the principle of operation, characteristics and applications of capacitor microphone. **(6)**	BTL 2	Understand
6.	Recommend any one method for power measurement in a three phase circuit with a neat diagram. **(13)**	BTL 2	Understand
7.	Define piezoelectric effect. Draw the equivalent circuit of a piezoelectric crystal and explain the operation. **(13)**	BTL 3	Apply
8.	Discuss the principle of operation, characteristics and applications of Hall effect transducer. **(13)**	BTL 3	Apply
9.	How the instrument is working , explain the following in detail. (i) Digital Multimeters. **(13)**	BTL 4	Analyze

10.	Explain the construction and working of CRO. **(13)**	BTL 4	Analyze
11.	**(i)**List the different types of ratios present in instrument transformers and write how it is calculated. **(7)** **(ii)**Describe the method of construction and operation of C.T. **(6)**	BTL 4	Analyze
12.	Discuss the constructional of P.T and explain about the error in potential transformer. **(13)**	BTL 5	Evaluate
13.	Explain the 2 wattmeter method of power measurement in a 3 phase circuit with neat circuit diagram. **(13)**	BTL 6	Create
14.	Define strain gauge factor and derive its expression. **(13)**	BTL 3	Apply
15.	Define thermoelectric effect. Explain the operation of thermo electric Transducers. **(13)**	BTL 3	Apply
16.	Discuss about photoelectric effect and how it is used as transducer. **(13)**	BTL 3	Apply
17.	Explain about the PMMC type indicating instruments with relevant diagrams. **(13)**	BTL 2	Understand
PART C			
1	The two wattmeter produces wattmeter readings P_1=1560W and P_2=2100W. When connected to delta connected load. If the line voltage is 220V, Calculate **(1)** the per phase average power **(2)** total reactive power **(3)** power factor **(4)** the phasor impedance. Is the impedance inductive or Capacitive? Justify **(15)**	BTL 5	Evaluate
2	The 3 phase 4 Wire, 75kW LT industry draws power from the Utility Grid. 5 Amps max capacity energy meter is fixed in the industry .The current transformer having with ratio of 200/5 Amps is connected in the lines and its secondary is connected to Energy meter. **(i)** Why current transformer is needed?.Explain**.** **(10)** **(ii)** What factors to be used along with Energy meter reading to arrive the actual consumption? Explain **(5)**	BTL 6	Create
3	With neat diagram explain about Moving iron type indicating instruments. **(15)**	BTL 5	Evaluate
4	Demonstrate the measurement of voltage , frequency and phase difference using cathode ray oscilloscope. **(15)**	BTL 6	Create
5.	Give the factors affecting the selection of transducers. Also tabulate the various type of transducers and their applications. **(15)**	BTL 5	Evaluate