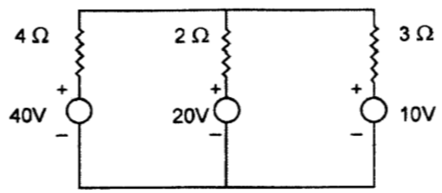
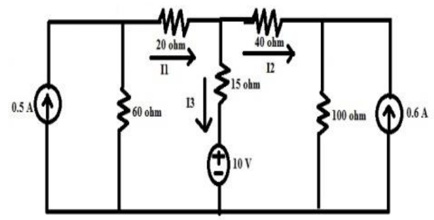
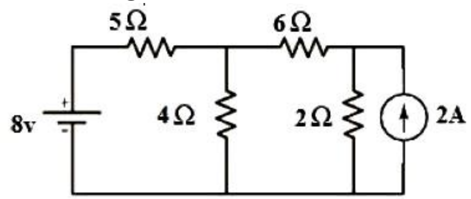
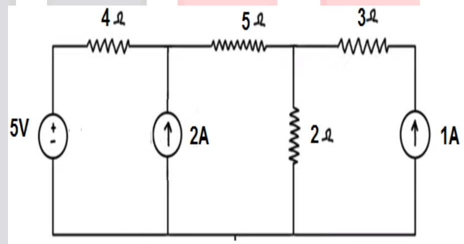
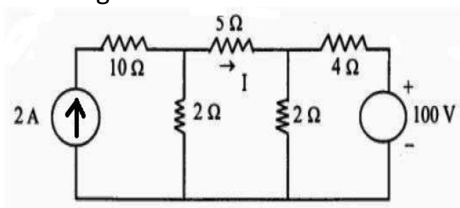
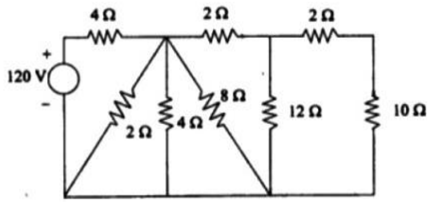
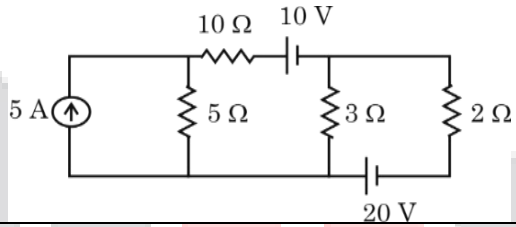
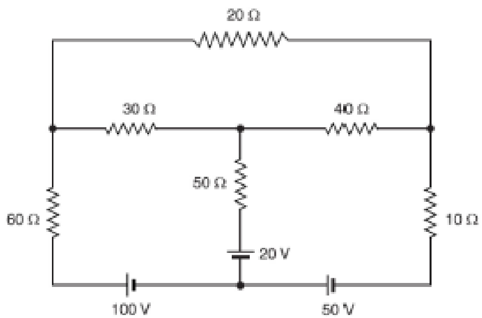
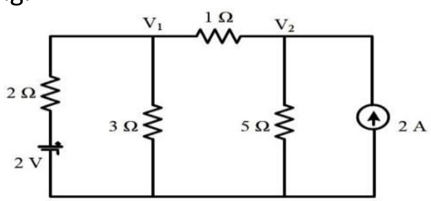
Meerut Institute of Engineering & Technology, Meerut

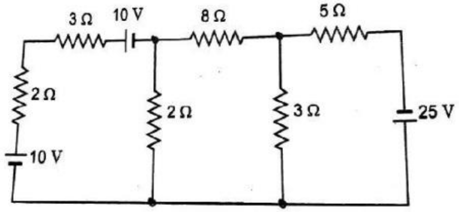
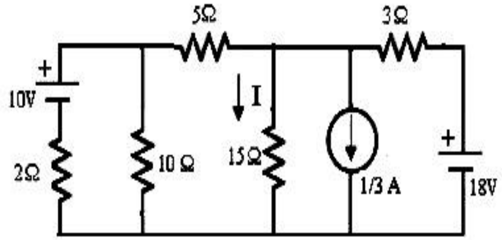
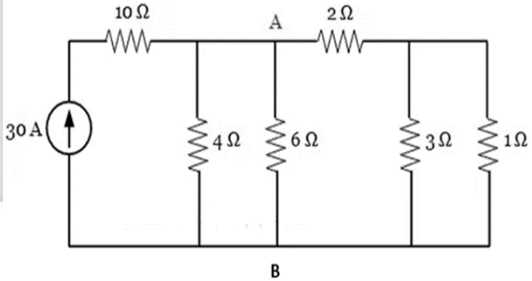
CO-Wise AKTU Question Bank

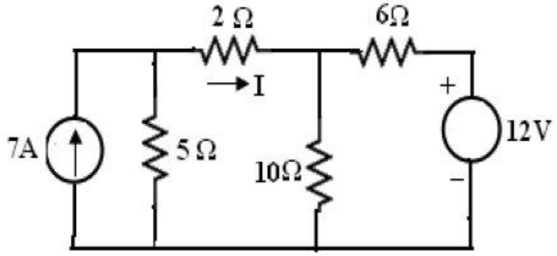
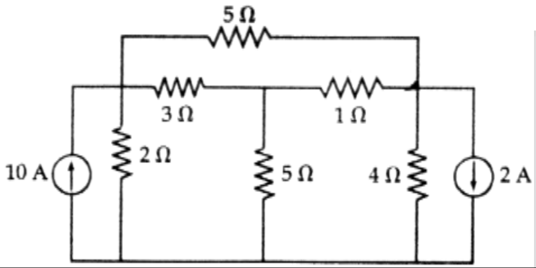
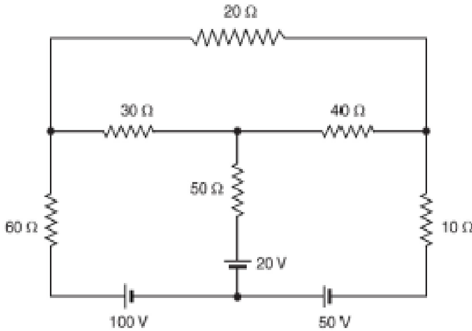
Course: B.Tech **Subject Name:** Fundamental of Electrical Engineering **Subject Code:** BEE101/201 **Semester:** I/II

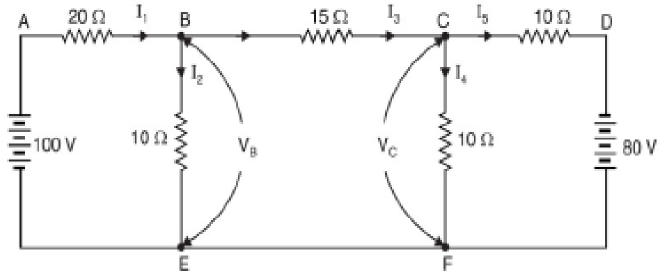
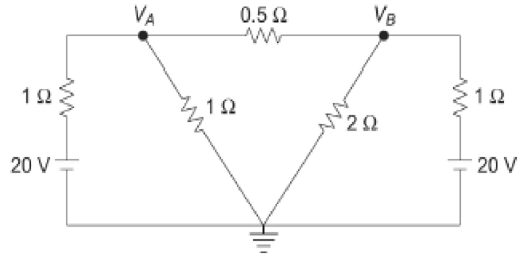
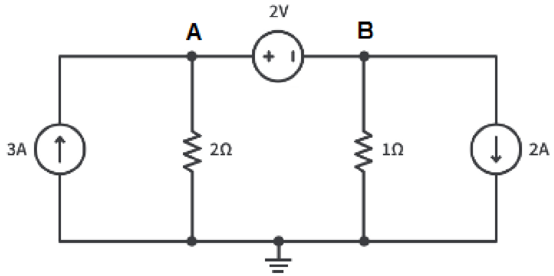
CO No.	Lect. No.	Syllabus Topic (As Per LP)	Ques. No.	Question Statement (As Per AKTU)	Session
UNIT 1 (D.C Circuits)					
1	**1**	Concepts of network, Active and passive elements, voltage and current sources. Concept of linearity and linear network, unilateral and bilateral elements. R, L and C as linear elements.	**1**	Define Active and Passive Elements.	2022-2023(ODD),22-23 (EVEN),2020-21 (ODD), 18-19, 17-18, 16-17,
1	**1**		**2**	Describe briefly the following elements with examples: (i) Unilateral & Bilateral	2022-2023(ODD)
1	**2**	Voltage source, Current source transformation, Kirchhoff's laws.	**3**	Define ideal voltage and current source.	2020-21 (ODD), 18-19, 17-18,
1	**2**		**4**	State and explain Kirchhoff's law. What are the application and limitations of Kirchhoff's law in circuit theory? Explain **OR** Describe KCL & KVL with necessary circuit representation.	2022-23(EVEN),2016-17 (ODD)
1	**3**	Mesh analysis with Numerical	**5**	Find the current in 2 ohm resistance in the following figure using loop analysis method  	2015-16 (EVEN)
1	**3**	Mesh analysis with Numerical	**6**	Using Mesh analysis find out the current I_1, I_2 and I_3 in the given circuit.	2016-17 (ODD)

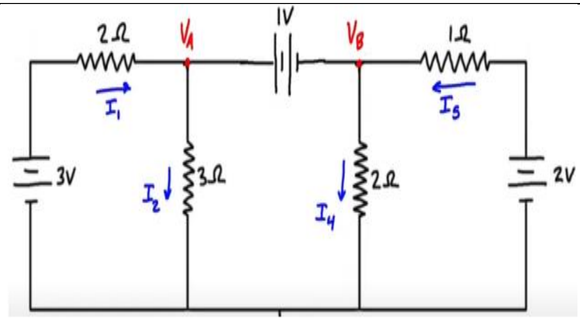
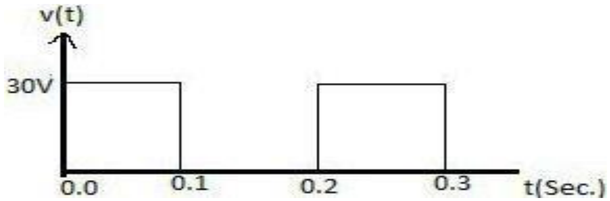
					
1	**3**	Mesh analysis with Numerical	**7**	Determine current in 4 ohm resistor by using mesh analysis in the circuit shown in figure below. 	2017-18 (ODD)
1	**3**	Mesh analysis with Numerical	**8**	Find the current in all branches by using mesh analysis. 	**2019-20(EVEN)**
1	**4**	Mesh analysis with Numerical	**9**	Apply Mesh analysis; obtain the current through 5 ohm resistance in the following circuit. 	2020-21 (ODD)

1	**4**	Mesh analysis with Numerical	**10**	Find the equivalent resistance of the following circuit and calculate the current supplied by source. 	2020-21 (ODD)
1	**4**	Mesh analysis with Numerical	**11**	Find the current in all branches shown in figure using mesh analysis. 	**2020-21 (EVEN)**
1	**4**	Mesh analysis with Numerical	**12**	Determine the currents in all branches of the circuit as shown in below figure, using Mesh current method? 	**2022-23(ODD)**
1	**5**	Nodal analysis with Numerical	**13**	Using Nodal analysis find the current through 1 Ω resistance shown in Fig. 	2016-17 (EVEN)

1	**5**	Nodal analysis with Numerical	**14**	Using Nodal analysis, find the current through 8 Ω resistor. 	2017-18 (EVEN)
1	5	Nodal analysis with Numerical	15	Determine current through 15 ohm resistance by node analysis. 	2018-19 (ODD)
1	5	Nodal analysis with Numerical	**16**	Determine the current Through A-B by using Nodal Analysis. 	**2019-20(EVEN)**
1	**6**	Nodal analysis with Numerical	**17**	Find current through 2Ω resistance using nodal analysis.	**2019-20(ODD)**

					
1	**6**	Nodal analysis with Numerical	**18**	Find the current in all branches by using nodal analysis. 	**2020-21 (ODD)** 2022-23(EVEN)
1	**6**	Nodal analysis with Numerical	**19**	Determine the currents in all branches of the circuit as shown in below figure, using Nodal current method? 	2022-23 (ODD)
1	**6**	Nodal analysis with Numerical	**20**	Determine the currents in the various branches of the circuit shown in Figure by nodal analysis?	2022-23 (ODD) 2022-

					
1	**6**	Nodal analysis with Numerical	**21**	Determine the current by Nodal method, through 2 ohm resistor for the network shown below? 	2022-23 (ODD)
1	**6**	Nodal analysis with Numerical	**22**	Calculate the current in both resistances by using nodal analysis 	IMPORTANT
1	**6**	Nodal analysis with Numerical	**23**	Calculate the resistive branch current by using nodal analysis.	IMPORTANT

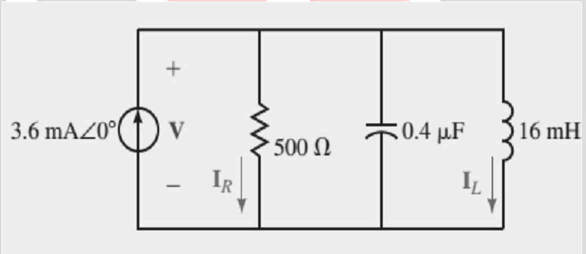
					
UNIT 2 (Steady State Analysis of Single Phase AC Circuits)					
2	**7**	Concepts of AC fundamentals: r.m.s value and average value	**25**	Draw a Phasor diagram showing the following voltages : V_1= 100 sin 500 t V_2= 200 sin (500 t + 45°) V_3 = cos 500 t Find rms value of resultant voltage	(2013-14) EVEN
2	**7**	Concepts of AC fundamentals: r.m.s value and average value	**26**	The equation of an alternating current is i = 141.4 sin314t. What isth2e r.m.s. value of current and frequency?	(2015-16)EVEN
2	**7**	Concepts of AC fundamentals: r.m.s value and average value	**27**	Writ2e a note on: Amplitude, mechanical degrees and angular velocity.	(2017-18)EVEN
2	**7**	Concepts of AC fundamentals: r.m.s value and average value	**28**	The equation of an alternating current i = 42.42 sin 628 t. Determine (i) maximum value (ii) frequency (iii) rms value (iv) average value (v) form factor	(2017-18)EVEN
2	**7**	Concepts of AC fundamentals: r.m.s value and average value	**29**	Derive that average power consumed by a pure inductor is zero.	2022-23(EVEN)
2	**8**	Form factor and peak factor of different waveforms	**30**	Find the r.m.s. value, average value and form factor of the given waveforms. 	(2013-14) ODD

2	**8**	Form factor and peak factor of different waveforms	**31**	Derive expressions for average value and r.m.s. value of a sinusoidally varying ACvoltage.	(2017-18)EVEN
2	**8**	Form factor and peak factor of different waveforms	**32**	Explain the form factor and peak factor.	(2017-18)EVEN
2	**9**	Form factor and peak factor of different waveforms	**33**	Determine the form factor of AC current i= 200 Sin (157 t + π/6).	(2019-20)ODD
2	**9**	Form factor and peak factor of different waveforms	**34**	Derive expression for average value and r.m.s. value of Half wave rectifier voltage output.	(2020-21)ODD
2	**9**	Form factor and peak factor of different waveforms	**35**	Derive expression for average value and r.m.s. value of Full wave rectifier voltage output.	(2021-22)EVEN
2	**10**	Concept of phase & phasors, phasor representation of sinusoidally varying voltage and current wave	**36**	Draw a Phasor diagram showing the following voltages : V_1= 100 sin 500 t V_2= 200 sin (500 t + 45°) V_3 = cos 500 t 9Find rms value of resultant voltage	(2013-14) EVEN
2	**10**	Concept of phase & phasors, phasor representation of sinusoidally varying voltage and current wave	**37**	Draw the phasor diagram for the following voltages. Calculate the resultant voltage. Also find the r.m.s. voltage. V_1=100sin 500t V_2=200sin (500t + π/3) V_3= - 50cos 500t V_4=150sin (500t - π / 4)	(2016-17) EVEN
2	**10**	Concept of phase & phasors, phasor representation of sinusoidally varying voltage and current wave	**38**	The two voltage waves are given: V_A= 150sin (ωt+45°) and V_B = 75 sin (ωt-15°) Which voltage wave is leading with other and what will be the phase angle between V_A and V_B.	(2016-17)ODD
2	**10**	Concept of phase & phasors, phasor representation of sinusoidally varying voltage and current wave	**39**	The instantaneous values of two alternating voltages are represented by V_1 = 60 Sin θ and V_2 = Sin (θ- π/3). Derive expressions for the instantaneous values of (i) the sum and (ii) the difference of these voltages.	(2019-20)ODD

2	**11**	Analysis of pure R, pure L and pure C circuit with power	**40**	What is phase angle difference between the voltage and current phasor in a purely capacitive circuit?	(2018-19)EVEN
2	**11**	Analysis of pure R, pure L and pure C circuit with power	**41**	Derive the expression for the average power in a single phase purely resistive circuit. Also draw the phasor diagram and waveform diagram for this circuit.	(2016-17) ODD
2	**11**	Analysis of pure R, pure L and pure C circuit with power	**42**	Why the average power consumed in purely inductive circuit is zero?	(2021-22) EVEN
2	**12**	Analysis of pure R, pure L and pure C circuit with power	**43**	A 120V, 100W lamp is to be connected to 220 volt, 50Hz supply. In order that lamp should operate on correct voltage, calculate the value of a). Non inductive resistance b). Pure inductance.	(2013-14) ODD
2	**12**	Analysis of pure R, pure L and pure C circuit with power	**44**	A coil and a non-inductive resistor are connected in series across a 200V, 50 Hz supply. The voltage acrossthecoilandresistoris120Vand140Vrespectively. If the supply current is 0.5 A, calculate— 1.) The resistance and inductance of the coil 2.) The power dissipated in the coil. 3.) The power factor of the coil. 4.) The power factor of the circuit.	(2013-14) ODD
2	**12**	Analysis of pure R, pure L and pure C circuit with power	**45**	A resistance and inductance are connected in series with voltage v = 283 sin 314 t. The current expression is found to be i= 4 sin (314 t - 45°). Find the value of resistance, inductance and power factor.	(2013-14) EVEN
2	**12**	Analysis of pure R, pure L and pure C circuit with power	**46**	A 46 mH inductive coil has a resistance of 10 ohm. How much current will it draw, if connected across 100 V, 50 Hz source? Also determine the value of capacitance that must be connected across the coil to make the power factor of the circuit to be unity.	(2016-17)EVEN
2	**13**	Analysis of pure R, pure L and pure C circuit with power	**47**	A series ac circuit has a resistance of 150 and inductive reactance of 10 Ω. Calculate the value of a capacitor which is connected across this series combination so that system has unit power factor. The frequency of ac supply is 50Hz.	(2016-17)ODD

2	**13**	Analysis of pure R, pure L and pure C circuit with power	**48**	A non inductive resistance of 10 ohm is connected in series with an inductive coil across 200 V, 50 Hz ac supply. The current drawn by the series combination is 10 Amp. The resistance of coil is 2 ohms. Determine: (i) Inductance of the coil (ii) Power factor (iii) Voltage across the coil.	(2017-18)ODD
2	**13**	Analysis of pure R, pure L and pure C circuit with power	**49**	If load draws a current of 10A at 0.8 p.f. lagging when connected to 100 Vsupply, calculate the values of real, reactive and apparent powers. And also find the resistance of load.	(2020-21)ODD
2	**13**	Analysis of pure R, pure L and pure C circuit with power	**50**	Determine the mathematical expression for instantaneous power and average power in the case of R and L elements connected in series across a single phase AC supply of voltage v = Vm sinwt . Also draw the instantaneous power waveform.	2022-23(ODD
2	**14**	Resonance in series circuit, it's frequency & characteristics	**51**	Derive resonance conditions in series circuit. Also derive the expression for Bandwidth.	(2014-15)EVEN
2	**14**	Resonance in series circuit, it's frequency & characteristics	**52**	Derive the condition for resonance in series RLC circuit. What are the different applications of resonance?	(2013-14) EVEN
2	**14**	Resonance in series circuit, it's frequency & characteristics	**53**	A series circuit has R = 10 ohm, L = 0.05 H and C = 10µF Calculate Q-factor of the circuit.	(2014-15)EVEN
2	**14**	Resonance in series circuit, it's frequency & characteristics	**54**	Explain resonance in a series RLC circuit with the help of impedance v/s frequency diagram and derive an expression for resonant frequency. Write properties of series resonance circuit.	(2015-16)EVEN
2	**14**	Resonance in series circuit, it's frequency & characteristics	**55**	Explain series resonance in RLC circuit. What are the bandwidth and quality factor of the circuit? Derive expressions for lower and upper half power frequencies for a series RLC circuit	(2016-17)EVEN
2	**14**	Resonance in series circuit, it's frequency & characteristics	**56**	Why series resonant circuit is known as acceptor circuit & parallel resonant circuit as rejecter circuit?	(2017-18)ODD
2	**14**	Resonance in series circuit, it's frequency & characteristics	**57**	Derive expression of resonance frequency for series RLC circuit. A series circuit consists of a resistance of 10Ω, and inductance of 50mH and a	(2018-19)ODD

				variable capacitance in series across a 100V, 50Hz supply. Calculate- (i) The value of capacitance to produce resonance. 582(ii) Voltage across the capacitance. (iii) Q-factor	
2	**14**	Resonance in series circuit, it's frequency & characteristics	**59**	Derive an expression of resonance frequency in series resonance circuit. If the bandwidth of a resonant circuit is 10 KHz and the lower half power frequency is 120 KHz, find out the value of the upper half power frequency and the quality factor of the circuit.	(2019-20)ODD
2	**14**	Resonance in series circuit, it's frequency & characteristics	**60**	Derive the equation for resonant frequency in the case of a series RLC circuit and draw the phasor diagram of resultant Voltage and Current.	2022-23(ODD) 2022-23(EVEN)
2	**15**	Bandwidth and quality factor	**61**	Explain the concepts of bandwidth and quality factor for a series **R-L-C** circuit. Derive their expressions.	(2013-14) EVEN
2	**15**	Bandwidth and quality factor	**62**	Derive the quality factor Q of the series R-L-C ckt at resonance. Define the bandwidth for the same.	(2013-14) ODD
2	**15**	Bandwidth and quality factor	**63**	A series circuit has R = 10 ohm, L = 0.05 H and C = 10μF Calculate Q-factor of the circuit.	(2014-15)EVEN
2	**15**	Bandwidth and quality factor	**64**	Derive the expression of Bandwidth of a series RLC circuit. Explain the relationship between bandwidth and quality factor.	(2017-18)ODD
2	**15**	Bandwidth and quality factor	**65**	A series circuit has R= 10Ω, L= 0.02H and C= 3μF. Calculate Q-factor of the circuit.	(2018-19)ODD
2	**16**	Parallel Resonance	**66**	Derive the expression for resonant frequency & quality factor for an ac circuit under the condition of parallel resonance.	(2018-19), 17-18, 14-15, 13-14
2	**16**	Parallel Resonance	**67**	Explain the term "Dynamic Impedance" in AC circuits. OR Derive mathematically dynamic impedance (Z_D) offered by RLC parallel circuit underresonance.Also, draw its phasor diagram.	(2019-20)ODD (2021-22)EVEN
2	**17**	Numerical on parallel R,L,C circuits	**68**	Explain Parallel Resonance. A circuit of a resistance of 20 Ω , and inductance of 0.3 H and a variable capacitance in series across a 220 V,50 Hz supply. Calculate:	(2014-15)EVEN

				(i)The value of capacitance to produce resonance (ii)The voltage across the capacitance and inductance (iii)The Q-factor of the circuit.	
2	**17**	Numerical on parallel R,L,C circuits	**69**	Three impedances of (70.7 + j 70.7) Ohm, (120 + j 160) Ohm and (120 + j 90) Ohm are connected in parallel across a 250 V supply. Determine (i) admittance of the circuit (ii) supply current and (iii) circuit power factor.	(2021-22) ODD
2	**17**	Numerical on parallel R,L,C circuits	**70**	Two coils having resistance 5 Ω and 10 Ω and inductances 0.04 H and 0.05 H respectively are connected in parallel across a 200 V, 50 Hz supply.Calculate: i. Conductance, susceptance and admittance of each coil. ii. Total current drawn by the circuit and its power factor. Power absorbed by the circuit.	(2021-22) EVEN
2	**17**	Numerical on parallel R,L,C circuits	**71**	Consider the circuit shown in figure below and calculate the following.  a. Determine the resonant frequencies, ω(rad/s) and f(Hz) of the tank circuit. b. Find the Q of the circuit at resonance. c. Calculate the voltage across the circuit at resonance. d. Solve for currents through the inductor and the resistor at resonance.	(2021-22) EVEN
2	**18**	Power factor	**72**	Define power factor. Discuss reasons for poor power factor. How can power factor beimproved?	21-22(ODD)19-20, 16-17, 15-16, 13-14
2	**19**	Three phase star and delta connections	**73**	Derive the relationship between line current and phase current for delta connected 3-phase load when supplied from 3-phase balanced supply.	19-20, 18-19, 17-18, 16-17, 15-16, 14-15, 13-14

2	**19**	Three phase star and delta connections	**74**	Derive the mathematical relationship between phase and line quantities in a 3-phase star configuration with the help of phasor diagram?	2022-23(ODD) 2022-23(EVEN)
2	**20**	Three phase star and delta connection numerical	**75**	A three-phase load consists of three similar inductivecoils,eachofresistance50Qandinductance 0.3 H. the supply is 415 V, 50 Hz. Calculate: (i) The line current, (ii) the power factor; and (iii) the totalpower when the load is (a) star connected and (b) deltaconnected.	(2013-14) EVEN
2	**20**	Three phase star and delta connection numerical	**76**	Three similar coils each having a resistance of 10 ohm and an inductance of0.0318 H in series are connected In delta. The line voltage is 400V, 50 HZ. Calculate: phase current, line current, power factor, total power in the circuit.	(2015-16) EVEN
2	**20**	Three phase star and delta connection numerical	**77**	Obtain the relation between line & phase voltages in balanced Star connected load system. Also draw its Phasor diagram. A 3-phase, star connected balanced load is supplied by 400 V, 50 Hz. The load takes a leading current of 100√3 A & power 20 kW. Calculate power factor of load and Resistance & Inductance per phase.	(2015-16) ODD
2	**20**	Three phase star and delta connection numerical	**78**	A balanced star connected load of (8 + j6) Ω per phase is connected to a 3-phase 400 V supply. Find the line current, power factor, and 3-phase power and 3-phase volt-amperes. Also draw the phasor diagram.	(2016-17)EVEN
2	**20**	Three phase star and delta connection numerical	**79**	A balanced star connected load of (6+j8) ohm per phase connected to abalance 3 phase, 400V supply. Find the line current, power factor, powerand total volt-amperes.	(2020-21)ODD
UNIT 3 (Transformers)					
3	**21**	Magnetic Circuit	**80**	Define the following terms as applied to magnetic circuit:(i) MMF(ii) Flux density(iii) Reluctance(iv) Permeability.	(2013-14)EVEN
3	**21**	Magnetic Circuit	**81**	Explain B-H loop for magnetic circuit	(2016-17) ODD

3	**21**	Magnetic Circuit	**82**	Deduce analogy between electric circuits and magnetic circuits. Also explain B-H curve and discuss its effect on hysteresis loss	(2016-17)EVEN
3	**21**	Magnetic Circuit	**83**	Explain different types of Magnetic materials with examples	(2018-19)EVEN
3	**22**	Magnetic Circuit	**84**	What is transformer? Explain the constructional features of different types of transformer.	(2014-15)ODD
3	**22**	Single phase transformer: construction and working	**85**	Derive an E.M.F expression of power transformer. Also draw an equivalent circuit of it. **OR** Discuss the principle of operation of a single phase transformer. Derive EMF equation for a single phase transformer.	(2013-14)ODD
3	**22**	Single phase transformer: construction and working			2018-19, 17-18, 15-16, 13-14
3	**22**	Single phase transformer: construction and working	**86**	What will happen if the primary of a transformer is connected to dc supply?	2019-20, 17-18, 14-15, 13-14
3	**22**	Single phase transformer: construction and working	**87**	Why transformer rated in VA? Explain in brief.	2021-22(ODD),2014-15
3	**23**	Ideal and Practical transformers with phasor and equivalent circuit	**88**	What do you understand by the term "ideal transformer "?	(2013-14)EVEN
3	**23**	Ideal and Practical transformers with phasor and equivalent circuit	**89**	Draw and explain the no load and full load phasor diagrams for a single phase transformer.	2021-2022(ODD/EVEN)2019-20
3	**24**	Ideal and Practical transformers with phasor and equivalent circuit	**90**	A transformer on no-load has a core loss of 50W, draws a current of 2A and has an induced emf of 230V. Determine the no-load power factor, core loss current and magnetizing current. Also, calculate the no-load circuit parameters of the transformer. Neglect winding resistance and leakage flux.	2021-22(ODD)
3	**24**	Ideal and Practical transformers with phasor and equivalent circuit	**91**	Draw equivalent circuit diagram of single phase transformer. **OR**	(2015-16)ODD

3	**24**	Ideal and Practical transformers with phasor and equivalent circuit		Draw the complete equivalent circuit model of a real transformer and explain itsdifferent parameters?	(2022-23)EVEN
3	**25**	Equivalent circuit of transformer with numerical	**92**	A 400 V/200 V single phase transformer has primary winding resistance 1.0 ohm and secondary winding resistance 0.2 ohm. What will be the total resistance of transformer referred to the primary side?	(2015-16)ODD
3	**25**	Equivalent circuit of transformer with numerical	**93**	An 1100/110V, 22 KVA, single phase transformer has primary resistance 4Ω and reactance 6Ω respectively. The secondary resistance and reactance are 0.04Ω and 0.065Ω respectively. Calculate:(i) Equivalent resistance and reactance of secondary referred to primary.(ii) Total resistance & reactance referred to primary.(iii) Equivalent resistance and reactance of primary referred to secondary.(iv) Total copper loss	(2018-19)EVEN
3	**25**	Equivalent circuit of transformer with numerical	**94**	A 20kVA, 2000V/200V, single-phase, 50 Hz transformer has a primary resistance of1.5 Ω and reactance of 2 Ω. The secondary resistance and reactance are 0.015 Ω and0.02 Ω respectively. The no load current of transformer is 1A at 0.2 power factor. Determine:Equivalent resistance, reactance and impedance referred to primary, Supply current, Total copper lossDraw approximate equivalent circuit	2021-22(EVEN)
3	**26**	Power losses in transformer	**95**	Write detailed note on Hysteresis loss and Eddy current loss in magnetic circuit and also state how to reduce the eddy current loss considerably.	(2016-17),ODD (2014-15)EVEN
3	**26**	Power losses in transformer	**96**	Classify the losses in transformer.	(2020-21)ODD
3	**27**	Efficiency of transformer and numerical	**97**	Derive the EMF equation of single phase transformer. A single phase 100kVA, 6.6kV/230V, 50 Hz, transformer has 90% efficiency at 0.8 lagging power factor both at full load and also at half load. Determine iron and copper loss at full load for transformer.	(2020-21)ODD, (14-15)ODD
3	**27**	Efficiency of transformer and numerical	**98**	A single phase 250 kVA transformer has an efficiency of96 % on full load at 0.8 power factor and on half (i) Iron loss (ii) Full load copper loss.	(2013-14)ODD
3	**27**	Efficiency of transformer and numerical	**99**	List the various losses occurring in transformer & the condition for maximum efficiency. In a 25 KVA, 2000/200V transformer the iron & copper losses are 200W & 400W respectively. Calculate the efficiency at	(2015-16)EVEN

				half load and 0.8 power factor lagging. Determine also the maximum efficiency & the corresponding load.	
3	**27**	Efficiency of transformer and numerical	**100**	A 25 KVA, 2000/200V transformer has full load copper & iron losses are 1.8 kW & 1.5 kW respectively. Find :(i)The efficiency at half the rated kVA & at unity power factor(ii) The efficiency at full load & at 0.8 power factor lagging.(iii) kVA load for maximum efficiency & value of maximum efficiency.	(2017-18)EVEN
3	**27**	Efficiency of transformer and numerical	**101**	A transformer is rated at 100 KVA. At full load its copper loss is 1200W and iron losses are 960W. Calculate: (i) Efficiency at full load, unity pf (ii) Efficiency at half load, 0.8 pf lagging. (iii) Efficiency at 75% full load, 0.7 pf lagging (iv) The load kVA at which maximum efficiency occurs (v) The maximum efficiency at 0.85 pf lagging.	(2018-19)ODD
3	**27**	Efficiency of transformer and numerical	**102**	State the significance of the regulation of transformer. A 4kVA, 200/400 V, 50 Hz, single phase transformer has equivalent resistance referred to primary as 0.15 Ω. Calculate, (i) The total copper losses on full load (ii) The efficiency while supplying full load at 0.9 power factor lagging (iii) The efficiency while supplying half load at 0.8 power factor leading. Assume total iron losses equal to 60 W.	2021-22(EVEN)
3	**27**	Efficiency of transformer and numerical	**103**	A 100 kVA, single-phase transformer has iron loss of 600 W and a copper loss of 1.5 kW at full-load current. Calculate the efficiency at (i) full load and 0.8 lagging pf, and (ii) half load and unity pf?	(2022-23)EVEN
3	**28**	Maximum efficiency of transformer and regulation	**104**	A 50 KVA transformer has a core loss of 400 W and a full load copper loss of 800 W. The power factor of the load is 0.9 losing. Calculate: (i) Full load efficiency (ii) The maximum efficiency and the load at which maximum efficiency occurs.	(2015-16)EVEN
3	**28**	Maximum efficiency of transformer and regulation	**105**	What do you understand by the efficiency of a transformer? Deduce the condition for maximum efficiency	(2016-17)ODD

3	**28**	Maximum efficiency of transformer and regulation	**106**	In a 25 KVA, 2000V/200 V transformer the iron and copper losses are 200W and 400W respectively. Calculate the efficiency of half load and 0.8 pf. lagging. Also determine the maximum efficiency and corresponding load.	(2016-17)EVEN
3	**28**	Maximum efficiency of transformer and regulation	**107**	Define voltage regulation of a transformer.	2019-20(ODD)
3	**28**	Maximum efficiency of transformer and regulation	**108**	What is voltage Regulation in a single Phase Transformer? What should be its value for an ideal transformer?	(2018-19)ODD
UNIT 4 (Electrical machines)					
4	**29**	DC machines: Principle & Construction	**109**	Draw and discuss the construction and principle of operation of a D.C. motor and also give some of its applications.	2017-18 (ODD)
4	**29**	DC machines: Principle & Construction	**110**	Why commutator is needed?	2019-20 (ODD)
4	**29**	DC machines: Principle & Construction	**111**	Describe briefly the different types of DC machines.	2022-23 (ODD)
4	**30**	DC Generator- e.m.f equation, types ,applications	**112**	A 4-pole DC generator with wave connected armature has 41 slots and 12 conductors /slots. Armature resistance and shunt field resistance are 0.5Ω and 200 Ω respectively. Flux/pole is 125 mWb. Speed N= 1000 r.p.m. Calculate the voltage drop across terminals. The load resistance is 10 Ω.	2013-14 (ODD)
4	**30**	DC Generator- e.m.f equation, types ,applications	**113**	Derive the expression for generated emf in DC machine. Explain the term Back E.M.F. when applied to DC motor. Briefly explain what role Back E.M.F plays in starting and running of motor.	2015-16 (ODD)
4	**30**	DC Generator- e.m.f equation, types ,applications	**114**	Derive e.m.f. equation of D.C. machine. Also deduce the expression for torque of a dc machine.	2016-17 (EVEN)
4	**30**	DC Generator- e.m.f equation, types ,applications	**115**	Give the E.M.F. equation of a D.C. generator and draw the characteristics of a D.C. seriesmotorA 25kw, 250V, dc shunt generator has armature and	2017-18 (ODD)

				field resistances of 0.06ohm and100ohm respectively. Determine the total armature power developed.	
4	**30**	DC Generator- e.m.f equation, types ,applications	**116**	A dc shunt generator delivers 50 kW at 250 V when running at 500 rpm. The armature and field resistances are 0.05 Ω and 125 Ω respectively. Calculate the speed of the same machine and developed torque when running as a shunt motor and taking 50 kW at 250 V.	2016-17 (EVEN)
4	**30**	DC Generator- e.m.f equation, types ,applications	**117**	Derive the EMF equation of the generator.	2022-23 (ODD)
4	**30**	DC Generator- e.m.f equation, types ,applications	**118**	A 4-pole generator with 400 armature conductors has a useful flux of 0.04Wb per pole. What is the emf produced if the machine is wave wound and runs at 1200rpm? What must be the speed at which the machine should be driven to generate the same emf if machine islap wound?	2021-22 (ODD)
4	**31**	DC Generator- e.m.f equation, types ,applications	**119**	Why is dc series motor preferred in elevators?	2013-14 (EVEN)
4	**31**	DC Generator- e.m.f equation, types ,applications	**120**	A dc shunt motor develops an open-ckte.m.f. of 250 V at 1500 rpm. Find its developed torque for an armature current of 20 A.	2013-14 (EVEN)
4	**31**	DC Generator- e.m.f equation, types ,applications	**121**	A 230 V dc series motor is taking 50 A. Resistance of armature and series field winding is 0.2 Ω and 0.1 Ω respectively. Calculate :a) Brush voltage b) Back emf.	2013-14 (EVEN)
4	**31**	DC Generator- e.m.f equation, types ,applications	**122**	Draw the torque v/s speed characteristics of a DC series motor and explain why motor should not be started at no load.	2015-16 (EVEN)
4	**31**	DC Generator- e.m.f equation, types ,applications	**123**	A 6-pole lap wound dc shunt motor has 250 armature conductors, a flux of 0.04 wb/pole and at 1200 rpm. The armature and field winding resistances are 1Ω and 220Ω respectively. It is connected to a 220 V DC supply. Determine: (i) Induced emf in the motor (ii) Armature current (iii) Input supply current (iv) Mechanical power developed in the motor (v) Torque developed	2015-16 (EVEN)

4	**31**	DC Generator- e.m.f equation, types ,applications	**124**	Write the expression for the induced e.m.f. and torque of DC machine. What is the value of constant relating ω and n ?	2014-15 (ODD)
4	**31**	DC Generator- e.m.f equation, types ,applications	**125**	A 120 V dc shunt motor having an armature resistance of 0.2 Ω and field resistance of 60 Ω, draw a line current 0f 40 A at full load. The brush voltage drop is 3V and rated full load speed is 1800 rpm. Calculate: (i) The speed at half load (ii) The speed at 125% of full load.	2016-17 (ODD)
4	**31**	DC Generator- e.m.f equation, types ,applications	**126**	A 250V dc shunt motor takes 41A at full load. Resistances of motor armature and shunt field winding are 0.1 Ω and 250 Ω respectively. Find the back e.m.f. on full load. What will be generated emf, if working as generator and supplying 41A to a load at terminal voltage of 250V?	2018-19 (EVEN)
4	**31**	DC Generator- e.m.f equation, types ,applications	**127**	Derive the expression of torque for dc motor. Also discuss the applications of it.	2019-20 (ODD)
4	**31**	DC Generator- e.m.f equation, types ,applications	**128**	Derive an expression for torque in DC motor. A 230V DC series motor draws a 50A current. Armature and series field winding resistances are 0.2 Ω and 0.1 Ω, Respectively. Calculate (i) brush voltage and (ii) back EMF	2021-22 (EVEN)
4	**31**	DC Generator- e.m.f equation, types ,applications	**129**	A six-pole, 2-circwave-connected armature of a DC machine has 300 conductors and runs at 1000 rpm. The emf generated on the open circuit is 400 V. Determine the useful flux per pole.	2022-23 (ODD)
4	**31**	DC Generator- e.m.f equation, types ,applications	**130**	Derive an expression for torque in DC motor. A 230V DC series motor draws a 50A current. Armature and series field winding resistances are 0.2 Ω and 0.1 Ω, respectively. Calculate (i) brush voltage and (ii) back EMF	2021-22 (EVEN)
4	**32**	DC Motor- Types, characteristics of series and shunt motors, applications.	**131**	What are the factors affecting speed of a DC motor? Compare lap and wave type armature winding.	2021-22 (EVEN)
4	**32**	DC Motor- Types, characteristics of series and shunt motors, applications.	**132**	Describe briefly the different types of DC machines.	2022-23 (odd)
4	**32**	DC Motor- Types, characteristics of series and shunt motors, applications.	**133**	Describe different types of DC machines with necessary circuit diagrams.	2022-23(EVEN)

4	**33**	Three Phase Induction Motor: Construction and working	**134**	What are the advantages of wound rotor motors over squirrel cage motors?	2015-16 (ODD)
4	**33**	Three Phase Induction Motor: Construction and working	**135**	Explain the working principle of three phase induction motor.	2016-17 (ODD)
4	**33**	Three Phase Induction Motor: Construction and working	**136**	Give the expression of speed in terms of poles and frequency of supply.	2019-20 (ODD)
4	**33**	Three Phase Induction Motor: Construction and working	**137**	Why an induction motor is called a generalized transformer? Compare the induction motor with the transformer.	2021-22 (EVEN)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**138**	A three-phase 50 Hz, induction motor has a full-load speed of 1460 r.p.m. Calculate slip, number of poles and frequency of rotor induced e.m.f.	2013-14 (EVEN)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**139**	The rotor speed of 6 pole, 50 HZ induction motor is 940 rpm. Determine the percentage slip.	2014-15(ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**140**	Draw slip v/s torque characteristics of a three phase induction motor and indicate: (i) Stable operating zone (ii) Induction generator operating zone.	2015-16 (EVEN)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**141**	Explain the working of 3 phase induction motor. What is meant by slip? Explain Torque-Slip characteristics of 3- phase induction motor	2015-16 (ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**142**	The induced e.m.f between the slip-ring terminals od a 3-phase induction motor, when the rotor is stand still is 100V. The rotor winding are star connected and have resistance and stand still reactance of 0.05Ω and 0.1Ω per phase 14respectively. Calculate the rotor current and phase difference between rotor v4oltage and current at 4% slip.	2016-17 (ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**143**	Explain the term slip and slip speed.	2017-18 (ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**144**	Draw torque slip characteristic of 3 phase induction motor. A12 pole alternator is coupled to an engine running at 500 rpm. It supplies a 3 phase induction motor having full load speed at 1440 rpm. Find % slip and number of poles of the motor.	2017-18 (ODD)

4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**145**	A 3-phase, 440V, induction motor is wound for 4 poles and is supplied from50Hz supply system. Calculate the speed of the motor when slip is 5%.	2018-19 (EVEN)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**146**	Derive and explain torque-slip Characteristics of 3-phase Induction motor.	2018-19 (EVEN)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**147**	Draw the slip-torque characteristics of three phase induction motor. A 3-phase, 50 Hz induction motor has 6 poles and operates with a slip of 5 % at a certain load. Determine (i) the speed of the rotor with respect to the stator (ii) the frequency of rotor current (iii) the speed of the rotor magnetic field with respect to rotor.	2019-20 (ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**148**	A 4-Pole , 3 phase induction motor runs at 1440 r.p.m. Supply voltage is 500 V at 50 Hz. Mechanical power output is 20.3 Hp and mechanical loss is 2.23 H.P. Calculate: (i) Mechanical Power Developed (ii) Rotor Cu Loss (iii) Efficiency	2020-21 (ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**149**	Draw and explain the Torque-Slip Characteristics of Three Phase Induction Motor.	2020-21 (ODD)
4	**34**	Slip, Slip-torque characteristics of three phase induction motor	**150**	Describe the working principle and slip-torque characteristics of a three-phase Induction motor.	2022-23 (ODD)
4	**35**	Single Phase Induction motor - Working & starting	**151**	Why Single Phase induction motor is not self starting. What are different methods to make self starting? Explain one of them.	2020-21(ODD),19-20,18-19,16-17,14-15,13-14
4	**36**	Synchronous motor - starting and working	**152**	Write a short note on synchronous condenser.	2013-14 (EVEN)
4	**36**	Synchronous motor - starting and working	**153**	Why a three phase synchronous motor is not self-starting? Discuss use of damper winding for starting a synchronous motor.	2015-16 (EVEN)
4	**36**	Synchronous motor - starting and working	**154**	Explain the principle of operation of a 3-phase synchronous motor.	2017-18 (EVEN) 14-15, 13-14

4	**36**	Synchronous motor - starting and working	**155**	Explain why a synchronous motor does not develop starting torque.	2016-17 (ODD)
4	**36**	Synchronous motor - starting and working	**156**	Why synchronous motor is doubly excited?	2021-22 (EVEN)
UNIT 5 (Electrical Installations)					
5	**37**	LT Switchgears : Switch Fuse Unit (SFU), MCB	**157**	Write short notes on the following: (a) MCB (b) MCCB (c) Fuse (d) Types of wires.	2018-19 (ODD)
5	**37**	LT Switchgears : Switch Fuse Unit (SFU), MCB	**158**	Describe the working principle of an MCB along with the necessary circuit diagrams?	2022-23(EVEN)
5	**38**	LT Switchgears : ELCB, MCCB,ACB	**159**	Explain a) MCB b) ELCB c) MCCB d) SFU.	2019-20(ODD),2021-22(EVEN),2020-21 (odd)
5	**39**	Types of Wires and Cables, fundamental of earthing and protection of lightning.	**160**	Explain the construction, rating and specific applications of at least two types of wires and cables used in electrical engineering.	2018-19 (EVEN)
5	**39**	Types of Wires and Cables, fundamental of earthing and protection of lightning.	**161**	Why Earth pin is made thicker and bigger than line and neutral?	2018-19 (ODD)
5	**39**	Types of Wires and Cables, fundamental of earthing and protection of lightning.	**162**	Explain following: (i) Need of Earthing (ii)Battery backup	2018-19 (ODD)
5	**39**	Types of Wires and Cables, fundamental of earthing and protection of lightning.	**163**	Explain the requirement of Earthing for electrical equipment. What is the difference between neutral and Earthing?	2019-20 (ODD)
5	**39**	Types of Wires and Cables, fundamental of earthing and	**164**	Name the various cables used in electrical system based on insulation. Explain any two. What are the features of good conductor in electrical	2019-20 (ODD)

		protection of lightning.		circuit?	
5	**39**	Types of Wires and Cables, fundamental of earthing and protection of lightning.	**165**	Explain the construction, rating, specific applications of at least two types of wiresand cables used in electrical installations.	2021-22(ODD)
5	**39**	Types of Wires and Cables, fundamental of earthing and protection of lightning.	**166**	Draw the typical constructional diagram of a Copper, 3 core, armoured XLPE cable and describe the purpose of each layer	2022-23(EVEN)
5	**40**	Types of Batteries	**167**	What is the difference between primary and secondary batteries?	2018-19 (EVEN)
5	**40**	Types of Batteries	**168**	Describe electrical characteristics of Lead-Acid battery.	2018-19 (EVEN)
5	**40**	Types of Batteries	**169**	What are the factors that affect the battery capacity?	2019-20 (ODD)
5	**40**	Types of Batteries	**170**	An alkaline cell is discharged at a steady current of 4 A for 12 hours, the average terminal voltage being 1.2 V. To restore it to original state of voltage, a steady current of 3 A for 20 hours is required, the average terminal voltage being 1.44 V. Calculate the ampere-hour and watt-hour efficiencies in this particular case.	2019-20 (ODD)
5	**40**	Types of Batteries	**171**	Draw the characteristics of battery. Calculate the backup of battery of 100AH connected to load of 100 watts and supply voltage is 12V.	2018-19 (ODD),2021-22(ODD)
5	**40**	Types of Batteries	**172**	Explain the construction, rating, specific applications of at least two types of wiresand cables used in electrical installations.	2021-22(ODD)
5	**40**	Types of Batteries	**173**	Draw and explain the characteristics of a battery. Calculate the backup of a battery of150AH connected to load of 150 watts, and the supply voltage is 12V.	2021-22(ODD/EVEN)